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Safer world.**



# Nicaragua

**National Disaster Preparedness Baseline Assessment**  
Final Report



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- CORPRED Regional Committee Coordinator and Governor, and Committee members of Bluefields, RAAS
- CODEPRED Political Secretaries, Mayors, and Committee members of Masaya, León, Rivas, Estelí
- COMUPRED Mayor and Committee members of Nindirí
- Nicaraguan Institute of Territorial Studies (INETER)
- Civil Defense Army of Nicaragua (Defensa Civil de Nicaragua)
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- Ministry of Education (MINED)
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- Instituto Nacional de Información de Desarrollo (INIDE)
- Banco Central de Nicaragua
- Governance Ministry
- Dirección General de Bomberos
- Ministry of Transportation
- Ministry of Foreign Affairs (MINREX)
- Nicaraguan Aqueduct and Sewer Company (ENACAL)
- Nicaraguan Red Cross
- World Food Programme (WFP)
- SWISS AID
- Oxfam
- Japan International Cooperation Agency (JICA)



## Acronyms

AECID	Spanish Cooperation for International Development
BREC	Curso de Búsqueda y Rescate en Estructuras Colapsadas
CC	Coping Capacity
CAAH	El Centro de Coordinación para la Asistencia y Ayuda Humanitaria
CDM	Comprehensive Disaster Management
CEPRENAC	Centro de Coordinación para la Prevención de los Desastres Naturales en América Central
CERF	Central Emergency Response Fund
CFAC	Conference of Central American Armed Forces
CIES	Nicaraguan Center for Health Studies and Investigations
COBAPRED	Comités de Barrio de Prevención, Mitigación y Atención de Desastres
COCOPRED	Comites Comunitarios de Prevención, Mitigación y Atención de Desastres
CODE	National Disaster Operations Center
CODEPRED	Comites Departamentales de Prevención, Mitigación y Atención de Desastres
COLOPRED	Comites Locales de Prevención, Mitigación y Atención de Desastres
COMUPRED	Comites Municipales de Prevención, Mitigación y Atención de Desastres
CORPRED	Comites Regionales de Prevención, Mitigación y Atención de Desastres
COSUDE	Swedish Cooperation
CPR	Cardio-Pulmonary Resuscitation
DANIDA	Danish Cooperation
DIPECHO	Humanitarian Assistance Office for Disaster Preparedness of the European Commission
DM	Disaster Management
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
ENABAS	Empresa Nicaragüense de Alimentos Básicos

## NDPBA Nicaragua Final Report - Acronyms

ENECAL	Nicaraguan Aqueduct and Sewer Company
EOC	Emergency Operations Center
EU	European Union
FISE	Social Investment Fund
FND	National Disaster Fund
GDP	Gross Domestic Product
GEVN	GEOFON (GEOForschungsNetz) Extended Virtual Network
GFDRR	Global Facility for Disaster Reduction and Recovery
IDB	Inter-American Development Bank
IFRC	International Federation of the Red Cross and Red Crescent
INETER	Nicaraguan Institute of Territorial Studies
INGO	International Non-Governmental Organization
INIDE	Instituto Nacional de Información de Desarrollo
INIM	Ministry of Women
JICA	Japan International Cooperation Agency
MARENA	Ministry of the Environment
MHE	Multi-Hazard Exposure
MHR	Multi-Hazard Risk
MIFIC	Ministry of Development, Industry and Commerce
MINED	Ministry of Education
MINREX	Ministry of Foreign Affairs
MINSAL	Ministry of Health
MOU	Memorandum of Understanding
NDMO	National Disaster Management Organization
NDPBA	National Disaster Preparedness Baseline Assessment
NDVRP	Natural Disaster Vulnerability Reduction Project
NEOC	National Emergency Operations Center
NGO	Non-Governmental Organization
NIO	Nicaraguan Córdoba
NWS	National Weather Service
OCHA	Office for the Coordination of Humanitarian Assistance
PAHO	Pan-American Health Organization



## NDPBA Nicaragua Final Report - Acronyms

PDC	Pacific Disaster Center
PDNA	Preliminary Damage and Needs Assessment
PREDECAN	Andean Community Disaster Prevention Support Project
RAAN	Autonomous Region of the North Caribbean Coast
RAAS	Autonomous Region of the South Caribbean Coast
RVA	Risk and Vulnerability Assessment
SAR	Search and Rescue
SE-SINAPRED	Executive Secretariat of the Sistema Nacional para la Prevención, Mitigación y Atención a Desastres
SICA	Sistema de la Integración Centroamericana
SINAPRED	Sistema Nacional para la Prevención, Mitigación y Atención a Desastres
SOP	Standard Operating Procedure
UCA	Central American University
UHR	Humanitarian Rescue Unit
UIFA	Unidad Informacion Facilitacion Assistance
UN	United Nations
UNAN	National Autonomous University of Nicaragua
UNI	National University of Engineering
UNICEF	United Nations Children's Fund
USD	United States Dollars
USGS	United States Geological Survey
V	Vulnerability
WB	World Bank
WFP	World Food Programme
WHO	World Health Organization



## Executive Summary

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

The NDPBA project provides a repeatable and measurable approach to examining key elements of DRR. The NDPBA approach consists of distinct yet complimentary activities, including:

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



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

# Findings

## Risk and Vulnerability Assement

The population of Nicaragua experiences very high levels of exposure to seismic activity and tropical cyclone winds. Volcanic hazards also pose a significant threat, while smaller proportions of the population are also exposed to landslides, inland floods, and tsunami hazard zones. See Figure 1 for total population exposure to hazards in Nicaragua.

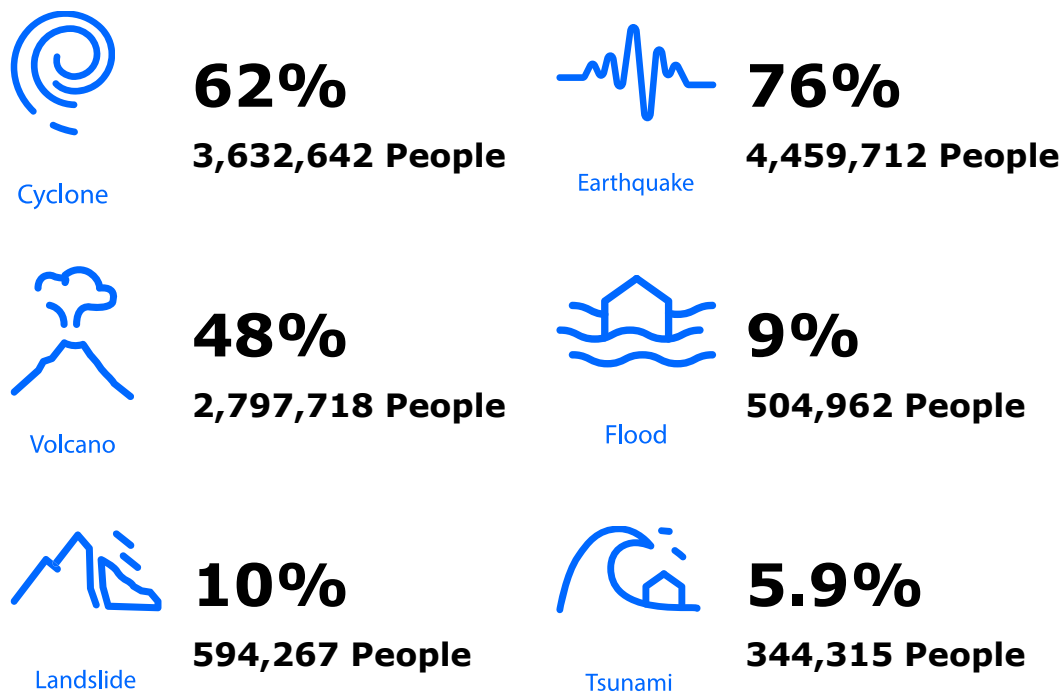


Figure 1. Population exposure to hazards

Table 1 provides a summary of the component results for Multi-Hazard Risk (MHR), Multi-Hazard Exposure (MHE), Vulnerability (V), and Coping Capacity (CC), including index scores and relative ranking among the 17 departments. A rank of 1 corresponds to a high score (e.g., high multi-hazard risk), while a rank of 17 indicates a low score (e.g., low multi-hazard risk).

Table 1. Nicaragua Multi-Hazard Risk (MHR) Index scores, rankings, and component indices by department

Department	Multi-Hazard Risk		Multi-Hazard Exposure		Vulnerability		Coping Capacity		Department Risk Level
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	
<b>RAAN</b>	0.586	1	0.271	12	0.741	1	0.253	17	Very High
<b>RAAS</b>	0.575	2	0.275	11	0.705	3	0.256	16	Very High
<b>Rio San Juan</b>	0.515	3	0.316	10	0.666	4	0.436	10	Very High
<b>Managua</b>	0.515	4	0.915	1	0.221	17	0.592	5	Very High
<b>Jinotega</b>	0.498	5	0.19	14	0.728	2	0.425	11	High
<b>Matagalpa</b>	0.495	6	0.341	8	0.512	7	0.369	15	High
<b>Chinandega</b>	0.494	7	0.729	3	0.329	11	0.577	6	High
<b>Granada</b>	0.474	8	0.754	2	0.324	12	0.656	1	High
<b>Masaya</b>	0.473	9	0.72	4	0.307	15	0.609	4	Medium
<b>Carazo</b>	0.469	10	0.632	6	0.322	13	0.546	7	Medium
<b>Rivas</b>	0.469	11	0.58	7	0.354	10	0.527	8	Medium
<b>León</b>	0.468	12	0.71	5	0.31	14	0.616	3	Low
<b>Boaco</b>	0.437	13	0.199	13	0.492	8	0.382	14	Low
<b>Madriz</b>	0.433	14	0.164	16	0.558	5	0.421	12	Low
<b>Nueva Segovia</b>	0.373	15	0	17	0.513	6	0.393	13	Very Low
<b>Chontales</b>	0.366	16	0.172	15	0.419	9	0.493	9	Very Low
<b>Estelí</b>	0.331	17	0.325	9	0.303	16	0.636	2	Very Low

## Comprehensive Disaster Management Assessment

Nicaragua has key components for an effective CDM system, a people-centered and participative approach to disaster management enhances awareness, educates, and builds a culture of prevention and mitigation, thereby strengthening communities through social organization and engagement. This approach is one way to reach remote and disbursed populations and improve the ability to care for disaster victims.

The assessment identified organizational challenges and the need to strengthen system capabilities in terms of preparation, coordination, control, and efficiency with a clear mission and a sense of ownership. Additional challenges identified the need for enhancing knowledge, training, and capacity building; strengthening mechanisms for communication and information sharing, as well as notification and alert systems; being better equipped, having necessary resources, and utilizing available technologies; and improving the integration of the national-response system at all levels, including local governments.

Other challenges included the need for infrastructure enhancements, enforcement pertaining to building codes or protocols, a lack of willingness to address disaster-management shortfalls, and the need for solidarity in addressing disaster-management challenges.

The above listed challenges were validated over the course of the project through interviews and site visits with stakeholders at national, regional, and municipal levels, demonstrating an awareness on the part of Nicaragua's disaster-management stakeholders of the issues they face.

Alongside these challenges are numerous strengths and successes. The advancements made by SINAPRED and the many participating institutions and organizations in the relatively short period since the establishment of Nicaragua's Legal Framework for disaster management (Law 337) are to be commended.



Figure 2. Word Cloud of survey responses to: "In your opinion, what is the greatest challenge to effective disaster response?"

# Recommendations

The following recommendations have been developed based on the RVA and CDM findings described in the previous sections. Refer to Table 12 for additional information on the evaluation criteria.

Table 2. Evaluation criteria for recommendations

Recommendations Evaluation Criteria		
Effort	<div>Years</div> <div><div></div><div></div><div></div><div></div><div></div></div> <div>05</div>	Estimated length of time (in years) to complete the project once it is started.
Complexity	<div>LowMediumHigh</div>	Overall complexity based on the estimated staff time, resources, and collaboration required to complete the project.
Cost	<div>\$\$\$</div>	<p>Estimated annual cost of the project, not including salaries, based on a percentage of the current NDMO annual budget.</p> <p>\$ approximates less than 1% of the annual operating budget.</p> <p>\$\$ approximates between 1% to 10% of annual operating budget.</p> <p>\$\$\$ approximates more than 10% of the annual operating budget.</p>

01

## Strengthen data standards and sharing

- A. Ensure that hazards and vulnerability data are consistently defined, documented, updated, and applied in disaster management and disaster risk reduction.
- B. Continue implementation strategies to strengthen data sharing and transparency among all organizations active in disaster management to support evidence-based decision making.

Effort:

05

Years

Complexity: Medium

Cost: \$

02

## Develop and strengthen multi-stakeholder partnerships

- A. Increase the capacity to conduct and update high-resolution hazard assessments with national coverage by developing partnerships with non-traditional stakeholders.
- B. Strengthen strategic multi-stakeholder partnerships to expand disaster risk-reduction resources to include non-traditional disaster management partners.

**Effort:**



**Complexity:** Low

**Cost:** \$

03

## Improve documentation of subnational economic resources

Provide a more comprehensive understanding of economic capacity (e.g., GDP, income, expenditures, remittances) at the department and local levels.

**Effort:**



**Complexity:** High

**Cost:** \$\$

04

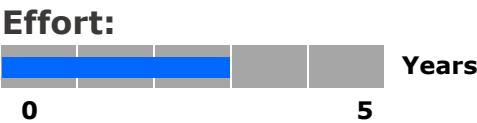
## Expansion of disaster management training programs

Advance current initiatives to institute a nationwide disaster management training program that defines training requirements for key disaster management positions, promotes consistent skills development, and broadens staff capabilities. Identify partners, programs, course offerings, and a schedule for training implementation to meet established requirements. Develop or enhance existing mechanisms to manage program implementation and facilitate the identification of skills and expertise that may be required to support disaster management activities.

- A. Define training requirements for disaster management personnel according to roles and job descriptions.
- B. Conduct a training audit to review existing training curricula and identify other course offerings that may be used to meet training requirements and address training gaps.
- C. Develop partnership agreements with institutions, NGOs, and the private sector to deliver training courses.
- D. Schedule and implement priority training courses.



- E. Develop a database for tracking and reporting training delivery, attendance, and personnel trained or certified in areas of expertise.



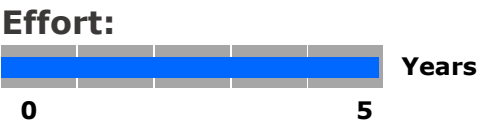
**Complexity:** Medium  
**Cost:** \$\$

05

**Strategic investments to advance and sustain DRR**

Identify and prioritize DRR projects and activities in accordance with strategic goals and objectives that will reduce risk, strengthen disaster risk management, and provide institutions with the necessary training, equipment, or technical support to manage, maintain, and sustain project outputs or deliverables.

- A. Utilizing the latest risk and vulnerability information; identify projects and activities (outside the scope of annual budget allocations) that will reduce, prevent or mitigate disaster risk while subsequently supporting long-term development goals.
- B. Develop detailed outlines of priority projects, identifying goals and objectives, cost-benefit analyses, deliverables and outcomes, timeline, implementation requirements, and lead institutions to manage, maintain, and sustain activities.
- C. Engage donors to identify funding sources.



**Complexity:** Moderate  
**Cost:** \$

06

## Enhance subnational planning for DRR

Continue to enhance municipal planning initiatives to incorporate analyses of socioeconomic risk factors and identify mitigation projects that prevent or reduce disaster risk. By incorporating risk and vulnerability information in municipal disaster plans, key projects and activities to prevent or mitigate risk can be identified for implementation.

Expanding planning and implementation in these areas in accordance with strategic plans will not only reduce risk at subnational levels, but further operationalize SINAPRED activities in accordance with the country's legal framework.

- A. Increase budget allocations for municipal disaster management planning efforts. Alternatively, identify funding source(s) (e.g., international donors) to support municipal disaster management planning in line with strategic goals and objectives.
- B. In cooperation with SINAPRED, implement training workshops at municipal levels to enhance understanding of risk, risk assessment, and disaster risk-reduction principles.
- C. Expand disaster management planning efforts to incorporate analyses of socioeconomic risk factors. Based on plan updates, identify potential mitigation projects to prevent or reduce risk.
- D. Evaluate and prioritize projects considering risk and vulnerability information, cost-benefit analyses, strategic goals and objectives, and sustainable development plans.
- E. Institute a phased approach to fund and implement high priority structural and non-structural mitigation projects, distinguishing among those that may be funded, managed and sustained through local initiatives, or require additional funding sources.

**Effort:**



**Complexity:** Complex

**Cost:** \$\$\$

07

### Boost private-sector engagement

Develop mechanisms and incentives to boost private-sector engagement and participation in disaster management activities.

- A. Encourage private-sector involvement in disaster management by engaging representatives of local business networks and associations (e.g., Chamber of Commerce), and large business entities, such as factories and hotels, in discussions related to hazard awareness, preparedness planning (e.g., continuity of operations), and disaster response (e.g., evacuation).
- B. Encourage participation in health and safety trainings, drills, and exercises.
- C. Explore ways that the private sector can actively participate in disaster-response activities (e.g., providing shelter, food, and water), and develop MOAs to formalize partnerships.

**Effort:**



**Complexity:** Medium

**Cost:** \$

08

### Formalize NGO partnerships

Utilize successful NGO partnerships as a model for increasing collaboration and potential integration into SINAPRED's disaster management structure to positively influence CDM growth for the country.

- A. Work with Ministry of Foreign Relations (MINREX) to identify NGOs whose missions align with disaster management-related activities, and explore potential partnerships and areas of collaboration.
- B. Areas of potential collaboration with NGO partners could include training, exercise participation, development and rehearsal of disaster-response plans, and implementation of community resilience-building initiatives.
- C. One example of community resilience building is the State of Hawaii's Hawaii Hazards Awareness and Resilience Program (HHARP).
- D. Synergistic activities could be defined by MOUs to ensure alignment with national goals and objectives.

**Effort:**



**Complexity:** Medium

**Cost:** \$

09

**Subnational resource assessment**

Conduct an assessment to document and track subnational disaster-management resources, including facilities (e.g., EOCs and command posts, warehouses) and equipment critical to disaster management activities to enhance understanding of capabilities and needs, justify budget increases, and inform contingency planning for the territories.

- A. Develop minimum standards for equipment, facilities, resources, and services that are used to perform expected disaster management functions at regional, departmental, and municipal levels.
- B. Assess and document the quantity, condition (age, quality, etc.), and functionality of existing subnational disaster management facilities, resources, equipment, and services.
- C. Based on the minimum standards and resource assessment, perform a gap analysis. Prioritize needed resources, repairs, retrofits, etc.
- D. Refine processes to adopt a phased approach to acquire, repair, and maintain necessary resources.
- E. Perform annual resource assessments and share reports with appropriate disaster management stakeholders to improve contingency planning.

**Effort:**



**Complexity:** Medium

**Cost:** \$\$

10

**Transportation infrastructure enhancements**

Continue investment in new transportation infrastructure and improvements to existing road networks that support disaster risk-management activities (e.g., evacuation, ingress/egress to warehouses and other essential facilities), while simultaneously addressing development needs and incorporating DRR strategies.

- A. Assess the condition and accessibility of transportation infrastructure in relation to the provision of critical disaster management services, location of essential facilities, etc.
- B. Engage the appropriate institutions and development planners in discussions to prioritize the repair or construction of new roads to support timely evacuation, access to, and provision of disaster relief supplies.

**Effort:**



**Complexity:** Complex

**Cost:** \$\$\$

11

**Increase collaboration and partnership to meet needs**

Given the subnational governments’ heavy reliance on the central government for disaster management support, limited staff resources, and the extensive scope of disaster management duties as set forth in the Legal Framework, re-examine how legislative requirements can be met based on current staffing, or how requirements can be met through increased collaboration with non-traditional partners (e.g., NGOs, donor-funded projects, private-sector involvement).

- A. Continue internal review processes on current staffing, budget and, resources to meet legislative requirements as set forth by Law 337.
- B. Identify strategies to boost staffing, budget, and/or resources, or amend the law so that legal requirements can be met.
- C. Explore ways to engage with non-traditional partners to fulfill requirements.
  - a. Areas of potential collaboration could include training, planning assistance, sheltering, risk assessment, public awareness and safety campaigns, and funding and implementation of DRR activities.

**Effort:**



**Complexity:** Medium

**Cost:** \$

12

### **Strengthen communications and connectivity**

Strengthen subnational institutions (e.g., disaster management committees and EOCs) through investments in telecommunications equipment and services (e.g., radios, internet, cell-phone service) to:

- A. Maintain ongoing efforts to enhance coordination and communication among national, regional, and municipal organizations.
- B. Expedite receipt and dissemination of hazard alert and warning information.
- C. Improve access to data, tools, and technologies that enhance situational awareness and support information sharing and decision making among disaster management stakeholders.

**Effort:**



**Complexity:** Medium

**Cost:** \$\$

13

**Develop shared inventory of relief supplies**

Develop, maintain, and share among disaster management stakeholders a single inventory of all disaster-relief supplies warehoused by national and subnational governments and NGO partners.

- A. Further develop the process to engage disaster management stakeholders and NGO partners in discussions regarding practicality and usefulness of a shared tool for managing inventories of relief supplies.
- B. Develop a shared, password-protected platform or database with update and reporting functions.

**Effort:**



**Complexity:** Medium

**Cost:** \$





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**National Disaster Preparedness Baseline Assessment**  
Final Report



## Project Overview

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

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

The goal of the project is to enhance disaster resilience within Nicaragua by:



### **Strengthening Governance**

Provides necessary justification to support policy decisions that will protect lives and reduce losses resulting from disasters.



### **Prioritizing Budgets and Investments**

Helps decision makers identify, assess, and prioritize investments that will have the greatest impact on disaster risk reduction.



### **Informing Decision Making**

Provides access to spatial and temporal information by multiple stakeholders, including multi-hazard exposure, impact, and risk information all in one place.



### **Encouraging Cooperation**

Brings international, national, and local stakeholders together to discuss country goals, capacities, needs, and successes to help shape priorities.



### **Identifying Actions to Increase Resilience**

Helps stakeholders develop a five-year action plan to achieve risk-reduction goals and enhance disaster mitigation, preparedness, response, and recovery.

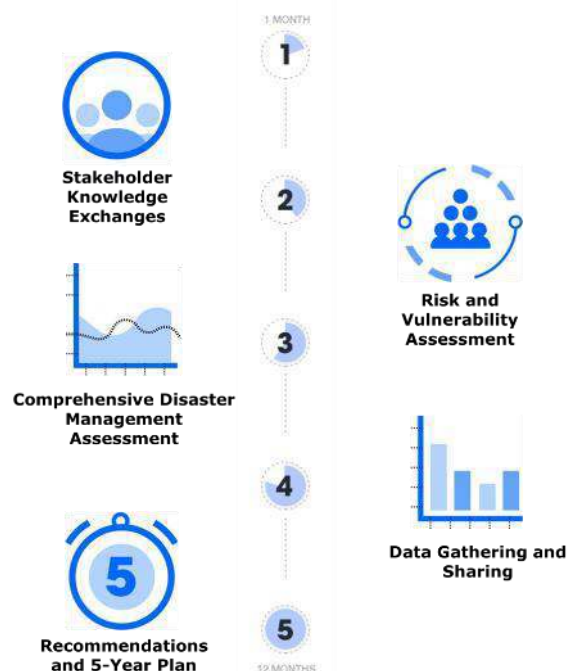


### Allowing Risk Monitoring and Data Management

Allows multiple agencies to easily update data and monitor how risk and vulnerability change over time at the national and subnational level.

The NDPBA project provides a repeatable and measurable approach to examining key elements of disaster risk reduction (DRR). The NDPBA approach consists of distinct yet complimentary activities, including:

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

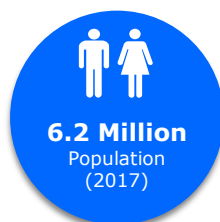


The data and final analysis provided in this report are integrated into the PDC's decision-support system known as DisasterAWARE™, allowing for open and free access to critical DRR data and information. Access to the system may be requested through [ndpba@pdc.org](mailto:ndpba@pdc.org).

## Country Background



The Republic of Nicaragua is the largest country in area in Central America, bordering Costa Rica to the south and Honduras to the north, and situated between the Caribbean Sea to the east and the Pacific Ocean to the west. Nicaragua covers an area of 129,494 square kilometers (~50,000 square miles) with 910 kilometers (~565 miles) of coastline. The capital city of Managua is the most populous city in the nation, with over 1 million residents within the city limits. Other highly populated cities include León, Masaya, Matagalpa, and Chinandega.<sup>1</sup>



The country is subdivided into 15 administrative departments: Boaco, Carazo, Chinandega, Chontales, Estelí, Granada, Jinotega, León, Madriz, Managua, Masaya, Matagalpa, Nueva Segovia, Río San Juan, and Rivas. In addition, there are two autonomous regions: the Región Autónoma de la Costa Caribe Norte (RAAN) and the Región Autónoma de la Costa Caribe Sur (RAAS). The autonomous regions were created in 1987 by Law 28 – Autonomy Statute for the Regions of the Atlantic Coast of Nicaragua<sup>2</sup> – and elected their first regional governments in 1990.<sup>3</sup> Nicaragua's departments and autonomous regions are further subdivided into 153 municipalities.

There are three major geographic regions in Nicaragua<sup>4</sup>: The Pacific lowlands, the Caribbean lowlands, and the central highlands – a region that includes 25 volcanoes. The Caribbean lowlands comprise the wettest geographic region in Central America, receiving rainfall amounts between 100 and 250 inches every year, and are home to the second-largest rainforest in the Americas after the Amazon in Brazil<sup>5</sup>. Climate in the country is tropical and varies depending on elevation. There is immense fluctuation in rainfall, with the rainy season occurring from May through October.

<sup>1</sup> World Atlas 2016. Accessed online 8/24/17 at: <http://www.worldatlas.com/articles/the-biggest-cities-in-nicaragua.html>

<sup>2</sup> UN-REDD 2012. Tenure of Indigenous Peoples Territories and REDD+ as a Forestry Management Incentive: The Case of Mesoamerican Countries. Accessed online 4/16/17 at <http://www.fao.org/3/a-i2875e.pdf>

<sup>3</sup> Fundación para la Autonomía y el Desarrollo de la Costa Atlántica de Nicaragua. Accessed online 4/16/17 at: <http://www.fadcanic.org.ni/?q=node/17>

<sup>4</sup> Countries and their Cultures. Accessed online 8/24/17 at: <http://www.everyculture.com/Ma-Ni/Nicaragua.html>

<sup>5</sup> Nicaragua Guide – The Nica Sagas. Accessed online 8/24/17 at: <http://www.nicaragua-guide.com/the-regions.html>

The eastern half of the country experiences heavy annual rainfall and frequent flooding, while the western half is much drier year-round.

Nicaragua's geography makes it vulnerable to hurricanes, droughts, fires, volcanic eruptions, tsunamis, and severe earthquakes. The country's economic development is often negatively affected by devastating natural disasters, which set back social and economic progress, with each disaster leaving the country more vulnerable to the next round of natural catastrophes. Prior to 2000, a formal national disaster-management system did not exist, and there was no executive agency to coordinate disaster risk management. However, various institutional mechanisms for disaster management were in place, involving institutions such as the Cruz Roja Nicaragüense (Nicaraguan Red Cross) and the Benemérito Cuerpo de Bomberos (Benemérito Fire Department).

After the devastation and widespread physical, economic, and social impacts of Hurricane Mitch (1998), reducing national vulnerability to natural disasters was deemed a fundamental sector-development issue, and Nicaragua (concurrently with other Central American countries) began to look at disasters differently, especially in terms of building institutional mitigation and response capacity.<sup>6</sup>

In March 2000, Nicaragua's National Assembly approved Law 337, which provided the legal foundation for the creation of the Sistema Nacional para la Prevención, Mitigación y Atención a Desastres (National System for Prevention, Mitigation, and Attention to Disasters), or SINAPRED, responsible for: 1) the prevention and mitigation of risk, 2) response to emergencies, and 3) the rehabilitation of territories affected by disasters.

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<sup>6</sup> The World Bank, 2009. Implementation Completion and Results Report for a Natural Disaster Vulnerability Reduction Project. Accessed online 2/26/16 at: <http://documents.worldbank.org/curated/en/159111468097454073/Nicaragua-Natural-Disaster-Vulnerability-Reduction-Project>





# Methods

**National Disaster Preparedness Baseline Assessment**  
Final Report





## Methods

This section of the report summarizes the NDPBA methodology implemented in Nicaragua to include stakeholder engagement, risk and vulnerability assessment, comprehensive disaster management assessment, and data gathering, processing, and analysis.

### Facilitated Knowledge Exchanges

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

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

This participatory approach was coordinated with the national disaster management agency, SINAPRED. Working closely with SINAPRED, the project team collaborated with a broad range of project stakeholders including disaster management leadership and personnel at national and subnational levels, the Defensa Civil de Nicaragua (Civil Defense Army of Nicaragua), Instituto Nicaraguense de Estudios Territoriales (Nicaraguan Institute of Territorial Studies, INETER), Ministerio de Salud (Ministry of Health, MINSA), Ministerio de Ambiente y los Recursos Naturales (Ministry of the Environment and Natural Resources, MARENA), Ministerio de Educación (Ministry of Education, MINED), as well as national and international NGOs and others. A full list of participating agencies and organizations is included in the **Acknowledgements** section of this report.

# Risk and Vulnerability Assessment (RVA)

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

## Multi-Hazard Exposure

Multi-Hazard Exposure is characterized by the people, property, systems, and other elements present in hazard zones that are subject to potential losses. For this assessment, exposure considers six hazard types:



Cyclone

Areas exposed to tropical cyclone wind speeds that coincide with the Saffir-Simpson Scale, Category 1 or higher.



Earthquake

Areas with MMI VII and above based on 1.0 second spectral acceleration at a 2,475-year return period.



Tsunami

Coastal Pacific zones include areas with elevation less than or equal to 10 meters. Caribbean/Lake zones based on analysis provided by SINAPRED.



Flood

Areas susceptible to inland flood based on historic observations and probabilistic modeling.



Landslide

Areas susceptible to landslide were estimated using environmental inputs of slope, lithology, precipitation, seismicity, and soil humidity. Susceptibility was classified on a relative scale.



Volcano

Areas exposed to multiple specific volcanic hazards, including hydromagmatic/plinian/stromboli an eruptions, lahars, lava flow.

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

## Vulnerability

Vulnerability can act to intensify hazard impacts, increasing overall risk. The Vulnerability Index was designed to capture the multi-dimensional nature of poverty, the inequality in access to resources due to gender, and the ability of a given area to adequately support the population. The dimensions of poverty measured are economic, health, living standards, and information access. Poverty is a major contributor to disaster vulnerability. However, pressures based on demographic factors like population growth and environmental quality also affect vulnerability throughout the country. In Nicaragua, Economic Constraints, Access to Information, Gender Inequality, Clean Water Vulnerability, Environmental Stress, Vulnerable Health Status, and Population Pressures are significant determinants of departmental vulnerability in areas with high Multi-Hazard Risk. The components of Vulnerability are defined here:



### **Economic Constraints**

Represents the limitations on the resources available to invest in mitigation and preparedness measures at the individual, household, and country levels.



### **Access to Information**

Represents the ability to access and comprehend hazard- and disaster-related information before, during, and after an event.



### **Gender Inequality**

Represents gender-based differences in access to resources, services, opportunities, and formal economic and political structures.



### **Clean Water Vulnerability**

Represents the general state of water-related infrastructure. Poor distribution and containment systems contribute to reduced water quality and increase the potential for spread of disease.



### **Environmental Stress**

Substantial water stress and land degradation can damage habitat and reduce quantity and quality of resources required to maintain human health and livelihoods. These stressors increase the likelihood and magnitude of hazards, such as flooding and landslides, while exacerbating impacts.



### **Vulnerable Health Status**

Reflects the population's general health. Poor health contributes to increased susceptibility to injury, disease, and stress associated with disasters, and may necessitate special accommodations for activities such as evacuation.



### **Population Pressures**

Refers to rapid, significant changes in the size and distribution of a population. Such changes tend to be difficult to plan for, and can destabilize social, economic, and environmental systems, placing additional stress on resources and infrastructure.

## **Coping Capacity**

Coping capacity describes the ability of people, organizations, and systems, using available skills and resources, to face and manage adverse conditions, emergencies, or disasters. Unlike Multi-Hazard Exposure and Vulnerability, the Coping Capacity Index was calculated using a *weighted average* of the four subcomponents. Governance was weighted at 30%, Infrastructure at 30%, Economic Capacity at 30%, and Environmental Capacity at 10%. The weighting serves to emphasize the relative importance of each dimension's contribution to the concept of Coping Capacity, and takes into consideration the quality of available data. Thematic areas with less information or lower quality data are therefore de-emphasized. In the case of Nicaragua, the quantity and quality of environmental capacity data are generally limited.



### **Environmental Capacity**

Represents the ability of the environment to recover from shock and maintain species health, biodiversity, and critical ecosystem services after impact. The environment can provide food/water and even tourism benefit.



### **Economic Capacity**

Represents a region's ability to absorb immediate economic losses and quickly mobilize financial assets for response and recovery activities.



### **Governance**

Reflects the stability and effectiveness of institutional structures to provide public services, freedom in selecting government, and enforcement of laws to prevent and control crime and violence. Instability of institutional structures can make a region more susceptible to the effects of hazard impacts.



### **Infrastructure Capacity**

Represents the resources that enable the exchange of information (communications) and the physical distribution of goods and services to the population (transportation and health care).



**Communications Capacity**

Represents the density and variety of communications infrastructure available to support coordinated action among local, national, and international actors.



**Transportation Capacity**

Denser transportation networks provide more options for bringing outside resources into a country (ports and airports) and increase the likelihood of alternate routes for reaching impacted populations.



**Health Care Capacity**

Represents availability of skilled caregivers and facilities, and whether populations have access to vital resources before, during, and after a hazard event.

**Lack of Resilience**

The Lack of Resilience Index represents the combination of susceptibility to impact and the relative inability to absorb, respond to, and recover from negative impacts that occur over the short term. The lack of resilience provides an indication of current socioeconomic conditions on the ground independent of hazard exposure. These data can be used during hazard events to prioritize response efforts. The basic model for Lack of Resilience Index is:



**Lack of Resilience =**



Vulnerability

**+**

**(1 -**



Coping Capacity

**) / 2**

**Multi-Hazard Risk**



**Multi-Hazard Risk (MHR)**

The combination of Multi-Hazard Exposure, susceptibility to impact (Vulnerability), and the relative inability to absorb, respond to, and recover from negative impacts that occur over the short term (Coping Capacity).



**Multi-Hazard Exposure (MHE)**

People, property, systems, or other elements present in hazard zones that are subject to potential losses.



**Vulnerability (V)**

The characteristics and circumstances of a community, system, or asset that make it susceptible to the damaging effects of a hazard.



**Coping Capacity (CC)**

The ability of people, organizations, and systems, using available skills and resources, to face and manage adverse conditions, emergencies, or disasters.

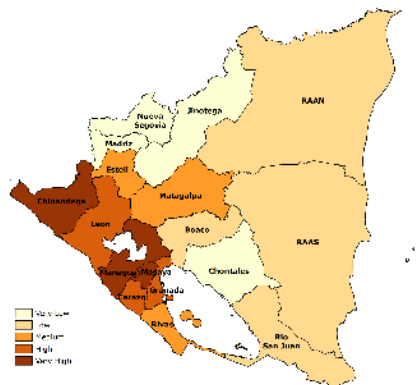
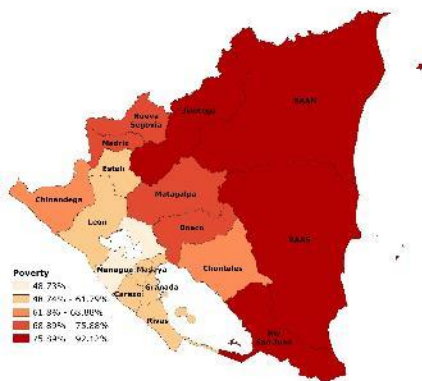
The basic model for the Multi-Hazard Risk Index is:



**Multi-Hazard Risk =**

$$\left[ \text{Multi-hazard Exposure} + \text{Vulnerability} + (1 - \text{Coping Capacity}) \right] / 3$$

**Methodological Process**



**Data Gathering**

- Online/archival research
- Stakeholder interviews

**Data Processing & Analysis**

- Indicator development
- Index construction

**RVA Findings**

- Reporting and dissemination
- DisasterAWARE™ data integration

Figure 3. NDPBA Risk and Vulnerability Assessment (RVA) methodological process

**Data Gathering**

In partnership with stakeholders, a review of archival research and stakeholder interviews were conducted to identify potential data to be included in the study. Each indicator was gathered from vetted sources and evaluated for potential use in the RVA model. Data were scrutinized to identify possible gaps and missing values, and to document any caveats regarding data quality or completeness. In certain

cases, missing documentation or lack of data lineage precluded the use of datasets in the analysis. For details on the RVA data sets used in this analysis see **Appendix A: RVA Component Index Hierarchies and Thematic Rationale**.

### ***Data Processing and Analysis***

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

### ***RVA Findings***

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





# Comprehensive Disaster Management (CDM)

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

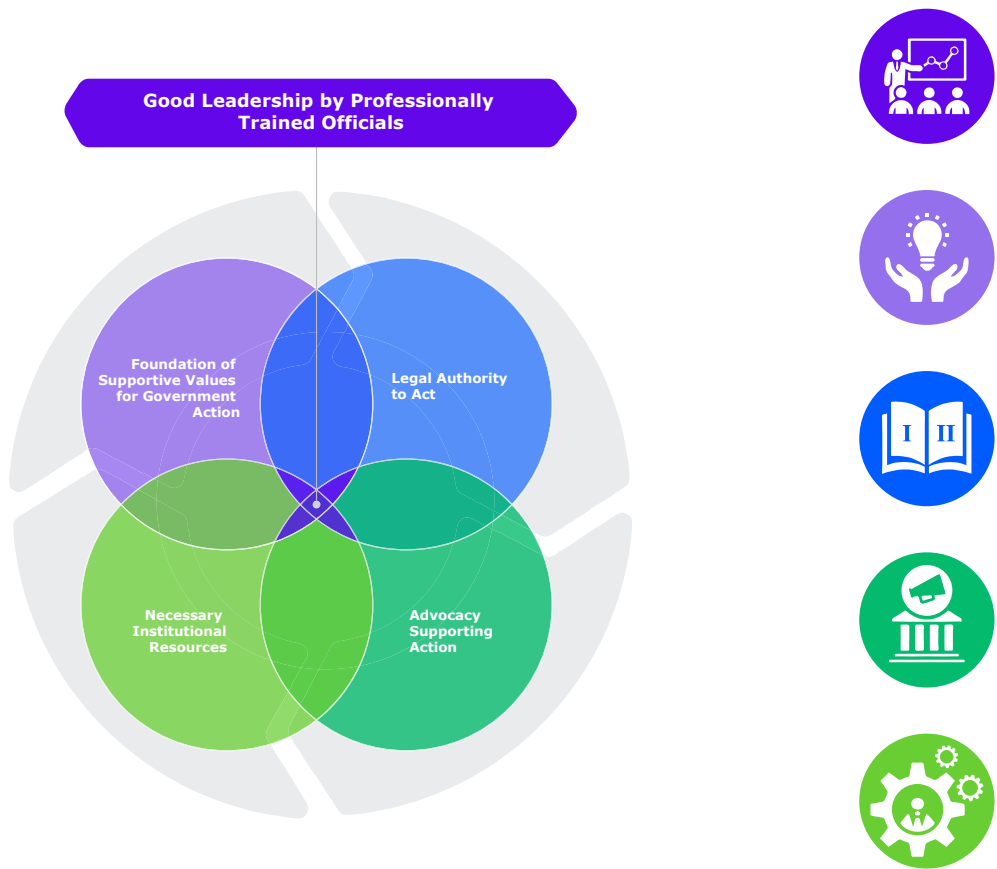


Figure 4. Comprehensive Disaster Management elements

For the purposes of this assessment, CDM is conceptualized as a function of five elements:



**Good Leadership by Professionally Trained Officials**

The basis of successful disaster management centers upon the importance of well-trained professionals. A community or country that has established professionalization of the disaster management field

through formalized training and education programs is ensuring a foundation of understanding and leadership among disaster management personnel at all levels. Training and exercises offer opportunities to build leadership capacity in the disaster management field, increasing the professionalization of the field.



### **Foundation of Supportive Values for Government Action**

Enables concepts to be developed into policies and provides government leaders the backing to spend money to obtain necessary resources. This is critical for communities and countries with a limited economic base. Disaster preparedness is only one of many issues a government may face. Government support must be encouraged to ensure that the proper importance is placed on disaster management mitigation and preparedness in an effort to build disaster-resilient communities with a focus on saving lives and reducing disaster losses.



### **Legal Authority to Act**

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



### **Advocacy Supporting Action**

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



### **Necessary Institutional Resources**

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

# Methodological Process

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

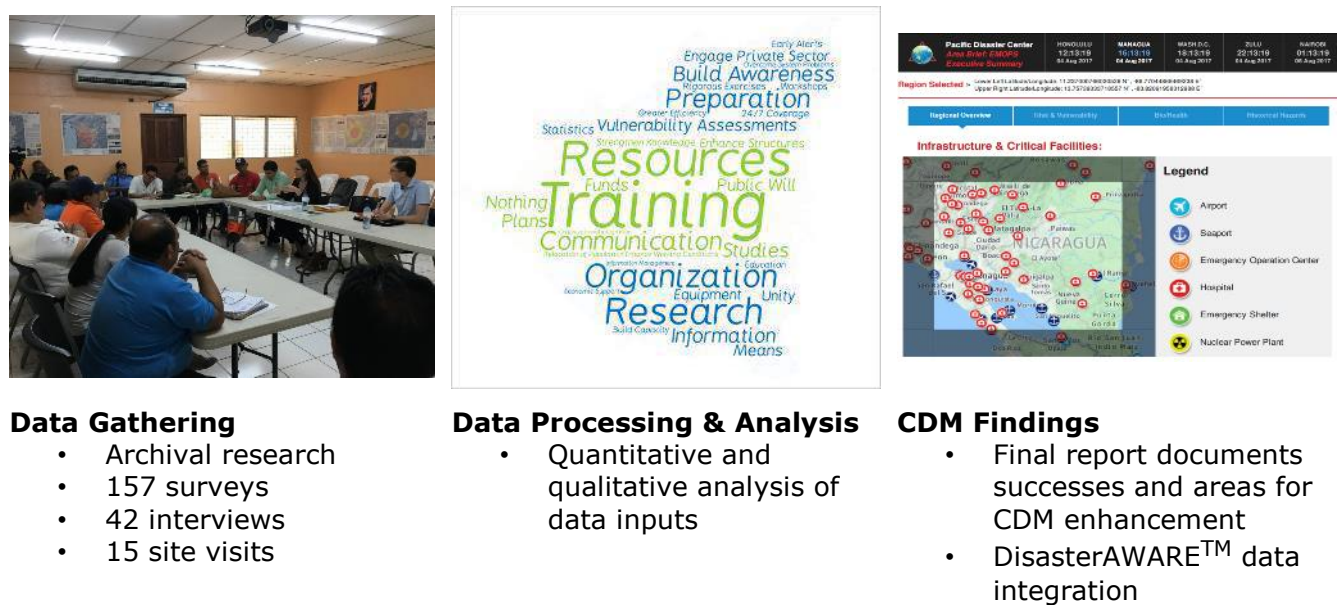


Figure 5. NDPBA CDM methodological process

## Data Gathering

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



Figure 6. Datasets for CDM analysis

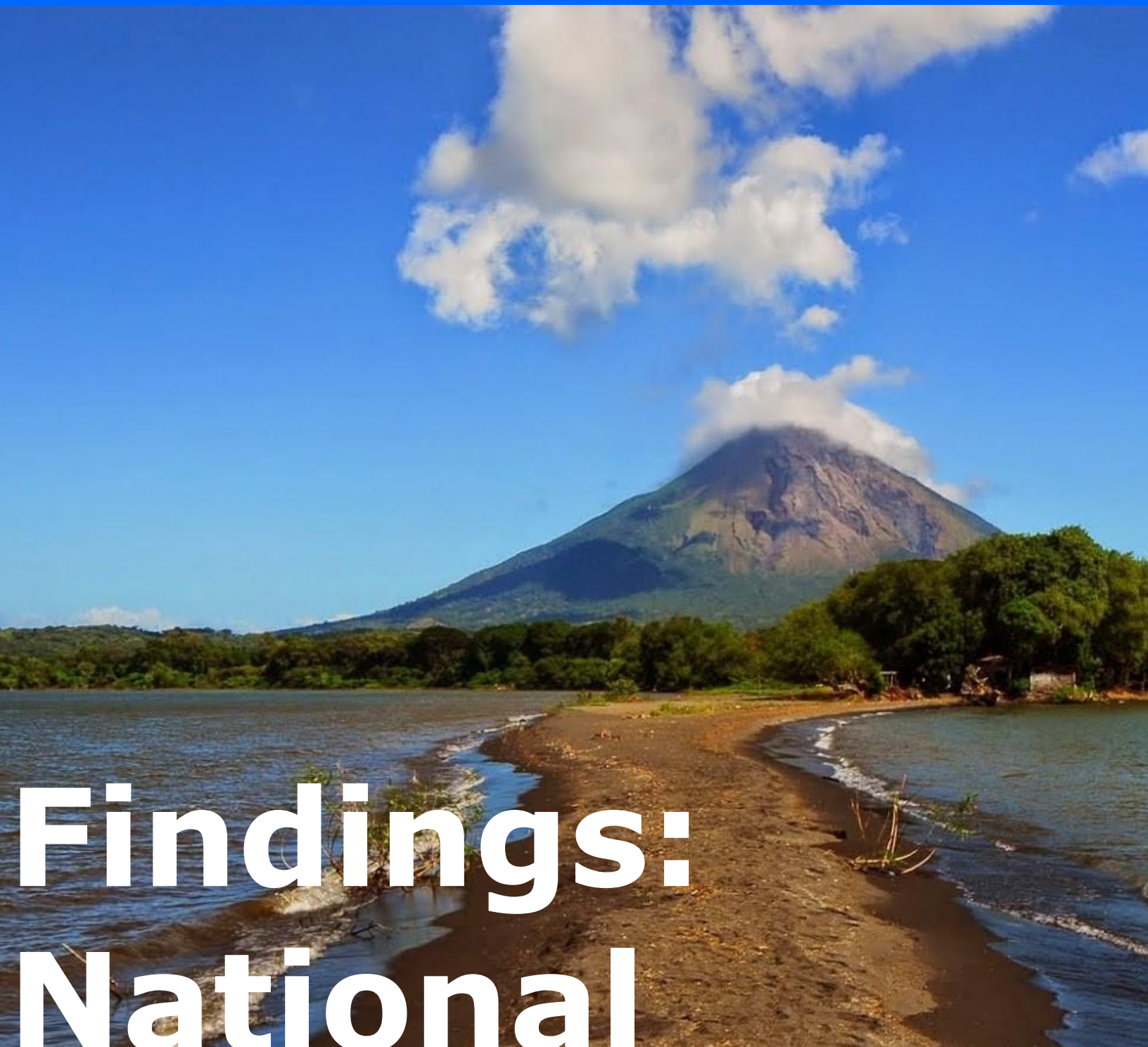
### **Data Processing and Analysis**

Three CDM surveys were administered over the course of the project, with emphasis on questions related to disaster preparedness and response activities. Survey responses were analyzed either quantitatively or qualitatively depending upon the question. Summary statistics and frequencies were generated for ranked-response questions. Open-ended questions helped to identify recurring themes that could be further explored during interviews with disaster management stakeholders. Survey responses are discussed in **Appendices C, D, and E**.

### **CDM Findings**

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





# Findings: National

**National Disaster Preparedness Baseline Assessment**  
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# Risk and Vulnerability Assessment (RVA)

Based on PDC’s Global Risk and Vulnerability Assessment, Nicaragua has the fourth highest multi-hazard risk within the Central American region, and ranks 74<sup>th</sup> highest in the world overall. In Nicaragua, risk is driven primarily by high multi-hazard exposure coupled with limited coping capacity. Though Nicaragua ranks relatively low in vulnerability at the national level, high poverty rates and limited access to basic services contribute significantly to overall risk. The subnational risk assessment describes how these factors of multi-hazard risk are distributed across departments in Nicaragua. The RVA results highlight regions of Nicaragua that may be in greater need of support due to increased population exposure, higher vulnerability, or lower coping capacity. The RVA helps to:



**Identify disaster risk reduction priorities**

Helps stakeholders develop a five-year action plan to achieve risk-reduction goals and to enhance disaster mitigation, preparedness, response, and recovery.



**Assess drivers of risk**

Allows examination from index to dataset level, identifying the level of exposure an area has to multiple hazards, the aspects of population that make them susceptible to hazard impact, and areas that can be improved to support coping strategies following hazard events.



**Provide a baseline for resource distribution**

Identify areas that may need additional support before, during, and after hazard events.

Table 3 provides a summary of the component results for Multi-Hazard Risk (MHR), Multi-Hazard Exposure (MHE), Vulnerability (V), and Coping Capacity (CC), including index scores, and relative ranking among the 17 departments. A rank of 1 corresponds to a high score (e.g., high multi-hazard risk), while a rank of 17 indicates a low score (e.g., low multi-hazard risk).

# NDPBA Nicaragua Final Report: Findings - National

Table 3. Nicaragua Multi-Hazard Risk (MHR) Index scores, rankings and component index, by department

Department	Multi-Hazard Risk		Multi-Hazard Exposure		Vulnerability		Coping Capacity		Department Risk Level
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	
<b>RAAN</b>	0.586	1	0.271	12	0.741	1	0.253	17	Very High
<b>RAAS</b>	0.575	2	0.275	11	0.705	3	0.256	16	Very High
<b>Rio San Juan</b>	0.515	3	0.316	10	0.666	4	0.436	10	Very High
<b>Managua</b>	0.515	4	0.915	1	0.221	17	0.592	5	Very High
<b>Jinotega</b>	0.498	5	0.19	14	0.728	2	0.425	11	High
<b>Matagalpa</b>	0.495	6	0.341	8	0.512	7	0.369	15	High
<b>Chinandega</b>	0.494	7	0.729	3	0.329	11	0.577	6	High
<b>Granada</b>	0.474	8	0.754	2	0.324	12	0.656	1	High
<b>Masaya</b>	0.473	9	0.72	4	0.307	15	0.609	4	Medium
<b>Carazo</b>	0.469	10	0.632	6	0.322	13	0.546	7	Medium
<b>Rivas</b>	0.469	11	0.58	7	0.354	10	0.527	8	Medium
<b>León</b>	0.468	12	0.71	5	0.31	14	0.616	3	Low
<b>Boaco</b>	0.437	13	0.199	13	0.492	8	0.382	14	Low
<b>Madriz</b>	0.433	14	0.164	16	0.558	5	0.421	12	Low
<b>Nueva Segovia</b>	0.373	15	0	17	0.513	6	0.393	13	Very Low
<b>Chontales</b>	0.366	16	0.172	15	0.419	9	0.493	9	Very Low
<b>Estelí</b>	0.331	17	0.325	9	0.303	16	0.636	2	Very Low



# Multi-Hazard Exposure

The population of Nicaragua experiences very high levels of exposure to seismic activity and tropical cyclone winds. Volcanic hazards also pose a significant threat, while smaller proportions of the population are also exposed to landslides, inland floods, and tsunami hazard zones. See Figure 7 for total population exposure to hazards in Nicaragua.

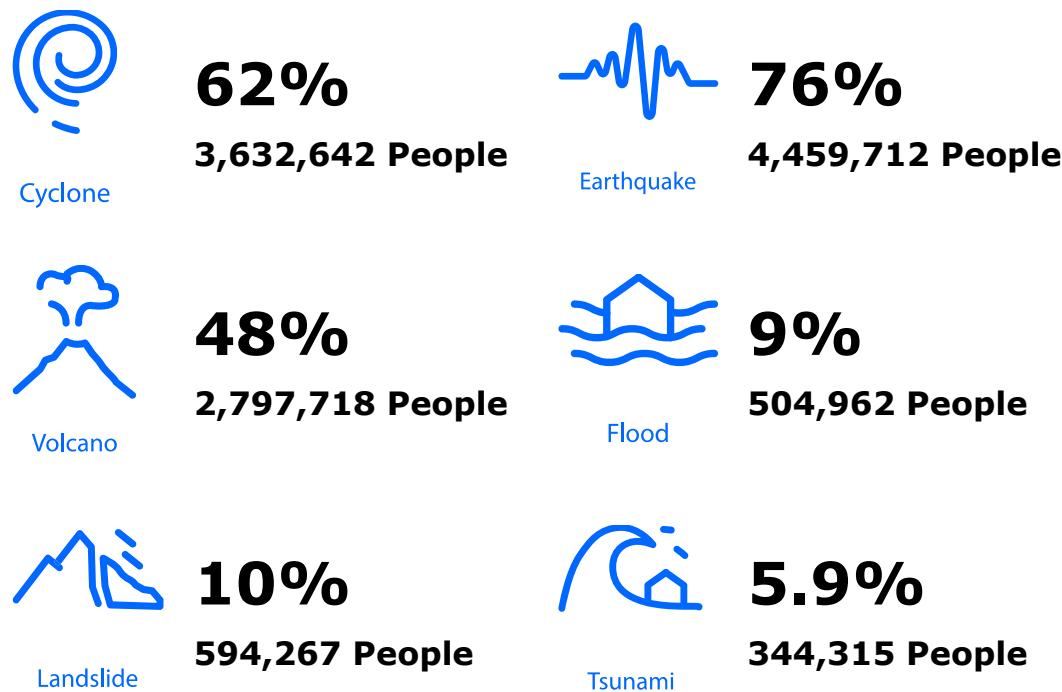


Figure 7. Population exposure to hazards in Nicaragua

Examining hazard-exposure data for each hazard type provides a cross-section that can be used to identify the specific hazards contributing to exposure in each department. Understanding exposure to specific hazards is valuable for determining appropriate mitigation actions. Differences in geography and hazard type inherently dictate which mitigation options are more effective for reducing casualties and losses in Nicaragua. For example, mitigation efforts designed to reduce the impacts of volcanic hazards in Masaya and Granada may be ineffective in preventing losses from floods in Estelí. This assessment demonstrates the importance of understanding hazard exposure, not only in terms of the total number of people exposed, but also the hazards that threaten them. At the department level, Multi-Hazard Exposure ranges from very high in the densely populated and highly exposed department of Managua, to very low in less-populated and less hazard-prone areas, such as Chontales and Nueva Segovia.

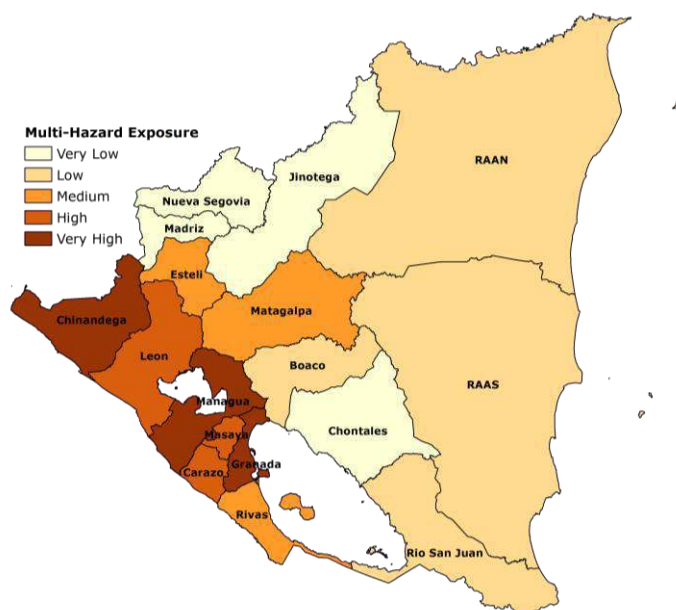


Figure 8. Distribution of Multi-Hazard Exposure Index scores across departments with relative ranking of each department by Multi-Hazard Exposure score

## Vulnerability

PDC's Global Risk and Vulnerability Assessment shows that vulnerability in Nicaragua has decreased significantly since 1995. Though the country once ranked 25<sup>th</sup> highest in the world for overall vulnerability, Nicaragua has taken action to reduce economic constraints and increase overall quality of life through the development of macroeconomic policies and the steady expansion of exports and foreign direct investment<sup>7</sup>. Today, Nicaragua ranks 87<sup>th</sup> in the globe in overall vulnerability and is 3<sup>rd</sup> lowest among Central American nations.

Despite this progress, poverty in Nicaragua remains relatively high and access to basic services continues to be a challenge. Given these challenges, certain regions lack adequate resources to build disaster resilience at local, household, and individual levels. As a result, vulnerable regions may rely heavily on national

<sup>7</sup> World Bank, 2017. <http://www.worldbank.org/en/country/nicaragua/overview>.

resources to prepare for, respond to, and recover from disasters. Areas with higher Vulnerability Index scores are more susceptible to harm from hazards, often lacking the resources to adequately implement preparedness or mitigation measures. Recognizing the sensitivities of vulnerable areas, the Vulnerability Index is an instrument for decision support in comparing and prioritizing disaster-mitigation projects and allocating aid following hazard events.

At the department level, vulnerability ranges from very high in Jinotega and the autonomous regions (RAAN and RAAS) to very low in Managua. See Table 4 for Vulnerability scores and ranks by department.

*Table 4. Vulnerability scores and ranks by department in Nicaragua*

Department	Vulnerability	
	Score	Rank
<b>RAAN</b>	0.741	1
<b>Jinotega</b>	0.728	2
<b>RAAS</b>	0.705	3
<b>Río San Juan</b>	0.666	4
<b>Madriz</b>	0.558	5
<b>Nueva Segovia</b>	0.513	6
<b>Matagalpa</b>	0.512	7
<b>Boaco</b>	0.492	8
<b>Chontales</b>	0.419	9
<b>Rivas</b>	0.354	10
<b>Chinandega</b>	0.329	11
<b>Granada</b>	0.324	12
<b>Carazo</b>	0.322	13
<b>León</b>	0.31	14
<b>Masaya</b>	0.307	15
<b>Estelí</b>	0.303	16
<b>Managua</b>	0.221	17

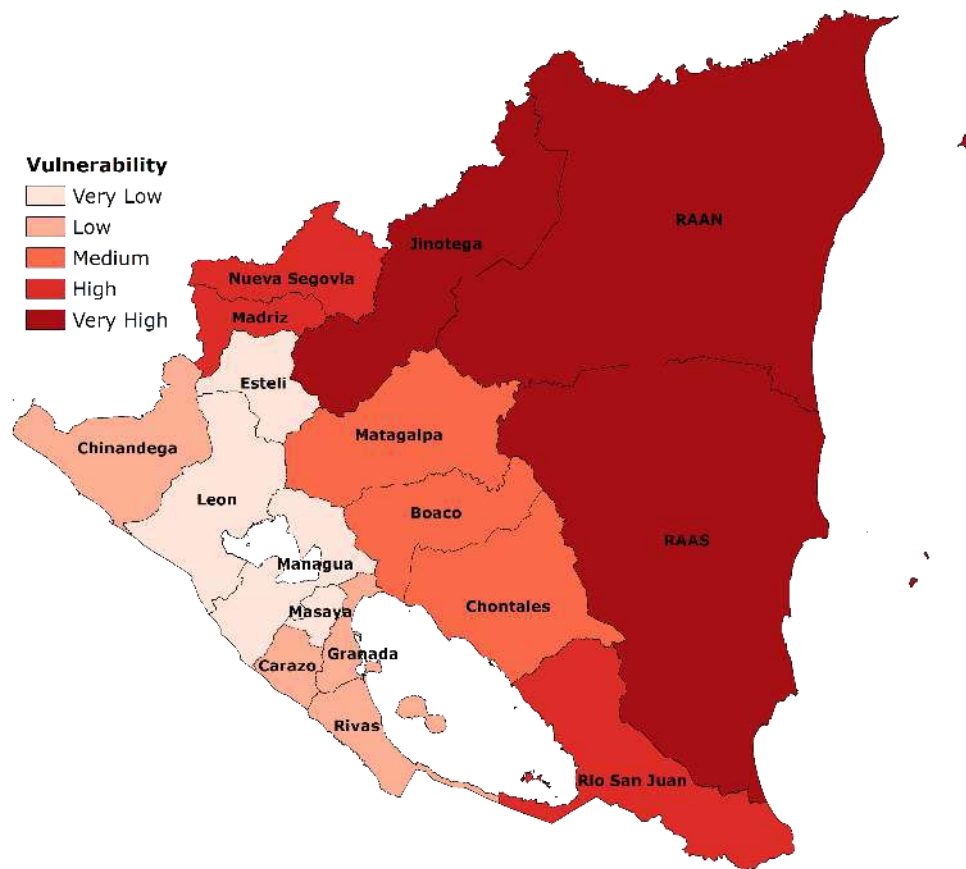











Figure 9. Distribution of Vulnerability Index scores across departments and relative ranking of each department by Vulnerability score

**Vulnerability: Case Study**

Examining the subcomponents of the Vulnerability Index can highlight the drivers of vulnerability within departments. In context, these sensitivities translate to increased susceptibility to hazard impacts because of limited economic resources, inability to access and comprehend vital emergency information, compromised water and sanitation services, rapid changes in urban population, disparities in health and health-care access, and gender-based differences in access to resources, services, and opportunities. Table 5 examines the specific drivers of vulnerability in the three most vulnerable departments.

Table 5. Drivers of high vulnerability in the three most vulnerable departments

	<b>RAAN – Highest Vulnerability (1 of 17 Departments)</b>	<div> <div>  <b>Economic Constraints</b>                      Very High (Rank: 1 of 17)                 </div> <div>  <b>Clean Water Vulnerability</b>                      Very High (Rank: 1 of 17)                 </div> <div>  <b>Population Pressure</b>                      Very High (Rank: 1 of 17)                 </div> </div> <p>87% of households in RAAN do not have access to piped water, and 94% are not connected to sewer or septic-based sanitation systems. Interventions that increase the delivery of piped water and sanitation to the autonomous region would serve to reduce overall Vulnerability.</p>
	<b>Jinotega – 2<sup>nd</sup> Highest Vulnerability (2 of 17 Departments)</b>	<div> <div>  <b>Gender Inequality</b>                      Very High (Rank: 1 of 17)                 </div> <div>  <b>Information Access Vulnerability</b>                      Very High (Rank: 1 of 17)                 </div> <div>  <b>Vulnerable Health Status</b>                      Very High (Rank: 2 of 17)                 </div> </div> <p>Clean-water vulnerability is lower in Jinotega, but the department ranks higher in dimensions of gender inequality. Subsequently, interventions aimed at reducing overall vulnerability in Jinotega should consider issues of gender-based access to resources to have the greatest impact</p>
	<b>RAAS – 3<sup>rd</sup> Highest Vulnerability (3 of 17 Departments)</b>	<div> <div>  <b>Gender Inequality</b>                      Very High (Rank: 2 of 17)                 </div> <div>  <b>Clean Water Vulnerability</b>                      Very High (Rank: 2 of 17)                 </div> <div>  <b>Economic Constraints</b>                      Very High (Rank: 3 of 17)                 </div> </div> <p>RAAS ranks high in economic constraints. Increasing investment in small business and capital growth can increase economic strength and reduce vulnerability.</p>

While the factors of vulnerability are inextricably linked, a single intervention may not reduce all components of vulnerability in all departments. This illustrates the utility of the Vulnerability Index in guiding resource allocation and highlights the importance of a thorough examination of all dimensions of vulnerability to inform decision making at the subnational level.

# Coping Capacity

In the Central American region, Nicaragua ranks third lowest in overall coping capacity, according to PDC’s Global RVA. The country’s limited coping capacity is driven primarily by constraints on governance, economy, and infrastructure. These indicators are reflected at the subnational level, where coping capacity is largely driven by governance and infrastructure, an indication that departments may have limited ability to absorb immediate economic losses and mobilize resources during a disaster.

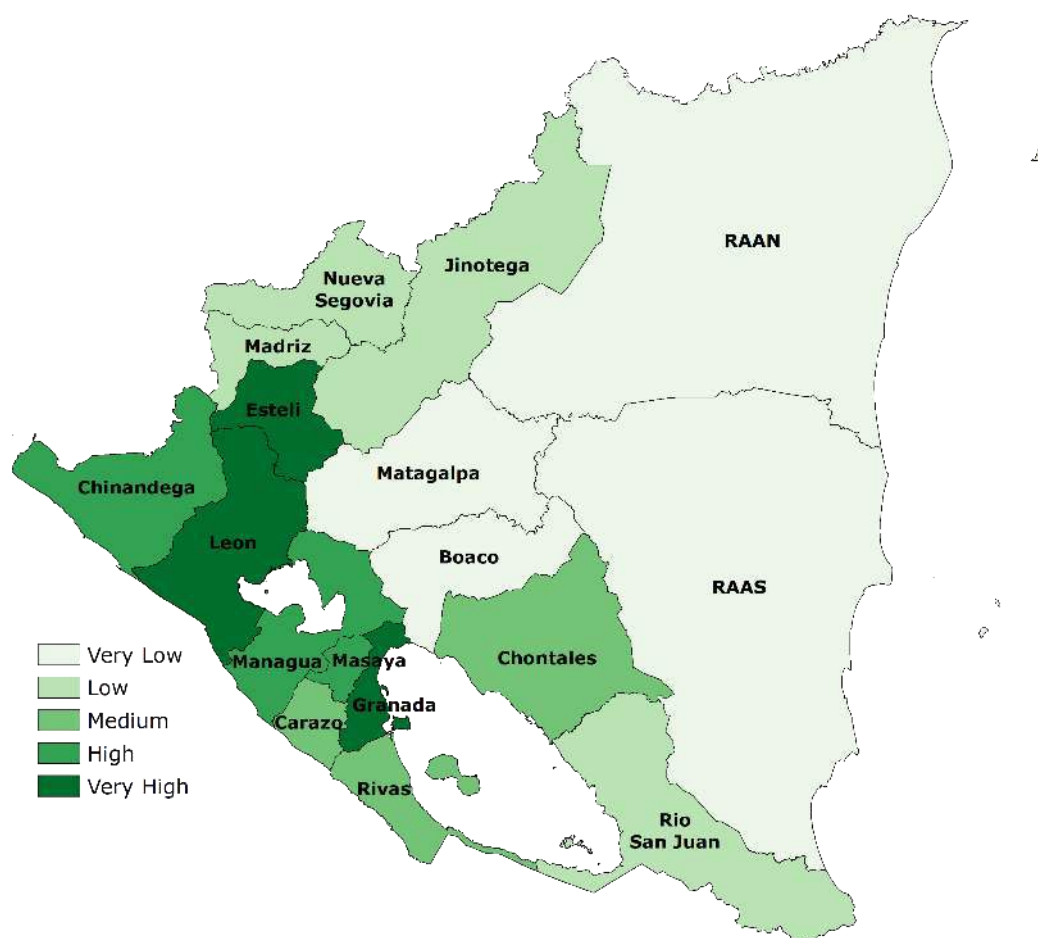


Figure 10. Distribution of Coping Capacity Index scores across departments and relative ranking of each department by Coping Capacity score

By analyzing the different subcomponents of the Coping Capacity Index, it becomes possible to identify distinct factors that drive a population's or organization's ability to cope with hazards. For example, low coping capacity in RAAN (ranked 17 of 17) is attributable to very low economic capacity, limited infrastructure, and weak governance. RAAN ranks in the bottom 2 in the country for all three dimensions. RAAS and Matagalpa (ranked 16<sup>th</sup> and 15<sup>th</sup>, respectively) similarly exhibit very low scores across these components of coping capacity. In the case of Matagalpa, both overall governance and economic capacity are slightly higher than in the autonomous regions. Instead, the low overall ranking is driven more by limitations in infrastructure and environmental capacity.

Table 6. Coping Capacity scores and ranks in Nicaragua

Department	Coping Capacity	
	Score	Rank
<b>Granada</b>	0.656	1
<b>Estelí</b>	0.636	2
<b>León</b>	0.616	3
<b>Masaya</b>	0.609	4
<b>Managua</b>	0.592	5
<b>Chinandega</b>	0.577	6
<b>Carazo</b>	0.546	7
<b>Rivas</b>	0.527	8
<b>Chontales</b>	0.493	9
<b>Rio San Juan</b>	0.436	10
<b>Jinotega</b>	0.425	11
<b>Madriz</b>	0.421	12
<b>Nueva Segovia</b>	0.393	13
<b>Boaco</b>	0.382	14
<b>Matagalpa</b>	0.369	15
<b>RAAS</b>	0.256	16
<b>RAAN</b>	0.253	17

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

Lower infrastructure scores can indicate a reduction in the exchange of information, and reduced access to vital resources and health services. Interventions could include fostering national campaigns to improve equity of infrastructure in rural areas, ensuring connectivity to critical services and resources.

Limited economic capacity means that these areas may not have financial assets, savings, or reserves to absorb immediate economic impacts, mobilize response and recovery services, or aid in disaster

relief. In departments with low economic capacity, disaster management practitioners can leverage mutual-aid agreements and non-traditional partnerships to support disaster preparedness, response, and relief initiatives.



# Lack of Resilience

The Lack of Resilience Index (Figure 11) represents the combination of Vulnerability and Coping Capacity. The graduation from two separate components to the larger overarching concept of resilience demonstrates the hierarchical approach of PDC's RVA, whereby results are built upwards to develop indices that have distinct implications for disaster risk reduction. Furthermore, since Vulnerability and Coping Capacity are measured independent of the hazard, disaster managers can overlay the Lack of Resilience Index with real-time hazard data to estimate risk on a per-event basis as new threats occur. Table 7 summarizes the results of the Lack of Resilience Index for Nicaragua.

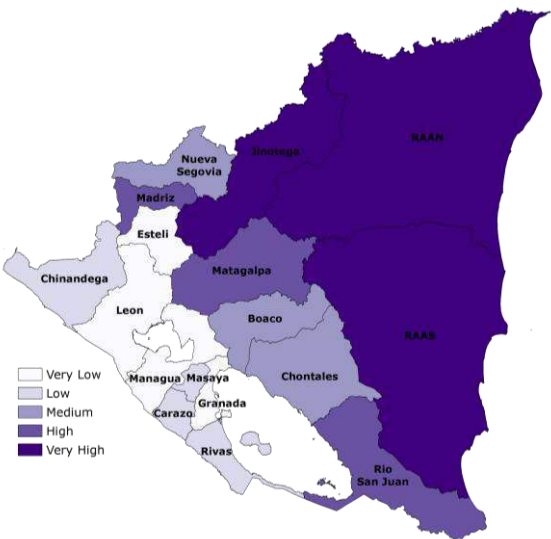


Figure 11. Distribution of Lack of Resilience Index scores across departments and relative ranking of each department by Lack of Resilience score

Table 7. Nicaragua Lack of Resilience (LR) Index scores and rankings by department

Department	Lack of Resilience		Vulnerability		Coping Capacity		Department Lack of Resilience
	Score	Rank	Score	Rank	Score	Rank	
<b>Boaco</b>	0.555	8	0.492	8	0.382	14	Moderate
<b>Carazo</b>	0.388	11	0.322	13	0.546	7	Low
<b>Chinandega</b>	0.376	12	0.329	11	0.577	6	Low
<b>Chontales</b>	0.463	9	0.419	9	0.493	9	Moderate
<b>Estelí</b>	0.334	15	0.303	16	0.636	2	Very Low
<b>Granada</b>	0.334	16	0.324	12	0.656	1	Very Low
<b>Jinotega</b>	0.651	3	0.728	2	0.425	11	Very High
<b>León</b>	0.347	14	0.310	14	0.616	3	Very Low
<b>Madriz</b>	0.568	6	0.558	5	0.421	12	High
<b>Managua</b>	0.314	17	0.221	17	0.592	5	Very Low
<b>Masaya</b>	0.349	13	0.307	15	0.609	4	Low
<b>Matagalpa</b>	0.572	5	0.512	7	0.369	15	High
<b>Nueva Segovia</b>	0.560	7	0.513	6	0.393	13	Moderate
<b>RAAN</b>	0.744	1	0.741	1	0.253	17	Very High
<b>RAAS</b>	0.724	2	0.705	3	0.256	16	Very High
<b>Río San Juan</b>	0.615	4	0.666	4	0.436	10	High
<b>Rivas</b>	0.413	10	0.354	10	0.527	8	Low



## Multi-Hazard Risk

The Multi-Hazard Risk Index (Figure 12) provides a high-level tool that supports comparison of risk across Nicaragua. Though the MHR Index provides a powerful overview of risk conditions, its component indices – Multi-Hazard Exposure, Vulnerability, and Coping Capacity – and their subcomponents provide crucial details on the drivers of risk. These drivers can be used to design focused interventions for overall disaster risk reduction at the department level.

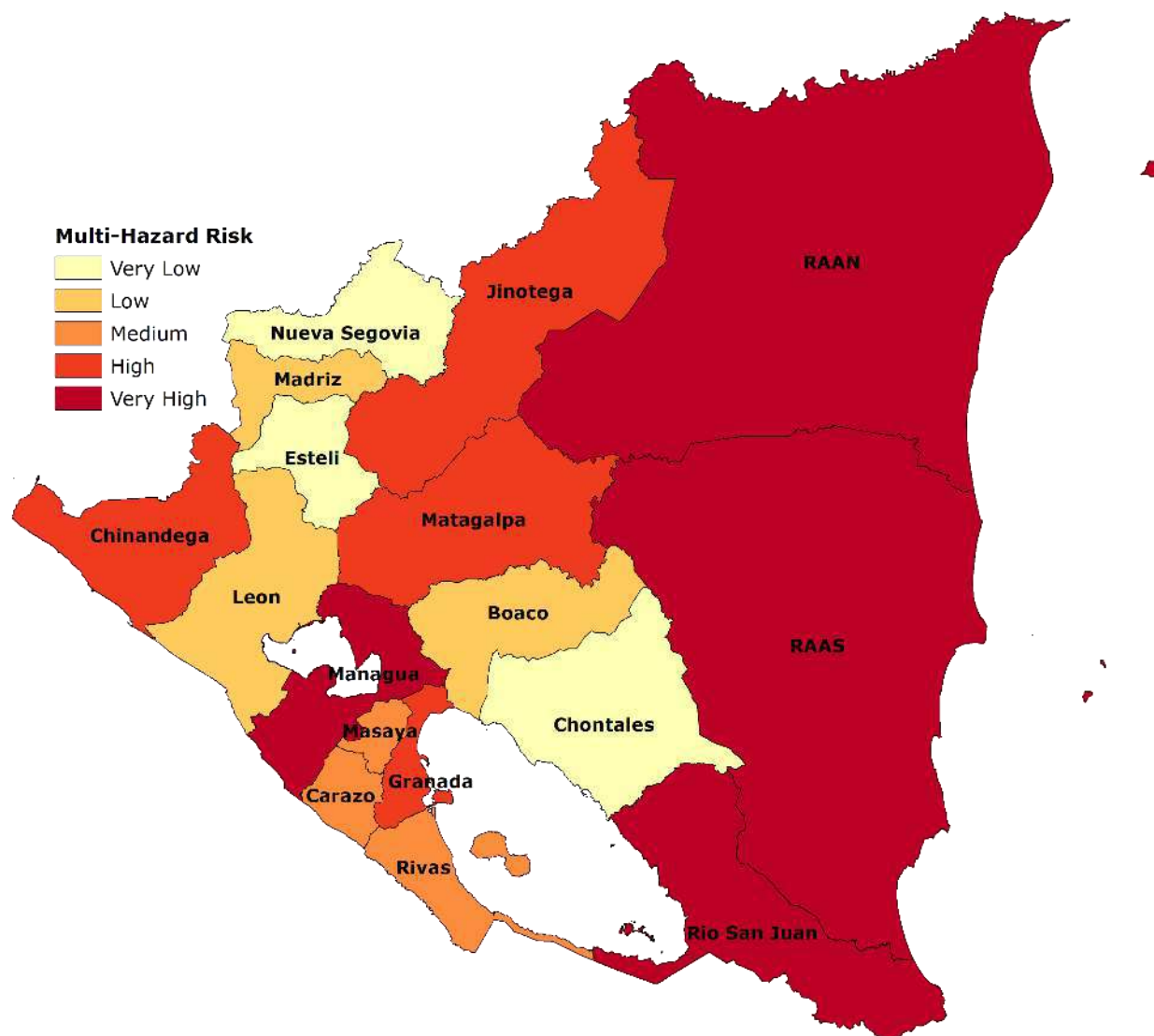


Figure 12. Distribution of Multi-Hazard Risk Index scores across departments and relative ranking of each department by score

# Recommendations

These programmatic recommendations are designed to acknowledge the complex drivers of risk that are prevalent throughout the country and support future assessments and sustainable disaster risk-reductions initiatives. Specific department-level recommendations are provided in each department profile. To focus interventions that reduce vulnerability and increase coping capacity at the department level, decision makers must carefully examine these drivers for each department.

Table 8. Evaluation criteria for RVA recommendations

Recommendations Evaluation Criteria		
<b>Effort</b>	<div><div>Years</div><div><div></div><div></div><div></div><div></div><div></div></div><div>05</div></div>	Estimated length of time (in years) to complete the project once it is started.
<b>Complexity</b>	<div>LowMediumHigh</div>	Overall complexity based on the estimated staff time, resources, and collaboration required to complete the project.
<b>Cost</b>	<div>\$\$\$</div>	<div>Estimated annual cost of the project, not including salaries, based on a percentage of the current NDMO annual budget.</div> <div>\$ approximates less than 1% of the annual operating budget.</div> <div>\$ \$ approximates between 1% to 10% of annual operating budget.</div> <div>\$ \$ \$ approximates more than 10% of the annual operating budget.</div>

01

## Strengthen data standards and sharing

- A. Ensure that hazards and vulnerability data are consistently defined, documented, updated, and applied in disaster management and disaster risk reduction.

B. Implement strategies to strengthen data sharing and transparency among all organizations active in disaster management to support evidence-based decision making.

Effort:

05

Years

Complexity: Medium

Cost: \$

02

**Develop and strengthen multi-stakeholder partnerships**

- A. Increase the capacity to conduct and update high-resolution hazard assessments with national coverage by developing partnerships with non-traditional stakeholders.
- B. Strengthen strategic multi-stakeholder partnerships to expand disaster risk-reduction resources to include non-traditional disaster management partners.

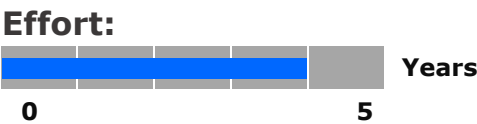


**Complexity:** Low  
**Cost:** \$

03

**Improve documentation of subnational economic resources**

Provide a more comprehensive understanding of economic capacity (ex. GDP, income, expenditures, remittances) at the department and local levels.



**Complexity:** High  
**Cost:** \$\$



## Comprehensive Disaster Management (CDM)

CDM assessment results highlight aspects of disaster management that may help address issues associated with increased exposure to natural hazards, higher socioeconomic vulnerability, or lower coping capacity. Overall, the CDM assessment helps to:



### **Identify disaster management capabilities**

Provides a contextual overview of disaster management capabilities and identifies the strengths and challenges of Nicaragua's disaster management system.



### **Provide context to RVA results**

Provides context to the RVA results previously discussed by highlighting the larger DRR framework in Nicaragua.

Successes, challenges, and their implications for the overall effectiveness of Nicaragua's disaster management system are outlined in detail in the following sections based on the five key elements assessed. Recommendations are provided for each CDM element to assist in strengthening disaster management capacities in-country. See Table 9 for the evaluation criteria of CDM recommendations.

Table 9. Evaluation criteria for CDM recommendations

Recommendations Evaluation Criteria		
<b>Effort</b>	<div><div>Years</div><div><div></div><div></div><div></div><div></div><div></div></div><div>05</div></div>	Estimated length of time (in years) to complete the project once it is started.
<b>Complexity</b>	<div>LowMediumHigh</div>	Overall complexity based on the estimated staff time, resources, and collaboration required to complete the project.
<b>Cost</b>	<div>\$\$\$</div>	<p>Estimated annual cost of the project, not including salaries, based on a percentage of the current NDMO annual budget.</p> <p>\$ approximates less than 1% of the annual operating budget.</p> <p>\$ \$ approximates between 1% to 10% of annual operating budget.</p> <p>\$ \$ \$ approximates more than 10% of the annual operating budget.</p>

# Good Leadership by Professionally Trained Officials

Training and capacity building aimed at improving disaster management skills, and exercises to test emergency-response procedures are important priorities for Nicaragua.



Good Leadership by Professionally Trained Officials



Training Programs

Training Frequency

Exercise Programs

Exercise Frequency

When asked, "What are the three most effective preparedness activities that your organization has undertaken?"

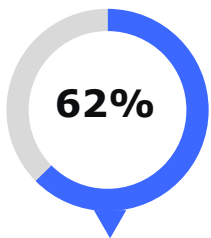
- 50% of participants listed preparedness activities related to "training," "education," "workshops," and "capacity building."
- Nearly 40% of responses stressed the importance of "exercises" and "simulations."

Training and exercises have also been key avenues to increase risk awareness among the general public, particularly in areas of high to very high Multi-Hazard Exposure (e.g., the departments of Managua, Masaya, Chinandega, León, Carazo, Rivas, and Granada).

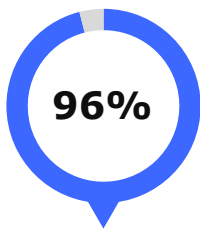
## Training Programs and Training Frequency

### Frequency

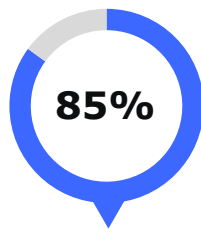
Organizationally-focused and skills-based training programs are widely implemented among disaster management professionals and emergency response personnel in Nicaragua. Many leaders have been the recipients of training or required to complete some form of disaster management training.



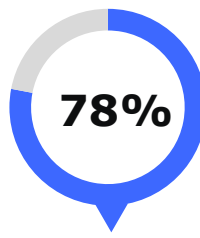
62% of those surveyed stated that their organizations have training programs to build capacity among disaster management staff members.



96% of those surveyed said that they had received training in their current positions.



85% of those surveyed reported that their organization requires them to complete disaster management training.



78% of those surveyed stated that they were in leadership positions within their organization.

SINAPRED conducts monthly trainings in each department on the topics of hygiene, health, and the environment within the overall context of disaster management. Trainings are also conducted in the autonomous regions of the Caribbean, but less frequently – every two to three months – due to logistical challenges posed by limited transportation infrastructure. Trainings at the department level are typically Train-the-Trainer courses, which enable participants (with the oversight and assistance of SINAPRED) to train municipal committees. Municipal committees, in turn, train at the community level.

Stakeholders interviewed said that efforts are made to train the same people to “add depth” to their skill sets and build overall capacity. Often training is focused on teachers and social workers. SINAPRED trainings have minimal prerequisites (e.g., participants must have the ability to read and write).

A detailed record of monthly trainings, including who receives training, is maintained by SINAPRED. Departments assist in maintaining this record as part of their monitoring and reporting function, serving as the link between municipalities and SINAPRED. In addition to their primary mission of fire prevention and reduction, fire departments work with the Nicaraguan Red Cross as first responders, and offer training to Red Cross staff in emergency first response, search and rescue, and managing hazardous materials. Fire departments, under the Ministry of Government, have a robust training program, training over 200 firefighters each year. An effort is underway to establish brigades of trained individuals, including women, in areas where there were previously no firefighting capabilities. In addition

### **Case Study: Nicaraguan Red Cross**

As part of the SINAPRED structure, the Nicaraguan Red Cross is responsible for providing first-aid training to the Municipal Committees, or COMUPREDS. A curriculum focused on health and safety has been developed specifically for this audience. The Red Cross also offers training to communities and the private sector. In an interview with the Red Cross in May 2017, stakeholders said that training has focused on the Pacific side of the country to date, but will expand to other priority areas across the country in the near future.

The Red Cross has a national training center, a cadre of certified trainers, and disaster-management training curricula that are being revised and updated, according to a stakeholder interview conducted in November 2016. The Red Cross expressed that training is much needed for the organization due to recent changes in personnel.

Priority training courses include search and rescue (SAR), vehicular accidents, vertical structures, and aquatic rescue. Staff training courses for technicians, paramedics, ambulance operators, and volunteers include emergency response and first aid. Five courses, available through the International Federation of the Red Cross and Red Crescent (IFRC) online-learning platform, are required for Red Cross staff.

Budget constraints and a lack of training resources have been overcome in part by funding provided by the Humanitarian Assistance Office for Disaster Preparedness of the European Commission (DIPECHO) since 2006, enabling the Red Cross to train community leaders in evacuation, first aid, fire prevention and control, psycho-social support, and search and rescue for collapsed structures.

Nicaragua is the first Latin American country to conduct a search and rescue course for collapsed structures (Curso de Búsqueda y Rescate en Estructuras Colapsadas, or BREC) at the community level. The Red Cross coordinates its training schedule closely with SINAPRED to identify where capacity building is most needed.



to the trainings held at their own facilities, fire departments offer courses and Train-the-Trainer courses to other institutions, including departmental and municipal committees. In an interview, stakeholders shared that training in first response and search and rescue is most effective when trainees have equipment to work with, and that budget increases are needed to obtain first-aid materials and build gymnasiums and classrooms for training purposes.



*Figure 13. Training resources available at the training academy for the country's firefighters*

The Ministry of Health (MINSA) offers three to four trainings in disaster risk management for all municipalities each year. Every SILAIS<sup>8</sup> has a Department of Capacity Building, which is responsible for providing training.

In line with efforts to create a “culture of risk reduction” in the country, SINAPRED and the Ministry of Education (MINED) have worked toward incorporating disaster risk-management concepts and best practices in primary- and secondary-school curricula for students, teachers, and local

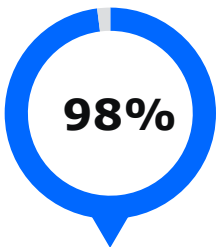
committees of school safety in each school. Leveraging information in a 2013 *School Safety Guide*, developed through a technical-support project funded by DIPECHO and the United Nations Children's Fund (UNICEF), MINED collaborates with SINAPRED and other experts to conduct annual Train-the-Trainer sessions for departmental and municipal committees. Municipal committees, in turn, train the committees of school safety in each school. Committees of school safety work closely with neighborhood committees (COBAPREDs) during disaster response.

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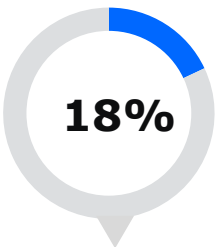
<sup>8</sup> SILAIS are unique “distribution areas” established by MINSA that are consistent with department administrative boundaries, except for the two autonomous regions, which are divided into two SILAIS each. Nicaragua has 17 departments and 19 SILAIS.

The value of training is well-recognized by disaster management personnel in Nicaragua. Training courses for disaster management personnel are generally available and widely offered. However, there is an expressed need for additional focused trainings to further bolster capability. Those surveyed stressed that training played an important role in improving organizational disaster management capabilities.

While survey responses indicated that training courses are required for disaster management staff, the specific types of training considered important for SINAPRED staff and those in leadership positions were not communicated. When asked what types of training help strengthen leadership capacity, stakeholders highlighted management of human resources,



98% stated that training had improved their job effectiveness.



18% said that they had experienced barriers to attending training.

*When asked: "How can your organization improve disaster management?" survey responses focused on two main themes:*

- The importance of training, strengthening capabilities, expanding knowledge, and advancing education.
- The need for additional resources, equipment, and a larger budget.



building teamwork, response and organizational capabilities, communication, leadership skills, risk management, planning, and experience exchanges with other Central American countries. Few of these types of trainings were among those mentioned as regular course offerings. It is unclear whether all disaster management staff are receiving the types of training most suitable to their roles and job descriptions, which would ensure consistent skills development and broaden staff capabilities.

**Postgraduate Education**

Postgraduate educational opportunities related to disaster management are offered at Central American University (UCA) in Managua, the National University of Engineering (UNI), and the National Autonomous University of Nicaragua (UNAN). Master’s degree programs in disaster management are offered through UCA and UNAN.

International organizations, including UN OCHA, SWISSAID, and others, support higher-education programs at these universities through associated trainings and by sponsoring SINAPRED staff enrollment in degree programs. According to those interviewed, formal postgraduate training and education is encouraged for SINAPRED staff members but is not a requirement.

## Exercise Programs and Exercise Frequency

Since 2016, Nicaragua has held four full-scale national exercises each year to build disaster management capacity among national institutions; subnational Committees for Prevention, Mitigation, and Disaster Assistance (Committees); the private sector; and families. This program of quarterly full-scale exercises is conducted in close coordination with Defensa Civil (Civil Defense) that requires the participation of the entire country.

### National Exercises

On March 17, 2016, Nicaragua conducted its first national multi-hazard exercise, in which each municipality considered a different hazard scenario rather than traditional single-focus exercises. The National EOC was activated for the exercise, which was coordinated by SINAPRED and involved disaster-management partners at multiple levels of government.

On December 20, 2016, SINAPRED held the fourth “National Multi-Threat Exercise for the Protection of Life.” The exercise provided local authorities in each department the opportunity to practice disaster-response actions. Multiple institutions, including the National Police, Nicaraguan Army, and Ministry of Family, participated in the exercise along with Nicaraguan residents. The exercise scenario included a shallow earthquake measuring 7.4 on the Richter scale centered 85 kilometers off the coast of Poneloya, an eruption of the Telica Volcano, and a Category 3 Hurricane (Jenny) impacting the Caribbean coast. SINAPRED estimated that half a million people took part in the exercise. According to those interviewed, reports are generated after each exercise to inform and improve emergency plans and procedures.

SINAPRED authorities summed up the importance of exercises in advancing disaster preparedness for present and future generations: Regulation 40 of Law 337 is referred to as the “citizens’ participation law” and states that people are required to be informed and to participate in the disaster management process. The objective is to shift the culture of the people from being “the object of protection to a rights actor... When families act as first responders, the focus shifts from the emergency to the people as protagonists. SINAPRED, as an institution, can then facilitate response, providing aid from the national level down to the families in need. This methodology has given us great results.”<sup>9</sup>

While the national exercises engage stakeholders at all levels of government and include the general public, in 2017, SINAPRED also established a program of exercises specifically aimed at building disaster management capacity at municipal levels. The exercises use hazard scenarios mapped by communities that are specific to each location, engaging Municipal Committees (COMUPREDs), Neighborhood

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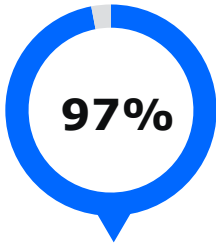
<sup>9</sup> High-level SINAPRED staff member

Committees (COBAPREDs), representatives of government ministries, private companies, business owners, and families. As an example, the COMUPRED in Rivas conducts exercises every two to three months to maintain readiness.

In addition to their participation in the quarterly national exercises, ministries and national institutions that are part of the SINAPRED system conduct exercises to strengthen disaster management capacity among staff at the facilities within their purview. For example, the Ministry of Health (MINSA) coordinates regular drills for each hospital and health center. The Ministry of Education (MINED) conducts school drills on the third Tuesday of every month, with the full participation of students and faculty. Emphasis is placed on teaching children what to do in case of a disaster. When children bring that knowledge home, there is the added benefit of increasing hazard awareness among families. Like other ministries, MINED generates scenarios for each exercise based on what is most needed to enhance capacity. MINED’s September 2016 exercise, for example, focused on “fire and fractures.”

The Nicaraguan Red Cross conducts two organizational exercises per year in addition to participating in the national exercises. These exercises, along with responses to real hazard events, help the Red Cross validate its plans, protocols, and procedures for emergency operations at its national and departmental EOCs.

Nicaragua has implemented a national exercise program that incorporates quarterly full-scale exercises at the national, departmental, and local level with drills conducted by ministries and institutions. The country’s exercise program has improved readiness at all levels, particularly in local communities. This is a best practice and highlights the willingness of the country to expend staff time and resources to ensure the entire system is ready for the next disaster.



97% of those surveyed said that their organizational disaster plans are tested, drilled, or exercised regularly.

## Successes



### **Training and exercises**

Nicaragua has established training and exercise programs to enhance disaster management capacities.



### **Train-the-Trainers courses**

Train-the-Trainers (TTT) courses are offered by several institutions, such as SINAPPRED and MINED, and are effective ways to build capacity and expand cadres of trainers at multiple levels.



### **Postgraduate-education opportunities**

Postgraduate-education opportunities in disaster management exist in-country.



### **Full-scale exercises**

Full-scale exercises occur four times per year, and a municipal exercise program was instituted in 2017.

## Challenges Identified



### **Staff training requirements**

It is unclear whether all disaster management staff are receiving the types of training most suitable to their roles and job descriptions, which would ensure consistent skills development and broaden staff capabilities. There is an expressed need for additional focused trainings. Training requirements for disaster management staff and those in leadership positions were not readily available.



### **Disaster management training documentation**

Mechanisms to document and report disaster management training implementation (e.g., courses, number of personnel trained, in what functional areas, and at what frequency) are generally in place, though documentation is incomplete.



### **Training budget and resource constraints**

Budget constraints and a lack of training resources are impediments to training implementation.



Recommendations

01

Expansion of disaster management training programs

Advance current initiatives to institute a nationwide disaster management training program that defines training requirements for key disaster management positions, promotes consistent skills development, and broadens staff capabilities. Identify partners, programs, course offerings, and a schedule for training implementation to meet established requirements. Develop or enhance existing mechanisms to manage program implementation and facilitate the identification of skills and expertise that may be required to support disaster management activities.

- A. Define training requirements for disaster management personnel according to roles and job descriptions.
- B. Conduct a training audit to review existing training curricula and identify other course offerings that may be used to meet training requirements and address training gaps.
- C. Develop partnership agreements with institutions, NGOs, and the private sector to deliver training courses.
- D. Schedule and implement priority training courses.

Effort:



Complexity: Medium

Cost: \$\$





## Foundation of Supportive Values for Government

Through the establishment of a National Disaster Fund, an annual budget allocation for disaster management, and appointed leadership positions, Nicaragua has demonstrated progress toward a Foundation of Supportive Values for Government Action. However, SINAPRED has a limited budget to implement its vision for the holistic disaster management approach articulated in Nicaragua's legal framework, and is often reliant on donor-funded projects to advance DRR initiatives in-country. Funded projects that do not align with SINAPRED's programmatic agenda may lack the support necessary to sustain activities upon project completion. Institutional mechanisms could be strengthened to more effectively align DRR activities with national goals and objectives, and the capacity to sustain and continue programs among local agencies and institutions could be enhanced.

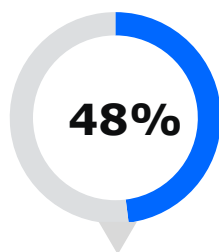


### Annual Budget

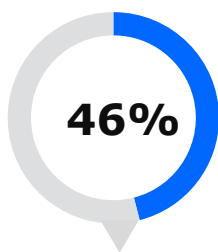
Nicaragua has a well-established financial protocol for disaster management with the establishment of the National Disaster Fund in 2000 through the enactment of Law 337, and in 2008, securing SINAPRED's operating budget as a line item in the national budget – an indication that the SINAPRED system is valued politically and is seen as an integral part of the country's development strategy.

SINAPRED's annual operating budget is 35,000,000 NIO (Nicaraguan Córdobas) or 1.2 million USD, which covers institutional and administrative costs, as well as salaries for nearly 100 employees. While no other ministries receive disaster management funding per se, their inclusion in the SINAPRED system offers opportunities, using their own institutional funds, to collaborate on disaster management-related projects and activities outlined in SINAPRED's Annual Plan.

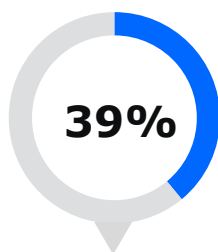
Law 337 mandates that local governments allocate funds for disaster risk-management activities within their jurisdictions. Municipalities reported being required to dedicate at least 7% of their budgets to disaster management. Many of those interviewed mentioned budget concerns, often having to make do with the resources on hand or borrowing from nearby municipalities. Forty-eight percent (48%) of those surveyed said that their organizations do not have dedicated budgets for disaster preparedness, and 46% do not have dedicated budgets for disaster response. Only 39% of survey respondents consider the national disaster-management budget adequate to respond to a major disaster. Furthermore, only 28% felt that their organizational budget was adequate for the last disaster response conducted.



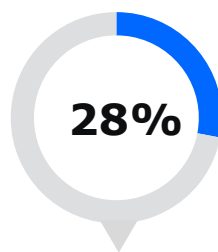
48% of those surveyed stated that their organizations do not have a dedicated budget for disaster preparedness.



46% of those surveyed stated that their organizations do not have a dedicated budget for disaster response.



39% of those surveyed consider the national disaster management budget to be adequate to respond to a major disaster.



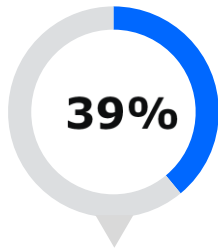
28% of those surveyed felt that their organizational budget was adequate for the last disaster response conducted.

The implementation of medium- to long-term DRM and DRR activities are often reliant on funding from NGOs and other donor agencies; for example, construction of EOCs and warehouses, the development of municipal DRM plans, retrofitting structures, and institutionalizing hazard-warning systems. According to a 2010 World Bank GFDRR report<sup>10</sup>, significant investments in DRM were carried out by SINAPRED in the 30 most vulnerable municipalities and in poor sections of Managua between 2004 and 2008 with Social Investment Fund (FISE) monies.

Adequate funds are not available to effectively address long-term DRM and DRR activities, including prevention and mitigation, as articulated in the country's legal framework. While SINAPRED has done a good job of leveraging donor-funded projects, donors often have requirements linked to timelines, goals, and objectives that may not be aligned with SINAPRED's programmatic agenda, leaving gaps in addressing long-term DRR activities. Without a strengthened fiscal policy in support of DRR, advancements in long-term DRR solutions to minimize risk for the country will be slow.

### National Disaster Fund

A major milestone achieved by the Nicaraguan Government was the establishment of a National Disaster Fund (FND) through the enactment of Law 337. The FND is managed by the Co-Direction of SINAPRED in compliance with administrative controls established by the Ministry of Public Finance and the Comptroller General of the Republic. The FND is capitalized with yearly national-budget allocations in the amount of 33,000,000 NIO (1.1 million USD). The FND may be increased with the contributions, gifts, bequests, or grants and contributions of persons, whether natural or legal, national, or foreign. Should there be inadequate funds in the event of a disaster, the release of additional funds



39% of those surveyed consider the National Disaster Fund to be adequate to support response to a major disaster.

<sup>10</sup> The World Bank GFDRR, 2010. *Disaster Risk Management in Latin America and the Caribbean Region: GFDRR Country Notes* Accessed online 11/14/16 at: [http://siteresources.worldbank.org/INTLACREGTOPURBDEV/Resources/840343-1319570618921/Nicaragua\\_DRM.pdf](http://siteresources.worldbank.org/INTLACREGTOPURBDEV/Resources/840343-1319570618921/Nicaragua_DRM.pdf)

is approved through legislation by Nicaragua's National Assembly. As mandated by Law 337, the non-executed resources for the fiscal year remain in the Fund. As of November 2016, the FND's balance was about 6,000,000 NIO (200,000 USD).

### **Funding DRM and DRR Projects**

Nicaragua has a long history of development-assistance programs funded and implemented through the collaboration of NGOs and INGOs, some of which contribute directly to DRM and DRR projects. The 2010 World Bank GFDRR report lists projects initiated between 2001 and 2010 with a DRM/DRR focus and aligned with Hyogo Framework for Action priorities. International partners funding the projects include: The World Bank, the Andean Community Disaster Prevention Support Project (PREDECAN), the Inter-American Development Bank (IDB), Global Facility for Disaster Risk Reduction (GFDRR), Japan International Cooperation Agency (JICA), European Commission, Government of Norway, Spanish Cooperation for International Development (AECID), DIPECHO, Danish Cooperation (DANIDA), and the Swedish Cooperation (COSUDE).

The main purpose of the Fund is to support the people who have been affected by a natural disaster. However, funds may also be used in executing activities with a prevention and mitigation focus. Some contributions to the FND made by international donor agencies may have contingencies associated with them, requiring that funds be directed toward activities with the intent of meeting specific objectives.<sup>11</sup> A significant challenge for any government is to finance and rapidly initiate recovery in the aftermath of an adverse natural event. Recommendations specific to

Nicaragua<sup>12</sup> include reinforcing its fiscal strategy to provide financial support after disasters that cause damage that cannot be funded through internal reserves. The suggested focus should be on DRM. Development of a financial strategy would ensure medium- to long-term DRM commitments for Nicaragua.

Findings confirm that while progress to enhance capabilities in the above-mentioned areas has been made, more is needed. Only large corporations typically have insurance against disaster losses. Furthermore, areas of the country where economic constraints such as poverty are prevalent, are more vulnerable to the effects of hazards, have fewer resources to invest in preparedness measures and may be slow to recover after a disaster. According to the RVA, departments demonstrating high to very-high economic constraints include: Río San Juan, RAAS, Jinotega, Boaco, Nueva Segovia, and RAAN. Notably, these departments are also among the least resilient as shown by the RVA Lack of Resilience scores.

### **Appointed/Cabinet-level Position**

The Co-Direction of SINAPRED is the coordinating entity in charge of overseeing compliance with the principles, objectives, and purposes of the National System. Co-Directors are appointed by the President, and as the liaisons between the

<sup>11</sup> The development of disaster risk management (DRM) plans for vulnerable municipalities is one example.

<sup>12</sup> The World Bank GFDRR, 2010.

executive branch of the government, sector institutions, and disaster management committees at all levels, have direct access to the President.

## Successes



### **Budget for disaster management**

The inclusion of a budget line for SINAPRED in the national budget demonstrates a foundation of supportive values for government action.



### **National Disaster Fund**

Nicaragua established a National Disaster Fund through enactment of Law 337 in 2000.



### **Appointed leadership positions**

SINAPRED Co-Directors are appointed by and have direct access to the President.

## Challenges Identified



### **Limited budget to implement DRR goals and objectives**

SINAPRED has a limited budget to implement its vision for a holistic disaster management approach as articulated in the country's legal framework, which presents challenges to fully realizing its DRR goals and objectives.



### **DRR program alignment**

SINAPRED has done a good job of leveraging donor-funded projects, donors often have requirements linked to timelines, goals, and objectives that may not be aligned with SINAPRED's programmatic agenda, leaving gaps in addressing long-term DRR activities.



### **Program sustainability**

Some donor-funded projects do not provide the technical support, equipment, or training necessary to maintain and sustain programs or capabilities after project completion, reducing the efficacy of outcomes and accomplishments.



Recommendations

01

Strategic investments to advance and sustain DRR

Identify and prioritize DRR projects and activities in accordance with strategic goals and objectives that will reduce risk, strengthen disaster risk management, and provide institutions with the necessary training, equipment, or technical support to manage, maintain, and sustain project outputs or deliverables.

- A. Utilizing the latest risk and vulnerability information, identify projects and activities (outside the scope of annual budget allocations) that will reduce, prevent, or mitigate disaster risk, while subsequently supporting long-term development goals.
- B. Develop detailed outlines of priority projects, identifying goals and objectives, cost-benefit analyses, deliverables and outcomes, timeline, implementation requirements, and lead institutions to manage, maintain, and sustain activities.
- C. Engage donors to identify funding sources.

Effort:



Complexity: Moderate

Cost: \$





## Legal Authority to Act

Nicaragua's Sistema Nacional para la Prevención, Mitigación y Atención a Desastres or SINAPRED (National System for Prevention, Mitigation, and Attention to Disasters) was established as the disaster management authority by Law 337. The law outlines the structures, functional relationships, methods, and procedures among public sector institutions, social- and private-sector organizations, and the departmental, regional and municipal authorities needed to carry out coordinated actions to reduce risk.



**Legal Authority  
to Act**



Disaster Management  
Legislation

Designated Authorities

Disaster Management  
Documentation Availability

Documentation/SOP Update  
Frequency

### Disaster Management Legislation

Through the enactment of Law 337, SINAPRED has the mandate to protect the lives and property of Nicaragua's citizens against the risks arising from natural and anthropogenic disasters. Law 337 respects the autonomy of regional and municipal governments, making them primarily responsible for activities related to prevention, mitigation, preparedness, response, rehabilitation, and reconstruction in their jurisdictions. Provisions are in place for the central government to supply economic and technical support and personnel if the capacities of the territories to manage these activities are exceeded.

Law 337 specifies that the National System be integrated with the following institutions:

- A National Committee on Prevention, Mitigation, and Disaster Relief;
- State organizations and institutions that form the public administration in different sectors and levels of territorial organization;
- Departmental committees;
- Municipal committees; and
- Committees of the autonomous regions.

Law 337 created a National Disaster Fund to be made available during disasters. It also established a "Co-Direction" to the National System responsible for:

- Ensuring compliance with the principles, purposes, and objectives of the National System and the fulfillment of its functions;
- Functioning as a liaison between the President and the different levels of territorial and sectoral organizations of the System;
- Coordinating the actions of the Sectoral Work Commissions; and
- Acting as the technical body for the National Committee and the National Disaster Fund.

In addition, the Law charged the general staff of the Civil Defense of the Nicaraguan Army with the creation of a National Disaster Operations Center (CODE), to be

equipped with the necessary personnel, facilities, equipment, and other resources to fulfill the functions of the National System.

Law 337 also outlines protocols for alerting the public in the case of hazard occurrences or emergencies, and details the process for declaring a “State of Disaster.” Pursuant to the law, it is the responsibility and function of the Ministry of Health (MINSA) to issue health alerts. Environmental alerts are the responsibility and function of the Ministry of Environment and Natural Resources (MARENA). In either event, the law requires these ministries to establish coordination with other ministries and appropriate levels of government.

Nicaragua’s legal framework has also promoted the development of strategic action plans that foster long-term DRM and DRR activities. A fundamental document is Nicaragua’s *National Human Development Plan (2012-2016)*, which outlines 12 priorities, among them, “La Protección de la Madre Tierra y Adaptación al Cambio Climático” (the Protection of Mother Earth and Adaptation to Climate Change). Strategies linked to this priority focus on risk management and environmental protection, including comprehensive disaster risk management and climate change adaptation. Nicaragua’s National Policy for Risk Management has its roots in this comprehensive disaster risk-management strategy and outlines six thematic areas for implementation upon which SINAPRED activities are based:

1. Promoting a culture of prevention;
2. Technical transference, vigilance, and monitoring;
3. Response plans;
4. Reconstruction and rehabilitation;
5. Mitigation and adaptation to climate change; and
6. Scientific advancements and research.

The *National Environmental and Climate Change Strategy Action Plan 2010-2015* highlights how impacts from climate change have caused disasters across Nicaragua, putting additional stress on an already resource-constrained nation. The Action Plan references the risk-management aspects of climate change and includes a component on “Mitigation, Adaption, and Risk Management to Climate Change.” A specific action under this component involves instituting “programs of decent housing for the people built with risk-reduction standards.” An additional action entails strengthening “meteorological, seismic, and hydrological monitoring and information mechanisms so that people have timely and accurate information, improving early-warning systems and community and inter-institutional response.”

Nicaragua’s disaster management law is comprehensive and well-articulated, encompassing all aspects of disaster management, including pre- and post-disaster activities and functions. According to stakeholder interviews, however, since the passage of Nicaragua’s disaster management law, the country has prioritized preparedness and response activities over prevention and mitigation. One stakeholder characterized the focus on preparedness and response activities as

being part of “phase one, because these actions save lives.” Limited budget and available staff resources were mentioned as contributing factors to a phased approach to full implementation of Nicaragua’s legal framework.

SINAPRED’s prioritization of, and focus on, response activities has been a necessary first step in strengthening the country’s capacity to meet the hazards it is exposed to. As important is the need to enhance risk knowledge and apply it to projects and activities that prevent and mitigate future risks. Boosting the prioritization of prevention and mitigation activities, as well as pre-disaster planning for post-disaster recovery, would bring the National System into increased alignment with CDM principles and best practices.

Strategic action plans, such as those discussed above, can help guide new policy development and improve disaster management legislation to ensure that DRR becomes a national priority. DRR projects backed by legislation and substantiated by evidence-based risk and vulnerability information will do much to protect lives and livelihoods and support long-term sustainable development.

The combination of legislation-backed initiatives and risk and vulnerability information can advance CDM in Nicaragua. Examples include: implementing structural and non-structural mitigation activities, such as instituting and enforcing building codes and regulations in areas of greatest multi-hazard exposure (Managua, Chinandega, and Granada); and protecting the environment to buffer hazard impacts and protect ecosystems, particularly in areas of low to very-low environmental capacity (Managua, Chontales, Carazo, Boaco, Rivas, Matagalpa, and Madriz) and high to very-high environmental stress (Masaya, Estelí, León, Madriz, Rivas, Managua, and Carazo).

## **Designated Authorities**

Clarity regarding roles and responsibilities for all stakeholders engaged in a country’s disaster management system is essential to minimize duplication of efforts and maximize the utilization of limited resources.

Nicaragua’s Law 337 established SINAPRED as the entity responsible for:

1. the prevention and mitigation of risk;
2. response to emergencies; and
3. the rehabilitation of territories affected by disasters.

SINAPRED links ministries and institutions, such as Health, Education, Environment, and Transportation and Infrastructure in the coordination of disaster management in Nicaragua. SINAPRED’s Co-Direction serves as the liaison between the executive branch of the government, a National Committee, and disaster management committees at department and municipal levels (Figure 14).

The National Committee is the administrative entity of SINAPRED. The committee’s role is to define the policies and plans of the National System and approve the annual

budget directed to the National Disaster Fund. Chaired by the President of the republic or his/her delegate, the National Committee's members include:

- Minister of Defense (accompanied by the Head of the National Army);
- Minister of Interior (accompanied by the Chief of National Police);
- Minister of Foreign Affairs;
- Minister of Finance and Public Credit;
- Minister of Development, Industry and Commerce;
- Minister of Health;
- Minister of Transportation and Infrastructure;
- Minister of the Environment and Natural Resources;
- Minister of Family;
- Minister of Education, Culture, and Sports;
- Director of the Nicaraguan Institute for Territorial Studies (INETER); and
- Other public institutions deemed necessary by the President.

SINAPRED's authority extends to subnational and local levels through established regional, departmental, and municipal committees. Two regional committees (CORPREDS) are responsible for disaster management activities within the northern and southern autonomous regions of RAAN and RAAS (respectively), and are presided over by provincial governors.

Committees in each department (CODEPREDS) are overseen by either the mayor of the largest municipality within a department or an appointed "political secretary," who coordinates subnational disaster management activities and acts as a liaison with SINAPRED.

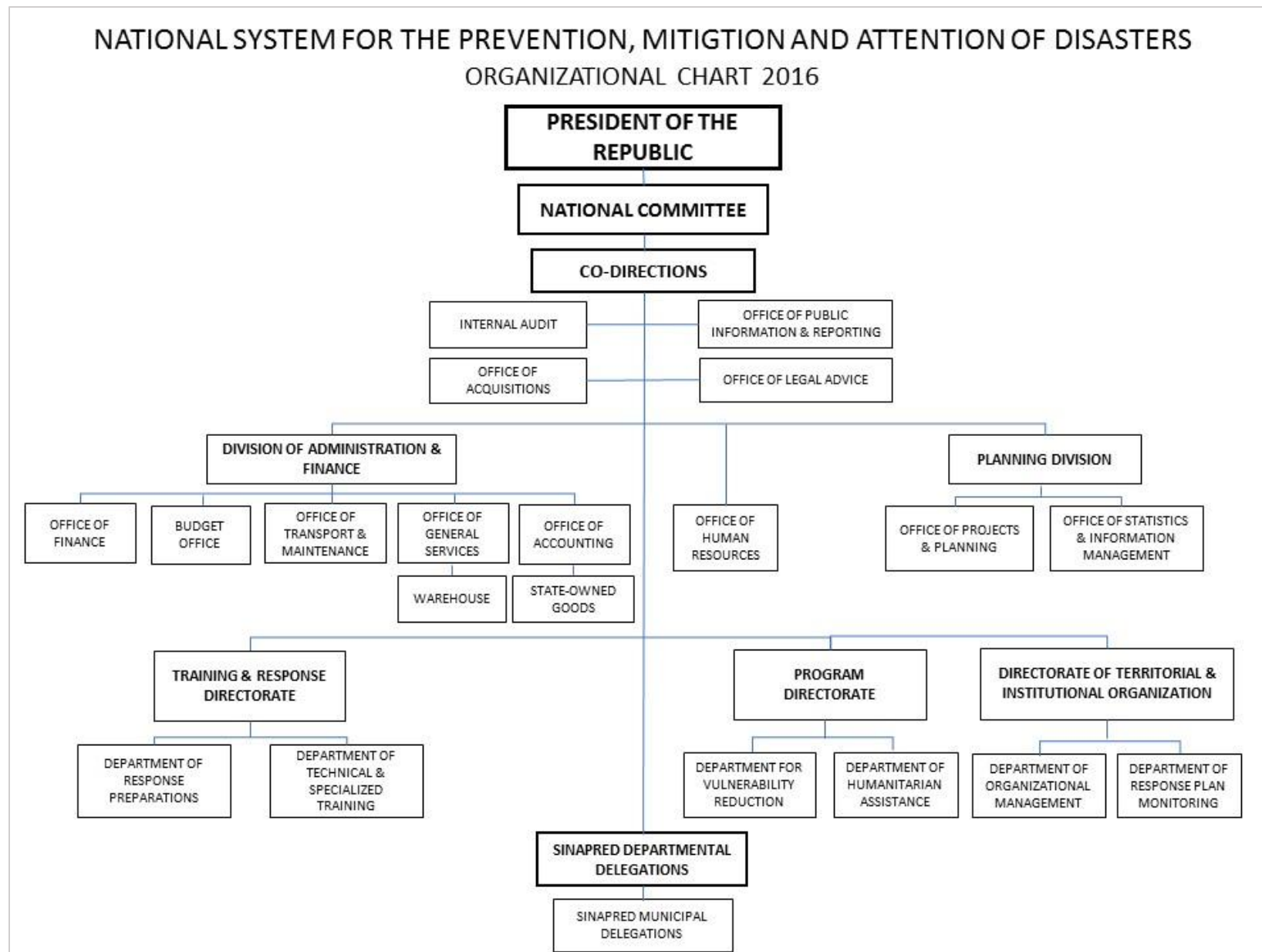


Figure 14. SINAPRED organizational structure

Disaster management committees within each municipality (COMUPREDs) lead local disaster response under Law 337, working closely with committees at local (COLOPREDs), district (COBAPREDs), and community (COCOPREDs) levels. COMUPREDs are supervised by the departmental CODEPRED during a disaster. COMUPREDs have a defined scope of work and geographic competencies as outlined in their response plans. If, in consultation with the CODEPRED, it is decided that the capacity of the municipality to respond to a hazard event is exceeded, the CODEPRED will step in to assist. If subnational capabilities are exceeded, assistance from the national level is provided.

SINAPRED is directly supported by representatives of various ministries and institutions that liaise with SINAPRED through participation in Sectoral Work Commissions chaired by members of the National Committee, including:

- Commission for Education and Information
- Commission on Natural Phenomena
- Security Commission
- Health Commission
- Commission on the Environment
- Supply Commission
- Infrastructure Commission
- Special Operations Commission

The National Committee is empowered to create other Sectoral Work Commissions as required to support disaster risk-management (DRM) activities.

Representatives of the institutions participating on the National Committee engage as members of the CORPREDs, CODEPREDs, and COMUPREDs at regional, departmental, and municipal levels. For example, a delegate from the Nicaraguan Army is assigned to each COMUPRED to assist with special operations, search and rescue, and other activities. COMUPREDs also have Sectoral Work Commissions, though fewer than at the national level. The following municipal Work Commissions are typical:

- Security Commission
- Supply Commission
- Infrastructure and Transportation Commission
- Health Commission
- Committee on the Environment and Natural Resources
- Consumer Defense Commission

The Nicaraguan Institute for Territorial Studies (Instituto Nicaraguense de Estudios Territoriales, or INETER) is the scientific and technical institution of Nicaragua's disaster management system, providing situational awareness, research, and monitoring of hazard phenomena throughout the country. INETER coordinates directly with the Co-Direction and Defensa Civil de Nicaragua to ensure timely

notification of hazard occurrences. SINAPRED activates the country's early-warning system based on recommendations from INETER and Civil Defense.

Law 337 charged Civil Defense with the creation and management of a Centro de Operaciones de Desastres or CODE, (National Disaster Operations Center) to be a specialized and permanent structure to facilitate the coordination of SINAPRED institutions and carry out efficient and timely response operations. During a disaster, Civil Defense leads operations at the CODE, which serves as the operational hub for information collection, processing, analysis, and dissemination to all SINAPRED institutions.

Foreign humanitarian aid is coordinated by MINREX. Nicaragua decides what aid is accepted from foreign institutions once the President declares a State of Disaster. All foreign aid for disaster assistance, whether organizational, physical, or material, is coordinated through MINREX. A specific unit within MINREX manages the entry and transit of supplies, NGO activities, etc. According to interviews, protocols and procedures are in place to expedite customs and border control, and for transporting supplies through Nicaragua to other countries requiring disaster assistance to "guarantee safe passage."

MINREX participates as part of the Humanitarian Assistance Center or CCAH (El Centro de Coordinación para la Asistencia y Ayuda Humanitaria). The CCAH is part of a Central American-wide system, whose primary mission is to administrate humanitarian aid. CCAH engages numerous representatives from about 10 national institutions, including the Office of the President, the National Assembly, Customs and Border Control, Health, Transportation, Hacienda Ministry, and the General Directorate of Revenue. A "green alert" triggers monitoring duties of the CCAH. Through its cooperation agreement with SINAPRED, MINREX not only participates in the CCAH but also coordinates during an event through technical liaisons posted at MINREX and the CODE.

While there have been no recent activations of the SINAPRED system (since Tropical Cyclones 12E [2011], Felix [2007], and Mitch [1998]), bilateral and multilateral aid

#### Civil Defense

Civil Defense leads the Special Operations Commission and represents the military forces within the SINAPRED system. Should SINAPRED need additional capabilities from the military, Civil Defense acts as the liaison to the higher commands. A Humanitarian Rescue Unit (UHR) is a permanent force within the Nicaraguan Army that is activated by Civil Defense to conduct search and rescue, and provide humanitarian relief during a disaster. The UHR includes 300 soldiers and dedicated equipment, and is augmented as necessary depending on the severity of the emergency. Nicaragua is part of the Conference of Central American Armed Forces (CFAC) and can request support from regional military partners, as necessary. Coordination with UHR-CFAC occurs through Nicaragua's Ministerio de Relaciones Exteriores, or MINREX (Ministry of Foreign Affairs).

Additional Civil Defense functions include training disaster -management committees at all levels, as well as community brigades; conducting exercises and disaster-preparedness drills; monitoring natural phenomena in coordination with INETER; transporting relief supplies; supporting the activation of shelters; developing hazard-specific contingency plans; and performing preliminary damage and needs assessments (PDNA).

has been received for lesser emergencies from the World Food Programme (WFP), United Nations (UN), the World Bank (WB), the Inter-American Development Bank (IDB), and national governments. Some of this aid has been used to fund development projects in the country. During non-disaster times, MINREX facilitates implementation of risk-management projects made possible through international aid from donors such as IDB, the Japan International Cooperation Agency (JICA), WFP, and national governments.

During a disaster, SINAPRED serves as the point of contact for the UN Humanitarian Network. The Humanitarian Cluster for Health is led by the Pan-American Health Organization (PAHO) and the UN Office for the Coordination of Humanitarian Assistance (OCHA). Both the World Health Organization (WHO) and PAHO have offices within MINSA. In 2016, per Law 337, MINSA assumed the duties of managing the country's blood bank, previously managed by the Nicaraguan Red Cross.

The Red Cross has a designated role to provide first aid and emergency services with its cadre of 55 ambulances and trained staff and volunteers throughout the country, and responds directly to "128" emergency calls (the equivalent of "911")<sup>13</sup>. The Red Cross plays an instrumental role within the SINAPRED system as an advocate for prevention activities and has developed strategies for effective communication related to prevention.

## **Disaster Management Documentation Availability**

The coordination of disaster activities across a broad range of partner organizations is most successful when partners are encouraged to engage throughout the planning process, from the initial drafting of plans to the sharing of relevant plans between organizations. Nicaragua's Law 337 facilitated the development of a National Response Plan in 2001. Copies of the National Response Plan and Annex to the National Response Plan updated in 2008 were found online.

SINAPRED has eight hazard-focused response plans and one operations plan, the "Disaster Protocol Guide," which articulates and defines coordination and protocols for activation of the Sectoral Work Commissions (e.g., Health, Supplies, Special Operations, etc.) These plans were not made available for review.

Civil Defense's website describes six contingency plans for providing humanitarian assistance for the following natural or man-made phenomena:

- Macro-Pacific regional earthquake plan
- Winter plan (includes heavy rains and hurricanes)
- Volcanic-eruption plan
- Forest-fire prevention and control plan
- Tsunami plan (for coastal areas of the macro-Pacific region)
- Mass-gathering security plan

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<sup>13</sup> According to stakeholder interviews, "People call the Red Cross over other actors for first response."

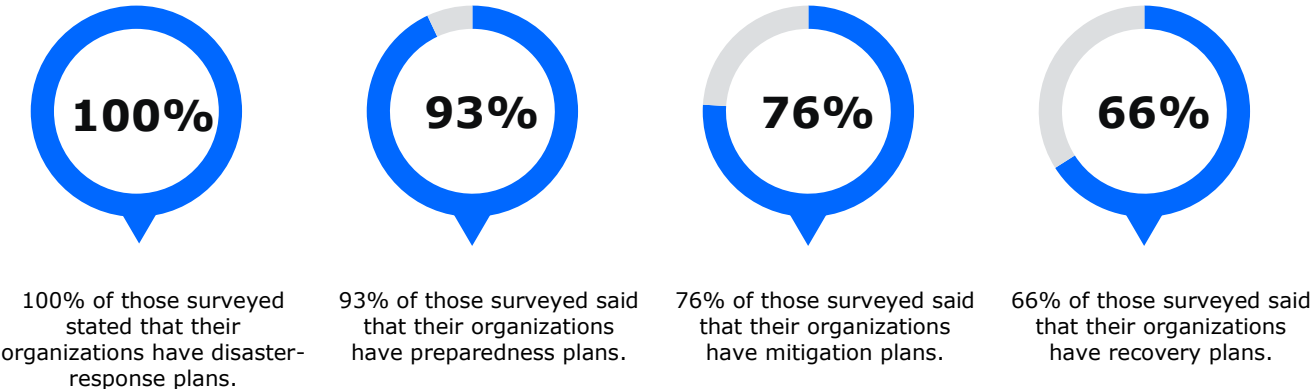


A Ministerial Decree establishes requirements for emergency-plan development among institutions that are part of the National System. For example, MINSA develops national- and community-level multi-hazard and contingency plans. MINED has also developed emergency plans at strategic (ministerial) and tactical (school) levels.

Disaster management planning at the municipal level is supported by specialists from SINAPRED’s Directorate of Territorial and Institutional Organization (Dirección de Organización Territorial e Institucional), which provides templates and technical guidance for the completion and update of plans. Municipal response plans incorporate relevant aspects of the national plans and are shared in digital form with SINAPRED. These plans generally identify threats and the populations exposed to them, including those who are particularly vulnerable or require special attention; describe operational procedures, including hazard monitoring, and alert and warning procedures; define roles and responsibilities of those participating in disaster management activities; and describe the resources available to support response operations. Some municipal plans include detailed maps of hazard zones.

Less formal response planning takes place at the neighborhood or barrio level. Per stakeholder interviews, neighborhood COBAPREDs maintain plans related to evacuation, communications, and the coordination and sharing of resources.

An impressive 100% of those surveyed reported that disaster response plans were in place within their organizations. Disaster preparedness plans were also prevalent (93%), but disaster-mitigation plans (76%) and recovery plans (66%) were less widely available. Despite the greater emphasis on response and preparedness planning, 90% of those surveyed consider their disaster management plans to be “comprehensive” in nature.



According to survey results, the composition of disaster management plans varied considerably (see Table 10)<sup>14</sup>.

<sup>14</sup> “Other” includes “missing,” “I don’t know,” and “does not apply” responses.

*Table 10. Survey responses to questions regarding specific elements of Nicaragua's disaster management plans*

<b>Does plan include information on:</b>	<b>Yes</b>	<b>No</b>	<b>Other</b>
All hazard types	79%	12%	8%
Public outreach	71%	19%	10%
Early warning	81%	14%	5%
Evacuation	91%	2%	7%
Logistics	71%	16%	14%
Shelter operations	31%	47%	22%
EOC activation	71%	19%	10%
Separate SOP for EOC activation	55%	22%	22%
Transportation	60%	26%	13%
Communications	66%	21%	13%
Public works and engineering	28%	48%	14%
Public health and medical services	21%	55%	25%
Search and rescue	47%	41%	13%
Hazardous materials	29%	54%	17%
Agricultural and natural resources	26%	52%	22%
Public safety	40%	43%	17%
Long-term recovery	29%	48%	23%

Coordination among designated authorities is most effective when informed by thoughtful planning that takes into account the above elements, as well as risk and vulnerability information. RVA results show that departments with the highest vulnerability related to access to information include Jinotega, RAAN, and Río San Juan. Data for these departments indicate that populations have less education and limited access to TV, radio, and the internet, which limit their ability to receive and understand hazard alerts and warnings.

Pre-positioning of relief supplies can be informed by considering which departments have the highest multi-hazard exposure (Managua, Granada, and Chinandega), where populations demonstrate the highest vulnerable health status due to undernourishment, disability, or recurring illness (Río San Juan, Jinotega, and

RAAS), and departments where clean-water vulnerability (limited access to clean water and sanitation) is very high (RAAN, Jinotega, and RAAS).

Locations where gender inequality and marginalization are prevalent (Jinotega, RAAS, and RAAN) or where population pressures are highest (RAAN, Río San Juan, and Jinotega) can inform planning efforts to ensure equitable distribution of relief supplies and the provision of adequate services or special assistance after a disaster.

In an interview, SINAPRED shared its vision of having comprehensive disaster risk-management (DRM) plans for all 153 municipalities in the country. Approximately 60 DRM plans were developed over the last 10 years with funding from The World Bank (WB) and the Inter-American Development Bank (IDB). However, recent development of DRM plans has been hindered by a lack of resources and available expertise necessary to produce them.

Response plans, on the other hand, are updated routinely and have been completed for almost every municipality. According to those interviewed, SINAPRED has an open policy for disseminating plans. When asked if representative sample plans could be made available to the project team, SINAPRED provided digital copies of 145 of 153 municipal response plans for review. DRM, mitigation, and recovery plans were not provided.

Disaster planning in accordance with Law 337 is a priority activity for SINAPRED, taking place at national, subnational, local, and institutional levels, as confirmed by survey responses and stakeholder interviews. Disaster-response plans were not only prevalent

within a majority of organizations, but many (81%) participants reported that they have access to copies of their organizations' disaster-management plans. The sharing of plans within and between agencies is also fairly widespread, with 66% reporting this to be the case. According to interviews, most disaster-response plans are updated annually.

While many municipal response plans include some analysis of risk factors, these discussions are limited and could be strengthened and expanded during subsequent revisions, taking social- and economic-risk and vulnerability information into account. By incorporating risk and vulnerability information in municipal disaster plans, key activities to prevent or mitigate risk could be documented and provide justification for implementation. Expanding planning and implementation in these

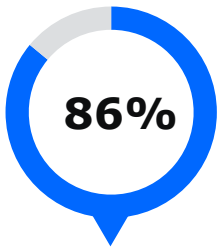


areas will not only reduce risk at subnational levels but further operationalize SINAPRED activities in accordance with the country’s legal framework.

**Documentation / SOP Update Frequency**

The National Response Plan for Nicaragua was completed in 2001 and updated in 2008. An Annex to the National Response Plan was also completed in 2008. Neither of these have been updated since 2008.

Stakeholders reported that SINAPRED’s “Disaster Protocol Guide” and hazard-specific contingency plans are updated annually. Municipal response plans are updated on an annual basis but may be updated more frequently, such as after a major event, at the beginning or end of the flood season, or during the dry season when wildfires are more prevalent. Several ministry representatives said that their institutional plans are updated each year, as required by law. The Nicaraguan Red Cross has a national disaster-response plan and hazard-specific contingency plans that are updated every two years.



86% of those surveyed stated that their standard operating procedures (SOPs) are updated annually.

## Successes



### **Legal framework**

Law 337 provides the legal framework and structure for disaster management activities in Nicaragua.



### **Disaster management authorities**

Law 337 establishes SINAPRED as the disaster management authority, and designates roles and responsibilities of other disaster management actors.



### **Disaster planning**

Institutions have disaster-response plans in place and procedures for routinely updating plans and procedures.

## Challenges Identified



### **Full implementation of legal framework**

Nicaragua's disaster management law is comprehensive and well-articulated, encompassing all aspects of disaster management, including pre- and post-disaster activities and functions. According to stakeholder interviews, however, since the passing of Nicaragua's disaster management law, the country has prioritized preparedness and response activities over DRR. Limited budget and available staff resources were mentioned as contributing factors to this phased approach to full implementation of Nicaragua's legal framework.



### **Subnational disaster management capacities**

Law 337 clearly outlines roles and authorities among disaster management actors, and the National System is infused with institutional expertise at all levels through the participation of sectoral work commissions within the disaster management committee structure. Yet, multiple stakeholders expressed the need to strengthen subnational (especially municipal) capabilities. Despite the mandate that they fund and manage disaster management activities within their territories, subnational governments still heavily rely on technical, material, and human-resource assistance from the central government. With only 100 employees to meet day-to-day responsibilities and provide the necessary assistance to subnational governments, SINAPRED would be quickly overextended during a major disaster.

### **Expansion of planning efforts**



While many municipal response plans include some analysis of risk factors, these discussions are limited and could be strengthened and expanded during subsequent revisions, taking social- and economic-risk and vulnerability information into account.

Recommendation

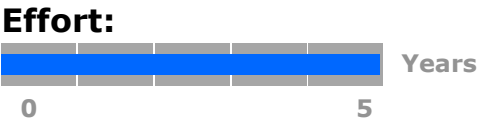
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Enhance subnational planning for DRR

Continue to enhance municipal-planning initiatives to incorporate analyses of socioeconomic risk factors and identify mitigation projects that prevent or reduce disaster risk. By incorporating risk and vulnerability information in municipal disaster plans, key projects and activities to prevent or mitigate risk can be identified for implementation.

Expanding planning and implementation in these areas in accordance with strategic plans will not only reduce risk at subnational levels but further operationalize SINAPRED activities in accordance with the country’s legal framework.

- A. Increase budget allocations for municipal disaster management planning efforts. Alternatively, identify funding source(s) (e.g., international donors) to support municipal disaster management planning in line with strategic goals and objectives.
- B. In cooperation with SINAPRED, implement training workshops at municipal levels to enhance understanding of risk, risk assessment, and disaster risk-reduction principles.
- C. Expand disaster management planning efforts to incorporate analyses of socioeconomic risk factors. Based on plan updates, identify potential mitigation projects to prevent or reduce risk.
- D. Evaluate and prioritize projects considering risk and vulnerability information, cost-benefit analyses, strategic goals and objectives, and sustainable development plans.
- E. Institute a phased approach to fund and implement high-priority structural and non-structural mitigation projects, distinguishing among those that may be funded, managed, and sustained through local initiatives, or require additional funding sources.



**Complexity:** Complex  
**Cost:** \$\$\$





## Advocacy Supporting Action

An organization's ability to respond adequately to a disaster event is indicative of the broader commitment to, and support for, disaster management activities by communities and the government. For the past 10 years, Nicaragua, with the advocacy of its government, has been promoting a "culture of prevention and preparedness," prioritizing the development of its disaster management system to address the risks posed by numerous hazards. Widespread engagement of the population in disaster management exercises and significant awareness and preparedness-building efforts at subnational and local levels have done much to build advocacy and support for the National System.



### Advocacy Supporting Action



Recent Disaster Events

Disaster Declarations

Recent Disaster Legislation

Political Approval Ratings

Agencies with Disaster Management Focus in Country

## Recent Disaster Events



Cyclone



Earthquake



Tsunami



Flood



Landslide



Volcano

### Tropical Cyclone Otto

Nicaragua's President issued a disaster declaration after three hazard events affected the country on 24 November 2016. Tropical Cyclone 16L (Otto), a Category 2 hurricane, posed the most significant threat that day, impacting the southeastern part of the country with winds of 175-195 km/hour. The hurricane made landfall near San Juan de Nicaragua and Río San Juan, less than 20 miles north of the border between Nicaragua and Costa Rica.

Modeling results (see Figure 15) based on advisory information show estimated wind impacts as the storm approached the southeastern coast of Nicaragua. By Advisory 13, issued by the National Hurricane Center in Miami, Otto had reached hurricane status. Forty-five minutes after Hurricane Otto made landfall, a 7.0 magnitude earthquake occurred off the Pacific coast of Nicaragua. The earthquake triggered a tsunami warning for the Pacific coast, and tremors were felt across the entire

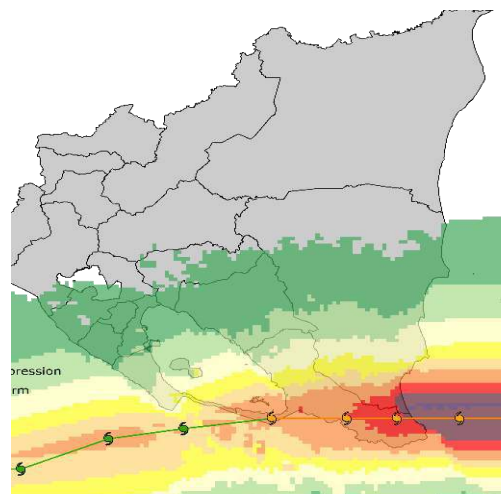


Figure 15. The Arbiter of Storms (TAOS) model estimated wind, rainfall, and storm-surge impacts based on the National Hurricane Center Advisory 13

region.<sup>15</sup> While the earthquake and tsunami warning initially diverted some attention away from Otto response activities, few damages as a result of the earthquake were reported in Nicaragua.

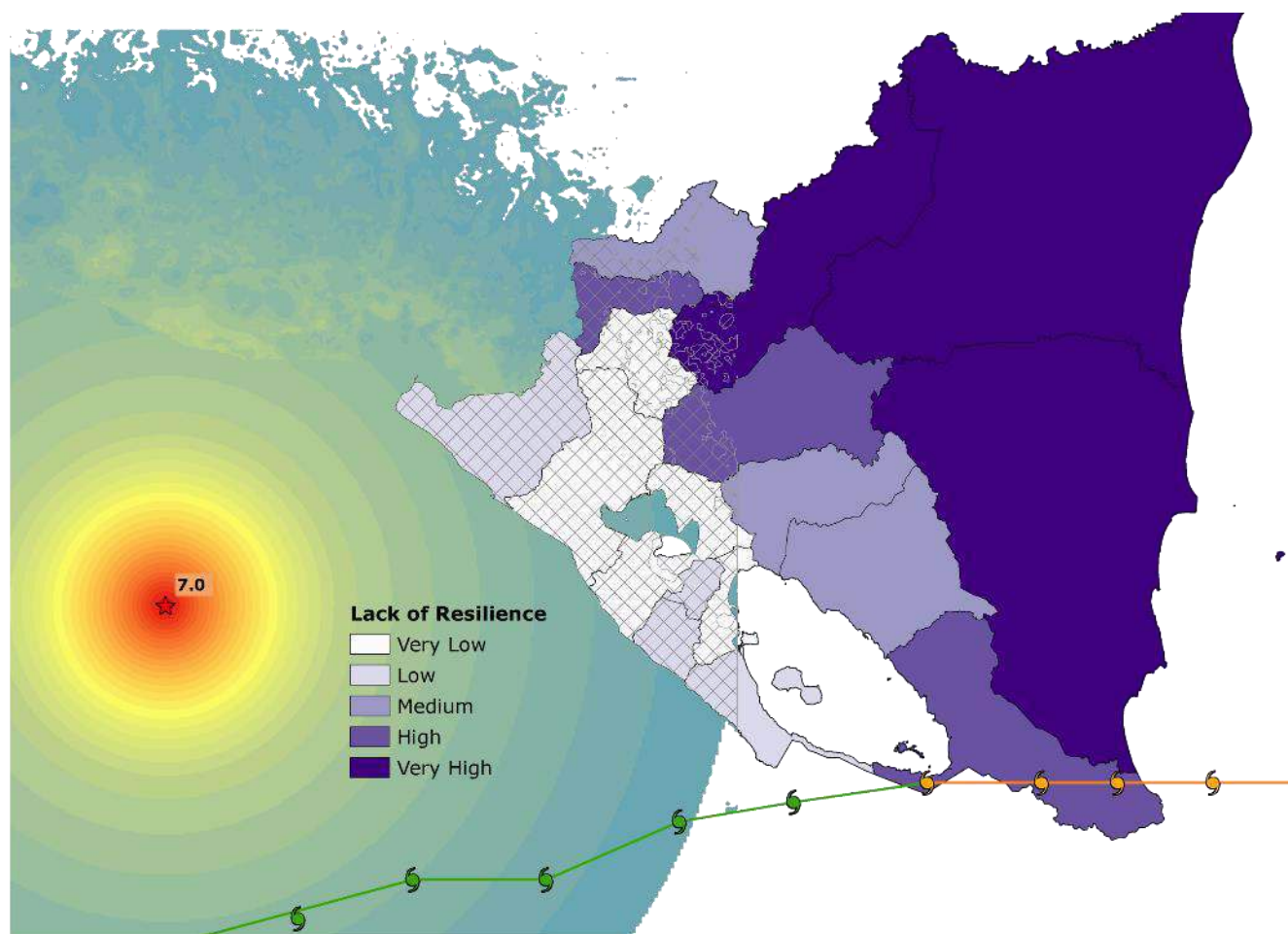


Figure 16. Epicenter and shaking intensity of the 7.0 magnitude earthquake that occurred off the Pacific coast of Nicaragua on 24 November 2016, with Hurricane Otto track and RVA Lack of Resilience Index layer (Source: PDC)

Fourteen municipalities suffered damage due to Otto's hurricane-force winds in the Autonomous Region of the South Caribbean Coast (RAAS); the departments of Central Zelaya, Río San Juan, and Rivas; and on Corn Island. Three municipalities (San Juan, San Carlos, and El Castillo) were hardest hit. Fortunately, there were no deaths or injuries resulting from the storm.

<sup>15</sup> PDC Updates, 7 December 2016: *Nicaragua Experiences Historic Day of Hazards*. Accessed online at: <http://www.pdc.org/news-n-media/pdc-updates/Nicaragua-Experiences-Historic-Day-of-Hazards/>

According to the preliminary damage and needs assessment published in December 2016, damage was mainly concentrated in the environmental, social, and infrastructure sectors. The areas most affected were in the Río San Juan Biosphere

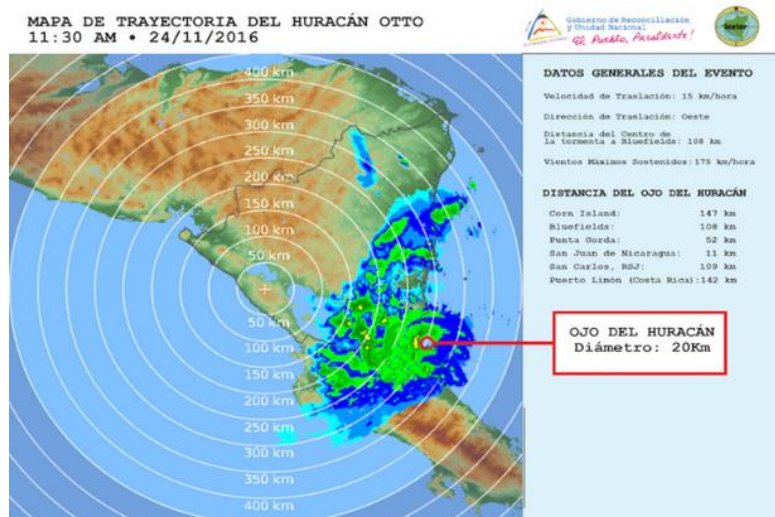


Figure 17. Trajectory of Hurricane Otto – 24 November 2016 (Source: INETER)

Reserve and the Isla de Ometepe Biosphere Reserve, where almost 2 million hectares of forest were damaged along with wildlife habitat. Otto's path directly impacted the Indio Maiz Biological Reserve, where proposed recovery actions will focus on protective measures and restoration in a core area of 85,924 hectares.

On Corn Island, storm surge impacted the southern coastal beach headlands, causing severe erosion and flooding some homes.

Preliminary damage, losses, and needs resulting from Hurricane Otto as reported in the December 2016 assessment are included in Table 11. Damage and losses represented 2.94% of GDP (2015 value).

Table 11. Preliminary damage, losses, and needs - Hurricane Otto

Sectors	Damage	Losses	Total (Damage and Losses) in Millions of Córdoba			Needs
			Private	Public	Total	
Environmental	1,249.4	8,584.0	81.0	9,752.4	9,833.4	570.9
Social Sectors	106.0	33.2	87.9	51.3	139.2	189.9
Productive Sectors	14.0	94.7	107.7	1.0	108.6	14.0
- Agriculture	-	19.5	19.5	-	19.5	
- Cattle Raising	0.8	-	-	0.8	0.8	0.8
- Fishing	0.2	71.4	71.4	0.2	71.6	0.2
- Commerce	0.0	0.3	0.3	-	0.3	0.0
- Tourism	13.0	3.4	16.4	-	16.4	13.0
Local Costs of the Emergency	55.9	6.7	-	62.6	62.6	67.9
Infrastructure	19.0	4.2	1.4	21.8	23.2	129.5
<b>Totals</b>	<b>1,444.2</b>	<b>8,722.8</b>	<b>278.0</b>	<b>9,889.1</b>	<b>10,167.0</b>	<b>972.3</b>

*In a survey, participants were asked, "How do you define 'effective disaster response'?"*

Prominent themes included 'timely, efficient, agile, and appropriate response actions,' 'safeguarding lives,' and 'performing accurate damage and needs assessments that speed recovery processes.'



Within a week of the storm's passing, building materials to repair homes were transported via river to the affected area.

### **Other Recent Disasters**

In April 2014, two powerful earthquakes, of magnitude 6.1 and 6.6, occurred just one day apart. The first, of 6.1M, was centered approximately 50 kilometers north of Managua, occurring at a depth of 10 kilometers. According to reports,<sup>16</sup> more than 1,500 homes were damaged or destroyed. Most affected were the municipalities of Nagarote (Department of León) and Managua. SINAPRED declared a red alert for this event, reporting one death and 266 injuries resulting from the earthquake. Ground shaking and landslides associated with the event broke sewer lines and interrupted power and water supplies. The next day, a 6.6M earthquake centered 56 kilometers SSE of Managua caused additional damage and buildings to

collapse. The 6.6M earthquake occurred at a depth of 151 kilometers.

In October 2011, Tropical Depression 12E caused widespread damage across Central America. El Salvador, Guatemala, Honduras, and Nicaragua were hardest hit and declared states of emergency. The storm affected more than 130,000 people across 13 departments of Nicaragua. According to a UN Central Emergency Response Fund (CERF) report<sup>17</sup>, severe flooding and landslides damaged property, vital infrastructure, and agricultural crops. More than 200 water sources were destroyed by excessive rainfall, and thousands of household latrines were damaged. The CERF allocated more than \$2 million to UN agencies to support life-saving interventions and humanitarian-assistance efforts in response to this event.

<sup>16</sup> Very strong earthquakes in Nicaragua – 1 death, 266 injured, 1500 houses damaged. Article by Armand Vervaeck, 10 April 2014. Accessed online 7/7/17 at: <https://earthquake-report.com/2014/04/10/strong-earthquake-nicaragua-on-april-10-2014/>

<sup>17</sup> CERF allocates \$2 million to respond to flood-affected populations in Nicaragua. 4 November 2011. Accessed online 7/7/17 at: <http://www.unocha.org/cerf/cerf-worldwide/where-we-work/2011/nic-2011>



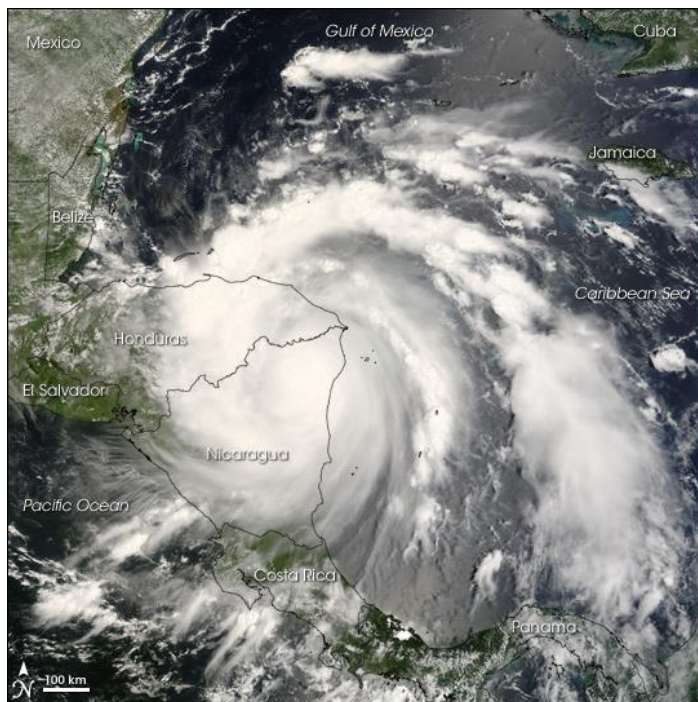


Figure 18. NASA image of Hurricane Felix, 4 September 2007

the country and a 7.2M earthquake occurred in the Fonseca Gulf near Chinandega, Nicaragua. Two of those surveyed also responded to the tsunami threat posed by November's earthquake. Others responded to Hurricane Felix in 2007, while several participants mentioned local flooding events caused by heavy rainfall.

Frequent testing of disaster management protocols through repeated events and exercises has given Nicaragua numerous opportunities to improve disaster management capacities and apply lessons learned. Frequent events have also served to raise awareness among the population, and maintain visibility and dialogue among stakeholders and government leaders.

In 1992, a 7.0M earthquake struck off the Pacific coast, killing 120 people and leaving more than 16,000 homeless. Less recently, a 6.2M earthquake struck northeast of Managua in December 1972, killing more than 5,000 people (according to media reports), and significantly damaging the majority of buildings in the capital city.

Several survey questions posed to stakeholders during facilitated-knowledge exchanges focused on disaster response. One question asked participants, "What was the last major disaster that required your organization to respond?" Many of those surveyed (79%) mentioned back-to-back events in November 2016 when Hurricane Otto made landfall in the southeastern part of

*When asked, "In your opinion, in what disaster was your organization's response most effective?"*

- 72% of participants responded, with 58% listing one or more specific events. Hazards most commonly referred to were earthquakes and hurricanes, with Hurricane Otto (2016), Hurricane Felix (2007), and earthquakes in 2016 and 2014 cited as examples. Floods, tsunami events, environmental hazards, a landslide, and a fuel explosion were also mentioned as examples of effective response.
- Many stated that their organizations' responses were effective in all cases, with several stating that their responses within the last decade have been effective.

A consistent message emerged during interviews with disaster management stakeholders working at national and subnational levels: Enhancing awareness among the population has not only saved lives and reduced injuries, but is also a key area of continued focus.

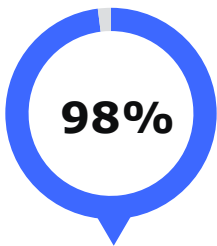
In interviews with SINAPRED soon after hurricane Otto, leadership shared that the response was successful largely because the population had been educated and informed about what to do in the case of such an event. This facilitated evacuation and “maintained a sense of overall calm.” When asked about lessons learned, “An area that we are working on now is to further engage the private sector. There is some engagement, but more can be done.” According to survey results, 65% of respondents felt that local-level public-private partnerships were being effectively leveraged.

**Building Community Preparedness**

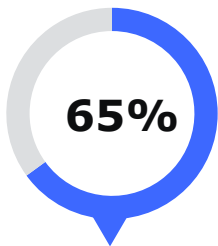
Enhancing awareness and preparedness at community and family levels to strengthen capacity is a top priority for SINAPRED. In an interview, SINAPRED noted that, “Tropical Cyclone Otto hit the country with winds of 175-195 km/hour, causing significant destruction. Thirty minutes after the storm passed, cleaning brigades within the affected communities were at work.” SINAPRED’s “bottom-up” approach to disaster planning and response that recognizes individuals and families as first responders has been very effective, more so than the “top-down” approach that had been previously adopted.

When asked about their greatest challenges and successes, many replied that their greatest success has been the progress they’ve made in promoting hazard awareness and preparedness among the population, but that this is also their greatest challenge. “There are many more people we need to reach.” “It can be considered one of our successes, but is also one of our greatest challenges.” Despite this assessment, an impressive 98% of those surveyed believed there was adequate local support for DRR.

Building a culture of prevention and preparedness involves not only the disaster management community, but the advocacy and dedicated involvement of numerous stakeholders, institutions, sectors, and community members. Advocacy, combined with risk- and vulnerability-assessment information, enables stakeholders to: educate communities about their hazard exposure (e.g., living, working, or attending school in hazard zones), identify areas and populations that are particularly



98% of those surveyed consider there to be adequate local support for DRR.



65% felt that local public-private partnerships are effectively leveraged.

vulnerable (e.g., due to economic constraints, limited access to information, or poor health and sanitation), and pinpoint locations that may require additional or special services before, during, and after a disaster (e.g., due to disability, poor health, age dependency). Inevitably, the demand for assistance often outweighs the availability of resources and services. Enhanced engagement of the private sector and increased collaboration with NGOs could help fill resource gaps through education and training, capacity building, and the provision of services, while simultaneously working in alignment with national DRR objectives.

## **Disaster Declarations**

A “State of Disaster” is declared by the President of the Republic of Nicaragua through an executive decree, which defines the type of disaster, areas affected, cause, and response provisions. Recent disasters that exceeded Nicaragua’s capabilities and required international humanitarian assistance include: Tropical Cyclone Otto in 2016, Tropical Depression 12E in 2011, Hurricane Mitch in 1998, and the 7.0M earthquake of 1992. A complete record of official disaster declarations was not available. However, in recent years SINAPRED has established and maintained a database (Unidad Informacion Facilitacion Assistance or UIFA) to record recent disasters and other incidents, such as vehicle accidents and livestock deaths.

## **Recent Disaster Legislation**

Since the enactment of Law 337 in 2000, the most recent updates to disaster-management legislation were in 2008 and 2014. Law 863, Chapter III, Article 4, published 19 May 2014 in *La Gaceta* (official diary) established the “Co-Direction” of SINAPRED. Law 863 describes the administrative, legal, and coordination functions of the Co-Directors, who are appointed by the President of the republic, and states that future reference to “SE-SINAPRED” in Law 337 is to be replaced by “Codirecciones.”

Decree No. 27-2008, published in *La Gaceta* June 10, 2008, reformed and added to Decree No. 53-2000 and allowed for the appointment of delegates of the National System to the departmental, regional, and municipal committees. Delegates are responsible for keeping minutes of the sessions of the committees, issuing certifications, informing, and coordinating directly with SINAPRED on disaster management related issues. At the department level, representatives are either the mayor of the largest municipality within a department or an individual deemed the department’s Political Secretary (POC). POCs are not employed by SINAPRED.

## Political Approval Ratings

According to a poll conducted by M&R Consultants in April 2017, the Nicaraguan government has an approval rating of more than 70%. A 26 April 2017 article<sup>18</sup> stated that of those surveyed, nearly 75% believed that conditions in the country had improved over the past five years, and almost 73% viewed the government as a unifying force for the nation. Nicaragua's Vice President also enjoys favorable political approval and gives daily radio broadcasts to promote awareness of potential hazards and encourage disaster preparedness among citizens.

## Agencies with a Disaster Focus Active in the Country



*Figure 19. The project team interviewed the Nicaraguan Red Cross in Managua, a key disaster management partner, to gain an understanding of capabilities and available resources to support disasters*

According to stakeholder interviews, NGOs and the private sector are engaged in disaster management activities as needed and in accordance with established protocols. Many NGOs are active in Nicaragua at the community level. However, an exact number was not available, and ministries generally lack a consistent sense of "what the NGOs are doing." Despite the need for services offered by community-based NGOs, collaboration with these entities has been somewhat "problematic," according to those interviewed. Ambiguity of mission was one of the issues raised. A lack of consistency and varying levels of

experience and expertise were others. These issues are compounded by NGOs "not necessarily working in areas where their assistance is most needed." As a result, Nicaragua has been recently working to formalize the coordination of NGO activities. Clearance by the Ministry of Foreign Relations (MINREX) is now required for NGOs to be active in the country.

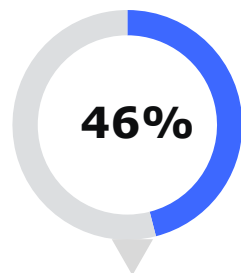
NGOs receptive to aligning their work with national DRR goals have been able to work effectively to positively influence CDM growth for the country, and enabled NGOs like the Red Cross to be formally integrated into the SINAPRED structure. MINSA maintains successful partnerships with UNICEF, PAHO, WHO, and the Red Cross for disaster response, and collaborates on projects with other agencies, such as DIPECHO and the Italian and Spanish Red Cross. MINSA also works with the

<sup>18</sup> <http://www.telesurtv.net/english/news/Poll-Nicaraguas-Ortega-Enjoys-High-Approval-Ratings-20170426-0002.html>

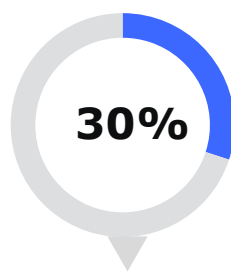


Nicaraguan Center for Health Studies and Investigations (CIES) and provides logistical coordination during disasters and prevention work with the World Food Programme (WFP).

Despite the engagements and significant contributions that NGOs have made to advance DRM activities in Nicaragua, only 46% of survey participants felt that NGOs were actively engaged in disaster preparedness at the local level, and only 30% believed that NGOs were effectively supporting national disaster management goals in Nicaragua.



46% of those surveyed consider NGOs to be actively engaged in local preparedness.



30% believe that NGOs effectively support national DM goals.

**Nicaraguan Red Cross**

Founded in 1934, the Nicaraguan Red Cross (Cruz Roja Nicaragüense) has a clear mission, well-trained staff, resources, and a long history of serving the country’s people, making their participation in the National System valuable and relied upon.

As a pioneer institution for disaster response in Nicaragua and in the Central American region, the Red Cross participated in the development of Law 337 and

participates in eight commissions under the law, including the Special Operations Commission for first response, which includes MINSA, firefighters, police, and the Nicaraguan Army. In addition to its significant training role (discussed in the previous section, Good Leadership by Professionally Trained Officials), the Red Cross is also part of the Supply Commission (Comisión de Suminitros) and has numerous resources dedicated to emergency response (discussed under Necessary Institutional Resources).

The Red Cross works in close cooperation with SINAPRED and implements operational strategies to ensure that duplication of disaster management efforts is minimized. There are over 30 chapters of the Red Cross throughout the country. Approximately half are located in the largest municipalities within departments. Each chapter has a council of five people with a director who is responsible for decision making with the approval of the central office, and at least one ambulance with trained staff and volunteers.

Other NGOs interviewed over the course of the project included the WFP, Oxfam, JICA, and SWISSAID. Their roles and contributions in support of disaster management are briefly outlined below.

### ***World Food Programme (WFP)***

With several offices across the country, the WFP in-country presence supports SINAPRED's disaster management priorities of improving preparedness and conducting training to build capacity, enhance food security, and improve nutrition. WFP has also provided funding for warehouse construction in the country. WFP has been instrumental in providing local disaster management committees in the most remote parts of the country with emergency tool kits and telecommunications equipment, and is collaborating with SINAPRED on a communication strategy to make preparedness information more easily accessible to all. WFP is also engaged in a project aimed at building resilience to drought within the "dry corridor" of the country. The project will offer education on best practices and other support to small farmers in the region.

During a disaster, WFP roles include conducting emergency food and needs assessments, and emergency food stocks, and can quickly (within 24 hours) mobilize emergency funds of up to \$1 million if necessary. The WFP maintains 450 metric tons of emergency food stocks in Nicaragua's government grain warehouse. Should the UN Cluster system be activated, the WFP is responsible for leading the Food Security, Telecommunications, and Logistics clusters.

### ***Oxfam***

Oxfam is active in the Central American region and is a participating member of CEPREDENAC (Centro de Coordinación para la Prevención de los Desastres Naturales en América Central). Its humanitarian mission supports poverty reduction and long-term sustainable development in the country. Working in partnership with DIPECHO, Oxfam has been working within the autonomous regions to strengthen capacity and strengthen communications between the population and SINAPRED.

As one of SINAPRED's partners, Oxfam monitors alerts and activates emergency protocols per its contingency plan, which is updated annually, and participates in training, exercises, and drills to improve internal organizational capacity. During a response, resources can be leveraged in support of risk management, livelihoods support, and water and sanitation. Oxfam has a warehouse of supplies and provides monetary and other assistance with damage and needs assessments after a disaster.

### ***Japan International Cooperation Agency (JICA)***

JICA has been actively working in Nicaragua for 25 years, providing financial and technical assistance in support of risk management. JICA works closely with SINAPRED, providing technical training and staff exchanges, and has partnered with INETER on hazard assessment, mapping, and capacity-building projects related to tsunami warning and community resilience. Recent activities have emphasized the transfer of project ownership to Nicaraguan counterparts.

### **SWISSAID**

Working closely with CEPREDENAC and SINAPRED, SWISSAID supports national institutions, improves risk-management capacities, and supports response operations during disasters. SWISSAID has been actively supporting SINAPRED since 2000, and was the first aid agency to work in support of Nicaragua's new disaster management law. Between 2013-2017, SWISSAID has operated a \$40 million program in Nicaragua, half of which has been allocated for a regional initiative in Nicaragua and Honduras focused on adaptation to climate change and risk reduction.

A project with SINAPRED to support capacity building and the development of risk-management plans at the local level is concluding this year. SWISSAID is seeking funding to continue working with INETER to improve early-warning capacity for earthquakes based on research developed in Switzerland. SWISSAID offers training support to SINAPRED staff attending the master's and postgraduate programs in disaster management offered at the Central American University (UCA) in Managua and the National University of Engineering (UNI).



## Successes



### **“Culture of preparedness”**

Nicaragua fosters the involvement of community members in preparedness and response activities.



### **Routine testing of DM protocols**

Frequent hazard events and regular exercises provide opportunities to test and improve disaster management protocols and apply lessons learned.



### **Effective response**

72% of those interviewed consider recent responses to disasters to be effective.



### **Legislative reforms**

Nicaragua’s disaster management experience has led to reforms in legislation as recently as 2008.



### **Daily radio broadcasts**

Nicaragua’s Vice President gives daily radio broadcasts to promote awareness of potential hazards and encourage disaster preparedness among residents.



### **Red Cross integration in National System**

Nicaragua has formally integrated the Red Cross into the National System and maintains successful partnerships with other NGOs.

## Challenges Identified



### **Limited private-sector engagement**

Stakeholders acknowledged that increased engagement of the private sector (e.g., factories, hotels, businesses) in preparedness activities could enhance participation and cooperation, and boost efficiencies during response.



### **Informal NGO partnerships**

CDM findings indicated that NGO partnerships could be expanded and activities better aligned with national DRR objectives. Many NGOs are working in Nicaragua at the community level, but there is little understanding of the work they are doing. Collaboration has been difficult due to inconsistent engagement in areas where they are most needed, changing missions, and varying levels of experience and expertise.



# Recommendations

01

## Boost private-sector engagement

Develop mechanisms and incentives to boost private-sector engagement and participation in disaster management activities.

- A. Encourage private-sector involvement in disaster management by engaging representatives of local business networks and associations (e.g., Chamber of Commerce), and large business entities, such as factories and hotels, in discussions related to hazard awareness, preparedness planning (e.g., continuity of operations), and disaster response (e.g., evacuation).
- B. Encourage participation in health and safety trainings, drills, and exercises.
- C. Explore ways that the private sector can actively participate in disaster-response activities (e.g., providing shelter, food, and water), and develop memorandums of agreement (MOAs) to formalize partnerships.

**Effort:**



**Complexity:** Medium

**Cost:** \$

02

## Formalize NGO partnerships

Utilize successful NGO partnerships as a model for increasing collaboration and potential integration into SINAPRED’s disaster management structure to positively influence CDM growth for the country.

- A. Work with Ministry of Foreign Relations (MINREX) to identify NGOs whose missions align with disaster management-related activities and explore potential partnerships and areas of collaboration.
- B. Areas of potential collaboration with NGO partners could include training, exercise participation, development, and rehearsal of disaster-response plans, and implementation of community resilience-building initiatives.
- C. Synergistic activities could be defined by memorandums of understanding (MOUs) to ensure alignment with national goals and objectives.

**Effort:**



**Complexity:** Medium

**Cost:** \$





## Necessary Institutional Resources

Since the establishment of its disaster management system in 2000, Nicaragua has made significant progress in developing the institutional, human, and material resources to manage the many risks faced by the country, and is recognized as a leader in disaster management in the region.



**Necessary Institutional Resources**



Resources Designated for Disaster Management

Inventory of Available Resources

Mutual-aid Agreements

### Resources Designated for Disaster Management

The World Bank-funded Natural Disaster Vulnerability Reduction Project (NDVRP) 2001-2009 helped Nicaragua build a National Disaster Operations Center (CODE) that is co-located with SINAPRED and Civil Defense headquarters. Other donors and NGOs have built warehouses, installed warning systems, and equipped local disaster managers with much-needed resources. Numerous human resources are also available to support disaster management activities within the disaster management committee structure that is infused with institutional expertise from national ministries, NGOs, and other organizations. Additional investments, however, are needed to equip and further bolster disaster management capabilities in the country.

#### ***Emergency Operations Centers (EOCs)***

Having a dedicated location from which to conduct disaster-response operations allows for more successful and comprehensive disaster management at the national and subnational levels.

The proximity of the National CODE to SINAPRED and Civil Defense (see Figure 20) supports effective collaboration and timely communication of decisions in support of disaster management activities. Civil Defense also maintains a mobile operations unit at the CODE equipped with a meeting room and telecommunications access that can be transported by semi-truck to a disaster-affected location.

Government ministries with a disaster management role (e.g., MINSA) have institutional EOCs and liaisons to SINAPRED. Liaisons go to the National CODE during times of disasters to ensure that their institutional response is coordinated with national response activities.



Figure 20. Nicaragua's SINAPRED, CODE, and Civil Defense headquarters



Figure 21. Members of the project team were provided a tour of the National CODE by Lieutenant Colonel Marengo, Director of Training, Civil Defense



*Figure 22. Lieutenant Colonel Marenco shared capabilities of the mobile operations unit with members of the project team*

Nicaragua's Red Cross has a national EOC, built in 2011, at its headquarters in Managua. As part of the National System, it is designated as an alternate EOC should the national CODE be damaged or unavailable. The Red Cross EOC has four functional areas: health, information reporting, logistics, and operations, and may be activated by the Red Cross Director independent of SINAPRED activations. The Red Cross also has dedicated buildings that serve as EOCs within six departments. Plans

are underway to establish seven additional departmental EOCs across the country. Where necessary, any physical structure may serve as a temporary EOC to support response operations.

Most municipalities have an EOC or command post that monitors radio communications 24 hours a day, seven days a week. First-response teams at the municipal level – comprised of Civil Defense, National Police, firefighters, health and education officials, Red Cross, etc. – provide emergency services as needed. The EOC of the most populous municipality or capital within a department also serves as the department EOC, where the department-level committee (CODEPRED) meets and coordinates response activities during a disaster. SINAPRED will also engage during a localized disaster, providing support and serving decision makers in an advisory capacity by sending specialists to impacted areas to advise the mayors or political secretaries in each department about the types and quantities of supplies that are needed, sheltering requirements, and other related needs. In the two autonomous regions, the highest level of coordination at the subnational level resides with the regional committees, or CORPREDs.

Transportation was cited as a challenge in many parts of Nicaragua, where poor road conditions and limited networks hinder the movement of emergency personnel and relief supplies. The autonomous regions, in particular, have limited road networks and dispersed populations, making the provision of goods and services difficult. Construction of a new road connecting Bluefields and Managua is currently underway. Scheduled for completion in 2019, the road will make transit times between the two cities approximately six hours. During Hurricane Otto, residents evacuated primarily by boat. Supplies for reconstruction were also delivered by waterway. Stakeholders reported that during an event, the Army and Navy support evacuations and provide alerts to remote communities by boat and helicopter.





Figure 23. The Bluefields EOC and Central Warehouse, funded by USSOUTHCOM.

Private boats are at the full disposal of disaster management personnel during an emergency.

The PDNA report generated after Hurricane Otto proposes the rehabilitation of infrastructure as one area of focus in the region, including resurfacing and raising the elevation of roadways susceptible to flooding, stabilizing embankments, and improving drainage. Other proposed infrastructure improvements include the reconstruction of facilities and public-sector institutions with prevention and risk-management measures, and the relocation of power lines to improve service delivery to communities.

### **EOC Supply Lists**

While a resource inventory list for the National CODE was not available, stakeholders shared that the CODE has a generator for back-up power supply with fuel for 72 hours. The CODE is also equipped with alert and early-warning systems, including radios and sirens. The CODE has a permanent and dedicated computer system for inter-institutional use to monitor events and supply disaster managers at the CODE with information regarding needs. Decision makers from Sectoral Work Commissions use this system. The CODE is equipped with TV monitors linked to authoritative information sources (e.g., INETER, USGS, NWS, SERVIR<sup>19</sup>, GEVN<sup>20</sup>), and radio equipment to maintain communications with all CODEPREDS and some COMUPREDS. The CODE is staffed 24/7 with a small crew dedicated to monitoring events. Only a small stock of supplies is maintained. No sleeping cots or food are kept on hand for 24-hour operations.

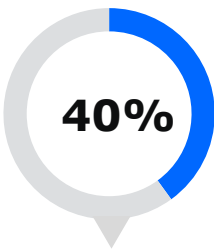
During an event, email, phones, and radio communications are the primary mechanisms for sharing information. SINAPRED has a dedicated phone number that anyone can call during an emergency: #22889910.

The facilities, staffing, and resources dedicated to disaster management at subnational levels vary considerably, as confirmed by surveys, interviews, and site visits. In a survey, only 40% of respondents felt that their organization's EOC had adequate resources to enable them to perform responsibilities effectively, and only

<sup>19</sup> SERVIR (meaning "to serve" in Spanish) is a joint development initiative of NASA and USAID partnering with regional organizations to make geospatial information, including Earth observation data from satellites, geographic information systems, and predictive models useful to developing countries.

<sup>20</sup> The GEOFON Extended Virtual Network (GEVN) operates a global broadband seismic network in partnership with institutions worldwide.

half of survey participants (50%) felt that they have the necessary resources to effectively perform their assigned job requirements.



40% of those surveyed felt that their organization's EOC had adequate resources to enable them to perform responsibilities effectively.



50% of those surveyed felt they had the necessary resources to effectively perform their job requirements.

Although no inventory lists were obtained during visits to several subnational EOCs, discussions with stakeholders provided insight into available resources as highlighted in the case studies presented in this report.

Communications during a disaster was a concern expressed by stakeholders. Many of those interviewed shared that they rely solely on radio communications during a disaster, and the number of radios available to them is extremely limited or non-existent. One NGO shared that there is no cell-phone service, internet connectivity, or radios in operation in remote areas of the country where they work. Another stakeholder said that his institution has no way to communicate with municipal counterparts during a disaster. Limited communications equipment and connectivity leaves some populations without warning mechanisms or opportunities to request assistance during a disaster.

Stakeholders repeatedly expressed that while they make do with the resources on hand, more resources such as tools and equipment are needed to improve efficiencies and enable them to do their jobs more effectively. In the words of one stakeholder, “the need for more resources is always present.”

**Case Study: Masaya**

Masaya’s municipal/departmental EOC is equipped with a large meeting room with tables and chairs, a communications room, an area for administrative staff, and seismic equipment provided by INETER.

Weekly meetings are held with institutions such as the Red Cross, police, MINSA, MINED, firefighters, and the Governance Ministry.

Eighteen radios are used to communicate and coordinate within their network. Each institution assigns human resources and provides necessary equipment to the EOC, which is then distributed as needed.

Structures surrounding the EOC house heavy equipment – including bulldozers, backhoes, trucks and, buses – available for disaster-management purposes.

While much progress has been made to equip and train subnational committees, more is needed to improve and decentralize capacities. There is still heavy reliance

### **Case Study: Nindirí**

The EOC in the municipality of Nindirí has two beds to accommodate staff during operations. Phone numbers of all staff are posted at the EOC for easy reference.

The COMUPRED has some radios with which they maintain communications with SINAPRED. However, all radios were in maintenance at the time the interview was conducted.

on assistance provided by the central government in terms of material and human resources. With a staff of only 100 persons, and a mandate to coordinate disaster management activities for the entire country, SINAPRED resources are not adequate to fully implement CDM at all levels, or meet all of the country's disaster management requirements:

- Prevention and mitigation of risk
- Response to emergencies
- Rehabilitation of territories affected by disasters as set forth in its legal framework

As SINAPRED moves from a centralized to decentralized system, a balance must be struck between efficiencies (to avoid duplication of effort)

and effectiveness (having the tools and resources to provide rapid support). Struggles in this regard are common in a maturing disaster management system, and issues are generally alleviated as subnational capacities are improved.

### ***Shelters***

By law, during a disaster, schools transition to shelters, although churches and stadiums are also used for this purpose. SINAPRED has identified the schools that can serve as shelters, taking into consideration their proximity to hazard zones. MINED maintains a database of all schools that serve as shelters. In these schools, teachers and staff are trained in shelter management. Some residents also volunteer their homes (casas solidaria) to be used as shelters during a disaster.

Shelter operations are managed by municipalities and overseen by SINAPRED. Institutional representatives from the Ministry of Family, MINSA, MINED, MIFIC (Ministry of Development, Industry, and Commerce), INIM (Ministry of Women), police, and the Red Cross, among others, perform assessments, provide services, and monitor needs in support of shelter populations.

One of the issues with shelters, as shared by stakeholders, is that some lack structural integrity. Not all schools are built to withstand hazard impacts or have been retrofitted with protective measures such as shutters.

### ***Warehouses and Relief Supplies***

SINAPRED manages eight warehouses throughout the country, two of which are in Managua. One, accessible only by SINAPRED and the Office of the President, houses a supply of roofing materials, plastic sheeting, nylon (sand) bags, wood for construction purposes, hygiene kits, kitchen kits, hammocks, blankets, and sleeping mattresses. The other warehouse in Managua stores food and other perishable items and is stocked in part through aid from the WFP. SINAPRED maintains a supply of

goods sufficient to serve 5,000 families over and above supplies housed at departmental or municipal warehouses. Should there be a need for additional supplies, SINAPRED is authorized by Law 337 to purchase supplies from the private sector and through mutual-aid agreements and pre-position or deliver them as necessary.

The WFP has five mobile warehouses but currently uses government warehouses for storing emergency food stocks and relief supplies. As space in existing government-owned warehouses is limited, discussions with MINREX are underway to allow WFP use of their own warehouses.



*Figure 24. Mattresses and foam padding are stored in the Bluefields central warehouse for use in the event of a disaster*

In other municipalities, small warehouses are stocked and maintained by municipal governments. The CODEPRED in Masaya reported that tents and sleeping mattresses are stored at “the old train station.” Supplies designated for disaster response include kitchen kits, hygiene kits, and search and rescue kits for 3,000 people provided through support from DIPECHO. No water or perishable items are maintained, however.

In the municipality of Nindirí, while there was no mention of

a warehouse, stakeholders shared that some supplies were kept on hand “to meet the start of a disaster.” Tools and equipment such as shovels, pumps, and pipes were used to combat recent forest fires in the municipality. A municipal commission oversees and documents supplies that are needed, and has the responsibility to restock and manage these. By law, municipal resources are allocated for disaster management. However, if needed, assistance is provided from both departmental and central levels. In the event of a severe disaster, help from the central government would be required.

Some ministries with a disaster management role maintain their own warehouses. In the department of Rivas, for example, MINSA manages a warehouse with a two-month supply of medicines and medical supplies.

The Red Cross maintains an inventory of disaster supplies in its central warehouse in Managua with four 8-ton trucks available to transport supplies as needed. The warehouse stocks goods for 850 families. Supplies include kitchen kits, plastic sheeting, mosquito nets, water-filtration bottles, blankets, and hygiene kits. Ten



mobile water-purification units (with generators) are also maintained by the Red Cross for use during a disaster.

### ***Other Emergency Response Resources***

Ambulances in Nicaragua are in short supply. The Red Cross estimates that at least one ambulance for every 100,000 people is required to serve the country's population. The Ministry of Health has 25 ambulances, of which only 15 are functioning. The fire department has firetrucks, firefighting equipment, and eight ambulances. The Red Cross maintains four ambulances in Managua and estimates that the city needs at least 25 ambulances to meet the need.



*Figure 25. An example of a government resource that serves both a day-to-day function for the country, as well as being available for utilization in the event of a disaster*

Nicaragua is steadily enhancing its capacity to provide early warning and has instituted a system of 60 sirens for tsunami warning in coastal areas. Sirens can be activated via the internet or by radio.

INETER operates and routinely monitors a network of 70 seismic stations around the country that is connected with and provides data to neighboring countries. INETER hosts a website with earthquake information that is available to the public. However, the system is not able to handle a large number of requests. According to one stakeholder, "the system crashes

every time there is an earthquake." Active volcanoes are monitored remotely through instrumentation and live cameras.

INETER relies on NOAA for tropical cyclone warning but has a national hydrological network of 270 stations – 120 of which are telemetric – collecting tidal and rainfall measurements, and lake and river levels.

Subnational EOCs were mostly consistent in having a warning point to receive alerts and some way to convey warnings, ranging from conventional mechanisms (sirens, radios) to more traditional means (ringing church bells). Several committees shared that one of their protocols is to meet at the EOC if heavy rainfall persists for a period of 15 minutes or more. Committees have an awareness of the hazards they face and have plans and protocols for response (e.g., evacuate local populations). Call lists of committee members have been developed and are posted in accessible locations to facilitate response coordination during events.



### ***Personnel with a Disaster Management Focus***

The committee structure and Sectoral Work Commissions, as established by the National System, bring significant human resources to bear in support of disaster management activities. As a member of SINAPRED, Civil Defense has an important capacity-building directive to organize and train SINAPRED committees at all levels, including community brigades. Exercises and drills have been effective means of building human-resource capacity at subnational levels. For example, disaster management personnel are trained to operate and communicate via radio in case other channels of communication fail, and have opportunities to practice these skills during exercise simulations.

### ***Tools and Applications***

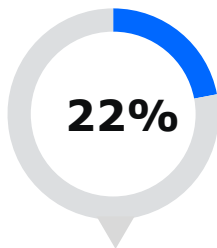
SINAPRED is developing a system, called *Andres*, to support disaster-response and risk-management activities. Hosted by Nicaragua's National Institute of Social Security (INSS), *Andres* is a password-protected site. The prototype system is currently accessible only to SINAPRED. Users will be able to access hazard maps, population, and critical infrastructure data (schools, hospitals, etc.) via a map-viewer component, as well as assessment results ranking areas of multi-hazard exposure as high, medium, and low. The system also has a reporting function with templates that can be completed (by municipalities, for example) and uploaded. As most data in Nicaragua is in paper format, *Andres* represents a significant step toward improving information access and sharing. The system's usefulness could be enhanced by including early-warning or near real-time situational awareness components to support a common operational picture among disaster management stakeholders. Overcoming prevalent connectivity issues through advancements in telecommunications infrastructure would further increase the utility of this tool.

### **Inventory of Available Resources**

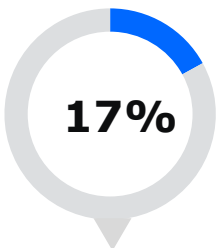
Inventories of available resources for disaster management were not available for review, although several stakeholders reported that they maintain databases of disaster-relief supplies. SINAPRED maintains an inventory of relief supplies and manages warehouse inventories via a database linked to their accounting and finance system. The Office of the President manages the inventory in the Managua warehouse it oversees. A COMUPRED commission oversees and documents disaster management supplies.

The Red Cross also has a system in place to manage the inventory of supplies/resources. The system generates monthly reports to manage inventory, especially perishable goods, to determine when re-stocking is needed. It also manages supply requests during disaster events. An annual inventory review is conducted to assess what is or no longer is needed.

While mechanisms exist within individual institutions to manage inventories of disaster management resources and relief supplies, a comprehensive, shared database of national and subnational resources and supplies does not exist. Few data were available to determine the adequacy of resource inventories. Warehouse inventories may not accurately reflect the current stock of supplies.

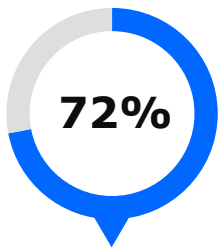


22% of those surveyed consider there to be sufficient government inventory to respond to a large-scale disaster.



17% of those surveyed felt that their organization has sufficient inventory to respond to a large-scale disaster.

### Mutual-Aid Agreements



72% of those surveyed stated that their organizations have mutual-aid agreements in place.

Nicaragua is a member of CEPREDENAC (Centro de Coordinación para la Prevención de los Desastres Naturales en América Central), a regional intergovernmental organization under SICA (Sistema de la Integración Centroamericana), with the mandate to promote DRR activities, projects, and programs. CEPREDENAC has designed operational preparedness and response procedures among Central American countries, including activation protocols and procedures to assist with the timely delivery of mutual assistance.

SINAPRED has a mutual-aid agreement with Empresa Nicaragüense de Alimentos Básicos (ENABAS), a national company that supplies basic grains. According to stakeholders, other agreements and purchasing procedures are in place to obtain needed disaster-relief supplies.

Of those surveyed, 68% reported that they have mutual-aid agreements in place. However, the details of specific agreements were not elaborated upon. In interviews conducted at national, departmental, and municipal levels, stakeholders also affirmed that both formal and informal aid agreements have been established with suppliers for the sharing of resources during a disaster. Suppliers are reimbursed for goods provided for disaster relief.

## Successes



### **Dedicated national EOC**

Nicaragua has a dedicated EOC co-located with SINAPRED and Civil Defense.



### **Institutional and subnational EOCs**

Government ministries have EOCs within their institutions and liaise directly with SINAPRED during a disaster. Territorial governments have EOCs or command posts.



### **Institutional expertise**

The National System integrates institutional expertise with the disaster management committee structure, engaging considerable human resources in support of disaster management activities.

## Challenges Identified



### **Quantity and quality of DM resources**

Subnational disaster management capabilities and available resources vary considerably, both in quantity and function. A minimum standard for equipment, facilities, and resources to perform necessary disaster management functions at the subnational level was not in evidence.



### **Infrastructure supporting DM**

Limited transportation networks and poor roadway conditions, particularly in the autonomous regions where populations are widely dispersed and rivers and waterways are relied upon as key means of transport, present challenges for evacuating populations and the timely delivery of personnel and relief supplies during a disaster.



### **Needs exceed staffing resources**

Given the subnational governments' heavy reliance on the central government for disaster management support, with a staff of only 100 persons and a mandate to coordinate disaster management activities for the entire country, SINAPRED resources are not adequate to meet the requirements necessary to fully implement CDM or achieve all activities as set forth in its legal framework.



### **Communications and connectivity**

Communications during a disaster are essential for the coordination and delivery of timely response actions. Many of those interviewed shared that they rely solely on radio communications during a disaster, and the number of radios available to them is extremely

limited or non-existent. One NGO shared that there is no cell-phone service, internet connectivity, or radios in operation in remote areas of the country where they work. Stakeholders at institutional and subnational levels expressed that investments in equipment and services to enhance the coverage of communications is a critical need. Limited communications equipment and connectivity leave some populations without warning mechanisms or opportunities to request assistance during a disaster. These also limit access to tools, data, and information systems that can provide critical support to disaster management decision making.



### **Inventory of relief supplies**

While mechanisms exist within individual institutions to manage inventories of disaster management resources and relief supplies, a comprehensive, shared database of national and subnational resources and supplies does not exist.

Recommendations

01

Subnational resource assessment

Conduct an assessment to document and track subnational disaster management resources, including facilities (e.g., EOCs and command posts, warehouses) and equipment critical to disaster management activities to enhance understanding of capabilities and needs, justify budget increases, and inform contingency planning for the territories.

- A. Develop minimum standards for equipment, facilities, resources and services that are used to perform expected disaster management functions at regional, departmental, and municipal levels.
- B. Assess and document the quantity, condition (age, quality, etc.), and functionality of existing subnational disaster management facilities, resources, equipment, and services.
- C. Based on the minimum standards and resource assessment, perform a gap analysis. Prioritize needed resources, repairs, retrofits, etc.
- D. Refine processes to adopt a phased approach to acquire, repair, and maintain necessary resources.
- E. Perform annual resource assessments and share reports with appropriate disaster management stakeholders to improve contingency planning.



**Complexity:** Medium

**Cost:** \$\$

02

## Transportation infrastructure enhancements

Continue investment in new transportation infrastructure and improvements to existing road networks that support disaster risk-management activities (e.g., evacuation, ingress/egress to warehouses, and other essential facilities), while simultaneously addressing development needs and incorporating DRR strategies.

- A. Assess the condition and accessibility of transportation infrastructure in relation to the provision of critical disaster management services, location of essential facilities, etc.
- B. Engage the appropriate institutions and development planners in discussions to prioritize the repair or construction of new roads to support timely evacuation, access to, and provision of disaster relief supplies.

**Effort:**



**Complexity:** Complex

**Cost:** \$\$\$

03

## Increase collaboration and partnership to meet needs

Given subnational governments' heavy reliance on the central government for disaster management support, limited staff resources, and the extensive scope of disaster management duties as set forth in the Legal Framework, re-examine how legislative requirements can be met through current staffing or increased collaboration with non-traditional partners (e.g., NGOs, donor-funded projects, private-sector involvement).

- A. Continue internal review processes on current staffing, budget, and resources to meet legislative requirements as set forth by Law 337.
- B. Identify strategies to boost staffing, budget, and/or resources, or amend the law so that legal requirements can be met.
- C. Explore ways to engage with non-traditional partners to fulfill requirements.
  - a. Areas of potential collaboration include training; planning assistance; sheltering; risk assessment; public awareness and safety campaigns; and funding and implementation of DRR activities.

**Effort:**



**Complexity:** Medium

**Cost:** \$

**04**

**Strengthen communications and connectivity**

Strengthen subnational institutions (e.g., disaster management committees and EOCs) through investments in telecommunications equipment and services (e.g., radios, internet, cell-phone service) to:

- A. Maintain ongoing efforts to enhance coordination and communication among national, regional, and municipal organizations.
- B. Expedite receipt and dissemination of hazard-alert and warning information.
- C. Improve access to data, tools, and technologies that enhance situational awareness and support information sharing and decision making among disaster management stakeholders.

**Effort:**



**Complexity:** Medium

**Cost:** \$\$

**05**

**Develop shared inventory of relief supplies**

Develop, maintain, and share among disaster management stakeholders a single inventory of all disaster-relief supplies warehoused by national and subnational governments and NGO partners.

- A. Further develop the process to engage disaster management stakeholders and NGO partners in discussions regarding practicality and usefulness of a shared tool for managing inventories of relief supplies.
- B. Develop a shared, password-protected platform or database with update and reporting functions.

**Effort:**



**Complexity:** Medium

**Cost:** \$







# Recommendations

**National Disaster Preparedness Baseline Assessment**  
Final Report



# Recommendations

The following recommendations have been developed based on the RVA and CDM findings described in the previous sections. Refer to Table 12 for additional information on the evaluation criteria.

Table 12. Evaluation criteria for recommendations

Recommendations Evaluation Criteria		
Effort	<div>Years</div> <div><div></div><div></div><div></div><div></div><div></div></div> <div>05</div>	Estimated length of time (in years) to complete the project once it is started.
Complexity	<div>LowMediumHigh</div>	Overall complexity based on the estimated staff time, resources, and collaboration required to complete the project.
Cost	<div>\$\$\$</div>	<div>Estimated annual cost of the project, not including salaries, based on a percentage of the current NDMO annual budget.</div> <div>\$ approximates less than 1% of the annual operating budget.</div> <div>\$\$ approximates between 1% to 10% of annual operating budget.</div> <div>\$\$\$ approximates more than 10% of the annual operating budget.</div>

01

## Strengthen data standards and sharing

- C. Ensure that hazards and vulnerability data are consistently defined, documented, updated, and applied in disaster management and disaster risk reduction.
- D. Continue implementation strategies to strengthen data sharing and transparency among all organizations active in disaster management to support evidence-based decision making.

Effort:  Years

05

Complexity: Medium

Cost: \$

02

## Develop and strengthen multi-stakeholder partnerships

- C. Increase the capacity to conduct and update high-resolution hazard assessments with national coverage by developing partnerships with non-traditional stakeholders.
- D. Strengthen strategic multi-stakeholder partnerships to expand disaster risk-reduction resources to include non-traditional disaster management partners.



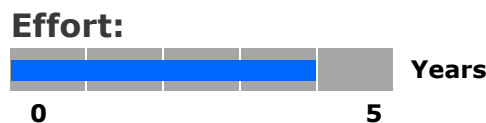
**Complexity:** Low

**Cost:** \$

03

## Improve documentation of subnational economic resources

Provide a more comprehensive understanding of economic capacity (e.g., GDP, income, expenditures, remittances) at the department and local levels.



**Complexity:** High

**Cost:** \$\$

04

## Expansion of disaster management training programs

Advance current initiatives to institute a nationwide disaster management training program that defines training requirements for key disaster management positions, promotes consistent skills development, and broadens staff capabilities. Identify partners, programs, course offerings, and a schedule for training implementation to meet established requirements. Develop or enhance existing mechanisms to manage program implementation and facilitate the identification of skills and expertise that may be required to support disaster management activities.

- F. Define training requirements for disaster management personnel according to roles and job descriptions.
- G. Conduct a training audit to review existing training curricula and identify other course offerings that may be used to meet training requirements and address training gaps.
- H. Develop partnership agreements with institutions, NGOs, and the private sector to deliver training courses.

- I. Schedule and implement priority training courses.
- J. Develop a database for tracking and reporting training delivery, attendance, and personnel trained or certified in areas of expertise.



05

**Strategic investments to advance and sustain DRR**

Identify and prioritize DRR projects and activities in accordance with strategic goals and objectives that will reduce risk, strengthen disaster risk management, and provide institutions with the necessary training, equipment, or technical support to manage, maintain, and sustain project outputs or deliverables.

- D. Utilizing the latest risk and vulnerability information; identify projects and activities (outside the scope of annual budget allocations) that will reduce, prevent or mitigate disaster risk while subsequently supporting long-term development goals.
- E. Develop detailed outlines of priority projects, identifying goals and objectives, cost-benefit analyses, deliverables and outcomes, timeline, implementation requirements, and lead institutions to manage, maintain, and sustain activities.
- F. Engage donors to identify funding sources.



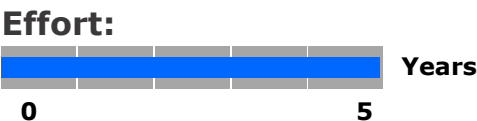
06

Enhance subnational planning for DRR

Continue to enhance municipal planning initiatives to incorporate analyses of socioeconomic risk factors and identify mitigation projects that prevent or reduce disaster risk. By incorporating risk and vulnerability information in municipal disaster plans, key projects and activities to prevent or mitigate risk can be identified for implementation.

Expanding planning and implementation in these areas in accordance with strategic plans will not only reduce risk at subnational levels, but further operationalize SINAPRED activities in accordance with the country’s legal framework.

- F. Increase budget allocations for municipal disaster management planning efforts. Alternatively, identify funding source(s) (e.g., international donors) to support municipal disaster management planning in line with strategic goals and objectives.
- G. In cooperation with SINAPRED, implement training workshops at municipal levels to enhance understanding of risk, risk assessment, and disaster risk-reduction principles.
- H. Expand disaster management planning efforts to incorporate analyses of socioeconomic risk factors. Based on plan updates, identify potential mitigation projects to prevent or reduce risk.
- I. Evaluate and prioritize projects considering risk and vulnerability information, cost-benefit analyses, strategic goals and objectives, and sustainable development plans.
- J. Institute a phased approach to fund and implement high priority structural and non-structural mitigation projects, distinguishing among those that may be funded, managed and sustained through local initiatives, or require additional funding sources.



Complexity: Complex

Cost: \$\$\$

07

### Boost private-sector engagement

Develop mechanisms and incentives to boost private-sector engagement and participation in disaster management activities.

- D. Encourage private-sector involvement in disaster management by engaging representatives of local business networks and associations (e.g., Chamber of Commerce), and large business entities, such as factories and hotels, in discussions related to hazard awareness, preparedness planning (e.g., continuity of operations), and disaster response (e.g., evacuation).
- E. Encourage participation in health and safety trainings, drills, and exercises.
- F. Explore ways that the private sector can actively participate in disaster-response activities (e.g., providing shelter, food, and water), and develop MOAs to formalize partnerships.

**Effort:**



**Complexity:** Medium

**Cost:** \$

08

### Formalize NGO partnerships

Utilize successful NGO partnerships as a model for increasing collaboration and potential integration into SINAPRED's disaster management structure to positively influence CDM growth for the country.

- E. Work with Ministry of Foreign Relations (MINREX) to identify NGOs whose missions align with disaster management-related activities, and explore potential partnerships and areas of collaboration.
- F. Areas of potential collaboration with NGO partners could include training, exercise participation, development and rehearsal of disaster-response plans, and implementation of community resilience-building initiatives.
- G. One example of community resilience building is the State of Hawaii's Hawaii Hazards Awareness and Resilience Program (HHARP).
- H. Synergistic activities could be defined by MOUs to ensure alignment with national goals and objectives.



**Effort:**



**Complexity:** Medium

**Cost:** \$

09

### Subnational resource assessment

Conduct an assessment to document and track subnational disaster-management resources, including facilities (e.g., EOCs and command posts, warehouses) and equipment critical to disaster management activities to enhance understanding of capabilities and needs, justify budget increases, and inform contingency planning for the territories.

- F. Develop minimum standards for equipment, facilities, resources, and services that are used to perform expected disaster management functions at regional, departmental, and municipal levels.
- G. Assess and document the quantity, condition (age, quality, etc.), and functionality of existing subnational disaster management facilities, resources, equipment, and services.
- H. Based on the minimum standards and resource assessment, perform a gap analysis. Prioritize needed resources, repairs, retrofits, etc.
- I. Refine processes to adopt a phased approach to acquire, repair, and maintain necessary resources.
- J. Perform annual resource assessments and share reports with appropriate disaster management stakeholders to improve contingency planning.

**Effort:**



**Complexity:** Medium

**Cost:** \$\$



10

### Transportation infrastructure enhancements

Continue investment in new transportation infrastructure and improvements to existing road networks that support disaster risk-management activities (e.g., evacuation, ingress/egress to warehouses and other essential facilities), while simultaneously addressing development needs and incorporating DRR strategies.

- C. Assess the condition and accessibility of transportation infrastructure in relation to the provision of critical disaster management services, location of essential facilities, etc.
- D. Engage the appropriate institutions and development planners in discussions to prioritize the repair or construction of new roads to support timely evacuation, access to, and provision of disaster relief supplies.

**Effort:**



**Complexity:** Complex

**Cost:** \$\$\$

11

### Increase collaboration and partnership to meet needs

Given the subnational governments' heavy reliance on the central government for disaster management support, limited staff resources, and the extensive scope of disaster management duties as set forth in the Legal Framework, re-examine how legislative requirements can be met based on current staffing, or how requirements can be met through increased collaboration with non-traditional partners (e.g., NGOs, donor-funded projects, private-sector involvement).

- D. Continue internal review processes on current staffing, budget and, resources to meet legislative requirements as set forth by Law 337.
- E. Identify strategies to boost staffing, budget, and/or resources, or amend the law so that legal requirements can be met.
- F. Explore ways to engage with non-traditional partners to fulfill requirements.
  - a. Areas of potential collaboration could include training, planning assistance, sheltering, risk assessment, public awareness and safety campaigns, and funding and implementation of DRR activities.

**Effort:**



**Complexity:** Medium

**Cost:** \$

12

## Strengthen communications and connectivity

Strengthen subnational institutions (e.g., disaster management committees and EOCs) through investments in telecommunications equipment and services (e.g., radios, internet, cell-phone service) to:

- D. Maintain ongoing efforts to enhance coordination and communication among national, regional, and municipal organizations.
- E. Expedite receipt and dissemination of hazard alert and warning information.
- F. Improve access to data, tools, and technologies that enhance situational awareness and support information sharing and decision making among disaster management stakeholders.

**Effort:**



**Complexity:** Medium

**Cost:** \$\$

13

**Develop shared inventory of relief supplies**

Develop, maintain, and share among disaster management stakeholders a single inventory of all disaster-relief supplies warehoused by national and subnational governments and NGO partners.

- C. Further develop the process to engage disaster management stakeholders and NGO partners in discussions regarding practicality and usefulness of a shared tool for managing inventories of relief supplies.
- D. Develop a shared, password-protected platform or database with update and reporting functions.

**Effort:**



**Complexity:** Medium

**Cost:** \$



## Five-Year Implementation Plan

Recommendations were prioritized for implementation over a five-year period based on feedback received from stakeholders at the Final Workshop and Knowledge Exchange (see Figure 26).

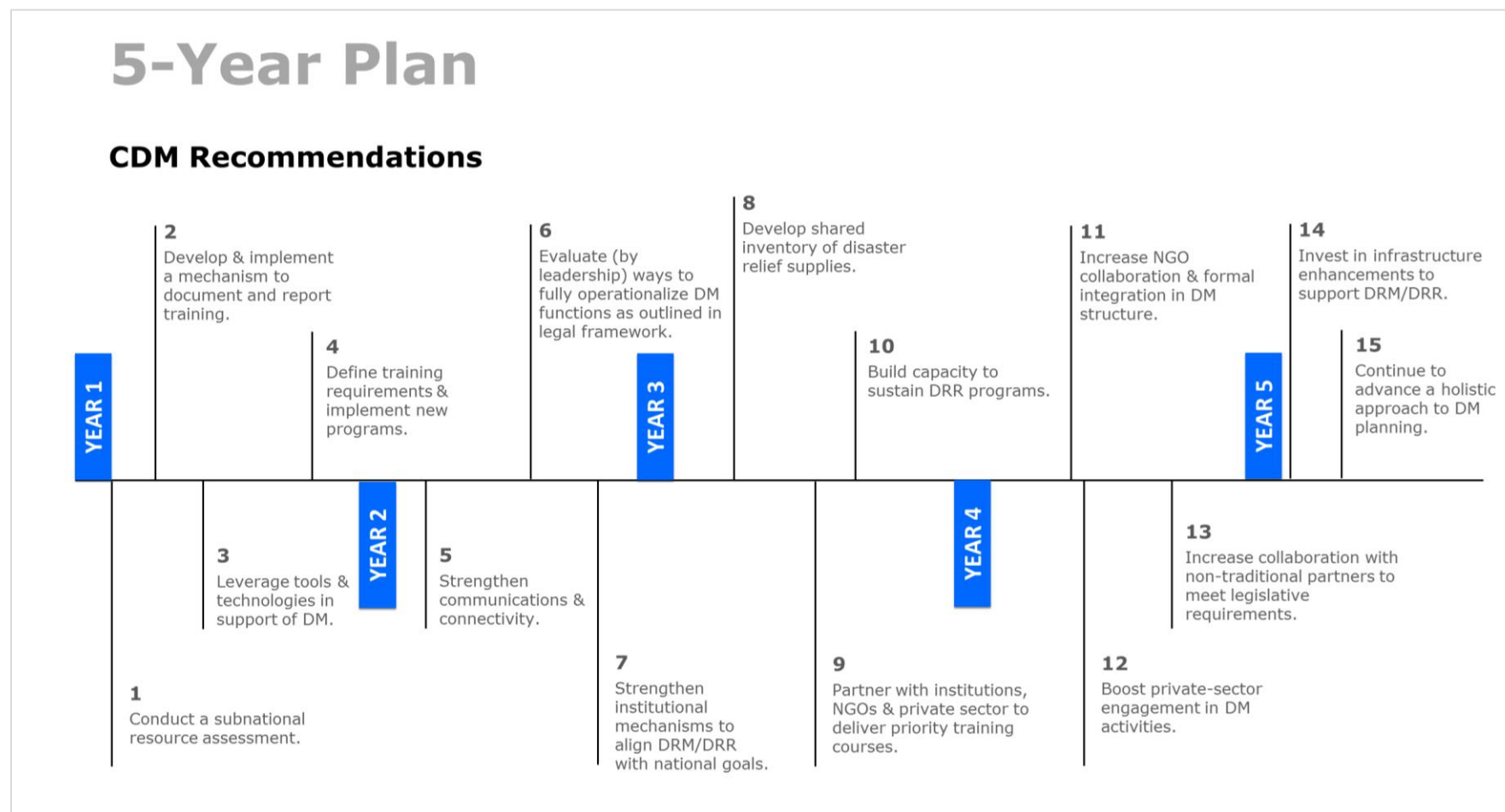


Figure 26. Five-year implementation plan for CDM recommendations



## Conclusion

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

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

The results of the RVA highlighted areas of the country that may require support in preparing for, responding to, and recovering from disasters. By identifying specific factors that influence risk in each department, the RVA supports evidence-based decision making through focused interventions that increase coping capacity, reduce vulnerability, and acknowledge hazard exposure at the subnational level. In summarizing the results of the RVA across Nicaragua, prevalent drivers of risk included low economic capacity and low access to information and clean water.

The goal of disaster management is to create safer communities and implement programs that protect human life, reduce losses, and promote rapid recovery. Disaster management activities are most effective when informed by risk and vulnerability information, such as what hazards are most likely to occur and where, and who and what may be in harm's way. Characteristics of the population and the built environment play a key role in determining vulnerability to hazard impacts and potential losses. Investing in projects and programs that aim to reduce risk and vulnerability and boost disaster management capacities and capabilities will promote resilience and support sustainable long-term growth and development.

Using a mixed-methods approach, the CDM assessment examined preparedness and response capacities and capabilities in Nicaragua. Assessment results provide actionable recommendations that draw on existing strengths and address possible gaps that affect the delivery of effective disaster management.

Nicaragua has a strong and proven disaster management system. The country's legal framework, broad institutional engagement, and dedicated disaster management leadership have established a firm foundation for steady advancement of CDM principles since Law 337 was enacted in 2000. Frequent testing of disaster management protocols, plans, and procedures through response to real events and regular full-scale exercises has done much to build advocacy and engagement

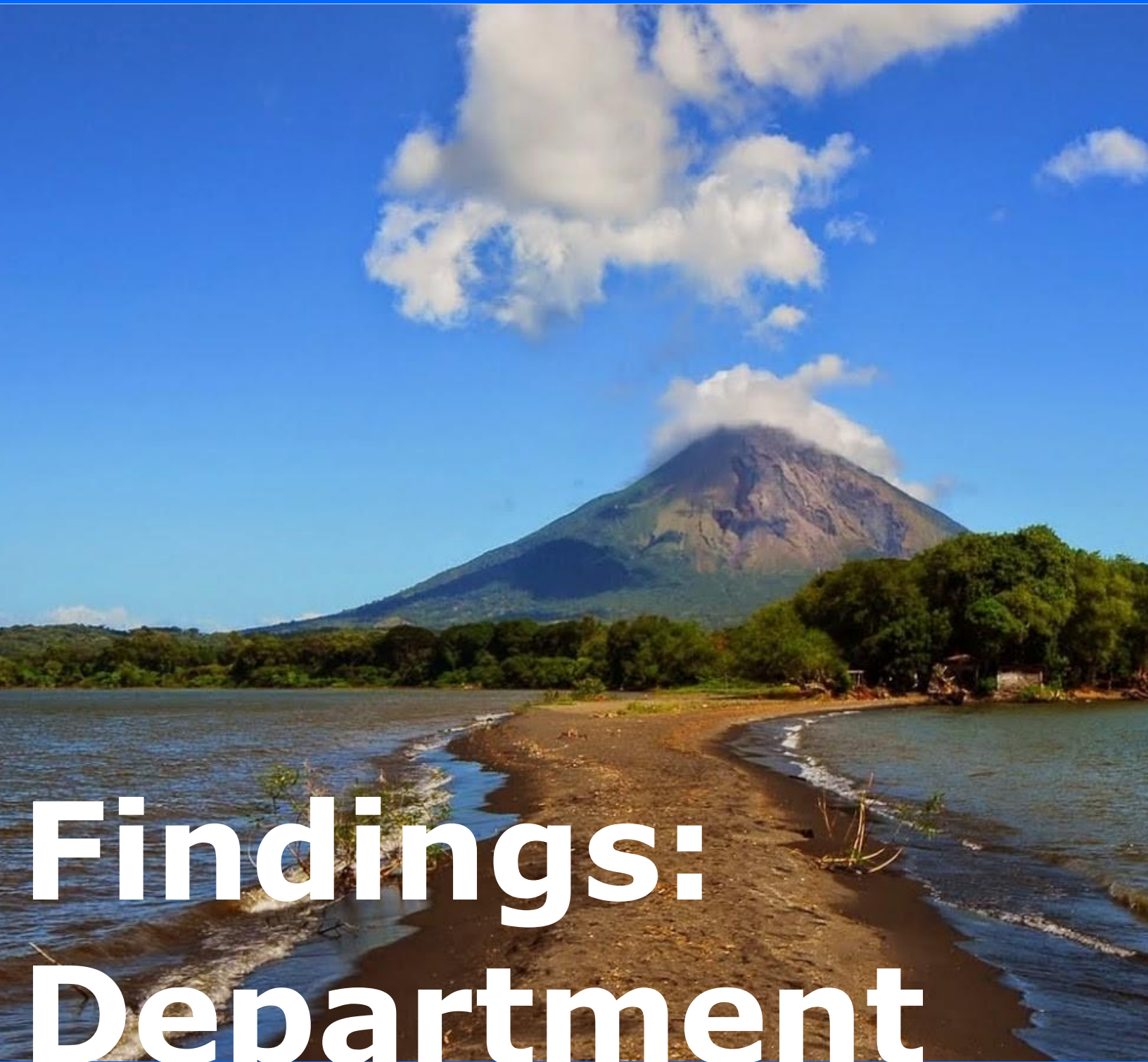
among stakeholders and the public alike. Disaster managers recognize the need for, and benefits of, citizen participation in a country exposed to numerous hazards and constrained by resource limitations and other challenges. Nicaragua's effort to "build a culture of preparedness" among its citizens is exemplary, and has consistently saved lives and reduced losses.

Nicaragua is firmly on a path toward realizing its holistic vision of implementing CDM. Overcoming challenges related to budget constraints; quality and availability of disaster management resources, particularly at subnational levels; infrastructure limitations, including communications, connectivity, and transportation; NGO partnerships and collaboration; alignment of donor-funded activities with national DRR goals and objectives; and the capacity to fully operationalize disaster management activities in accordance with the country's legal framework; will positively influence CDM growth for the country.

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

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





# Findings: Department

**National Disaster Preparedness Baseline Assessment**  
Final Report



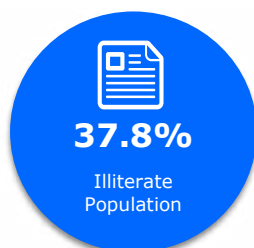
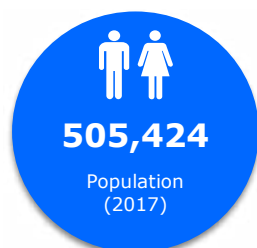
## Department: Región Autónoma de la Costa Caribe Norte (RAAN)



Department Capital: Bilwi

Area: 32,820 km<sup>2</sup>

Región Autónoma de la Costa Caribe Norte is the largest territory in Nicaragua, located in the northeastern part of the country. It is primarily known for its nature reserves, indigenous communities, and its extensive array of seafood.



Municipality	Population
Waspán	59,565
Puerto Cabezas	103,805
Rosita	34,221
Bonanza	27,683
Waslala	69,309
Mulukukú	49,494
Siuna	110,980
Prinzapolka	50,367

**Multi-Hazard Risk Rank:  
Very High (1 of 17)**

**Lack of Resilience Rank:  
Very High (1 of 17)**



## RVA Component Scores

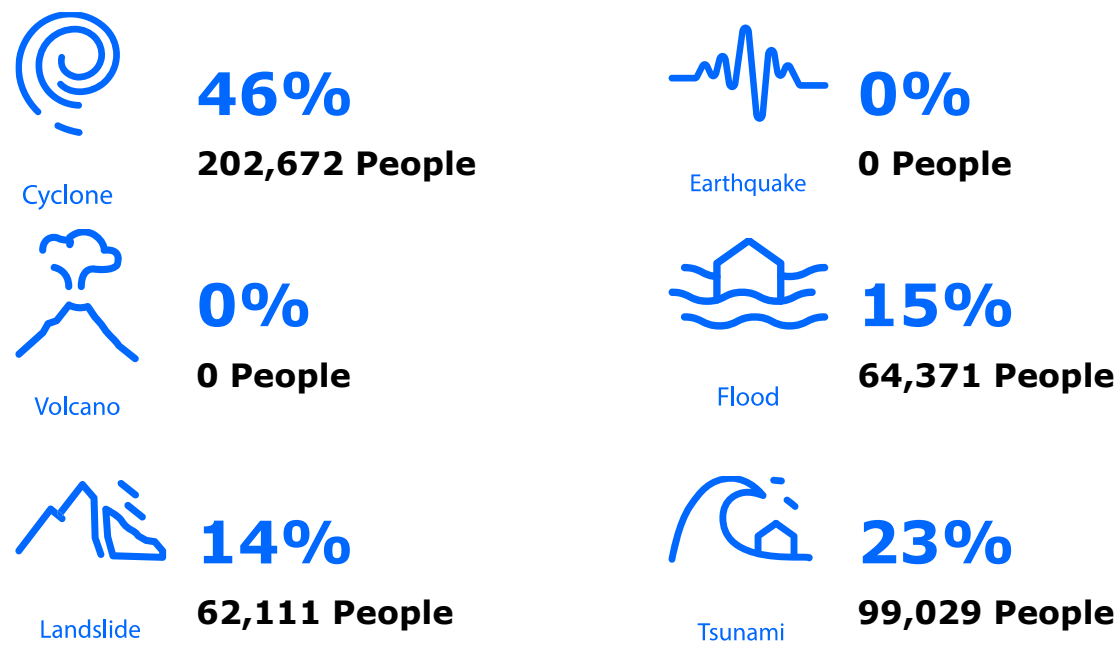
Table 13. Department scores and ranks (compared across departments) for each index

Multi-Hazard Risk		Lack of Resilience		Multi-Hazard Exposure		Vulnerability		Coping Capacity	
Very High		Very High		Low		Very High		Very Low	
Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)
0.586	1	0.744	1	0.271	12	0.741	1	0.253	17

Multi-Hazard Exposure (MHE)

Multi-Hazard Exposure<sup>21</sup> Rank: 12 of 17 Departments (Score: 0.271)

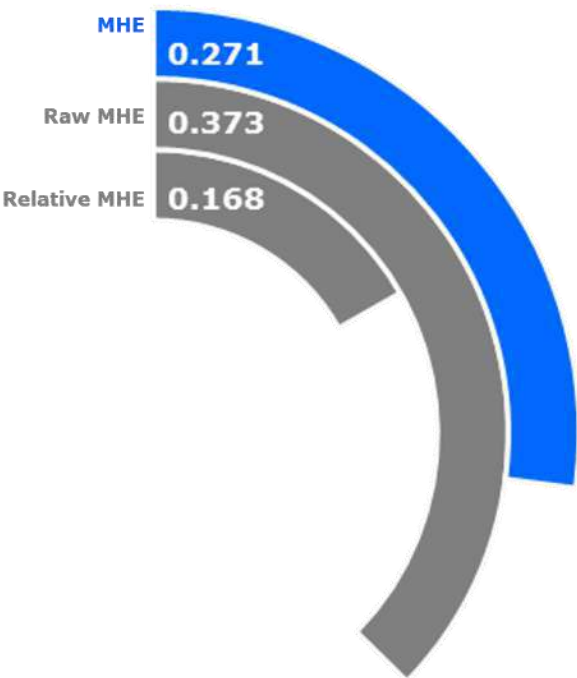
Table 14. Estimated ambient population<sup>22</sup> exposed to each hazard



**Knowledge Recovery in RAAN**

In disaster-prone areas of RAAN, “an important effort is being made [...] to create understanding and awareness of how indigenous people cope with natural hazards by tapping into their ancestral store of knowledge and keeping it alive.” Implemented by the Directorate of Adolescents and Youths (DAJ) of the Municipal Mayor’s Office of Puerto Cabezas through support from UNICEF, the research has resulted in “the compilation of local practices that define the communities’ capacities for self-governing of risk management” as well as the acknowledgement of “the importance of ancestral community organization as a key element for preparedness, mitigation, warning and response actions.”

From: *Knowledge Recovery in Nicaragua, UNISDR, 2015*



<sup>21</sup> Multi-Hazard Exposure: Average exposure of the population to hazards.  
<sup>22</sup> Ambient Population: 24-hour average estimate of the population in each department. Ambient population typically differs from census population.

## Vulnerability (V)

### Vulnerability<sup>23</sup> Rank: 1 of 17 Departments

(Score: 0.741) Vulnerability in RAAN is primarily driven by very high Information Access

Vulnerability, Economic Constraints, Population Pressures, Clean Water Vulnerability, and Gender Inequality. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Vulnerability score.

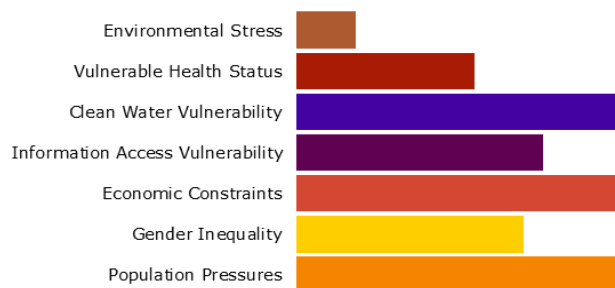









Table 15. Component scores for each vulnerability sub-component

	<b>Environmental Stress</b>	<b>0%</b> Province at Drought Risk	<b>13.5%</b> Erosion Risk	<b>83.0</b> Livestock per km <sup>2</sup>			
	<b>Vulnerable Health Status</b>	<b>15.3</b> Infant Mortality Rate	<b>94.4</b> Maternal Mortality Rate	<b>67.4 yrs</b> Average Life Expectancy	<b>1.5%</b> Acute Malnutrition (Children < 5)	<b>0.3%</b> Population Disabled	
	<b>Clean Water Vulnerability</b>	<b>13.2%</b> Households with Access to Improved Water	<b>6.0%</b> Households with Access to Flush Toilets				
	<b>Information Access Vulnerability</b>	<b>37.8%</b> Illiteracy	<b>4.4 yrs</b> Average Years of Schooling	<b>78.9%</b> Primary School Enrollment	<b>97.1%</b> Households without Internet	<b>57.3%</b> Households without TV	<b>35.0%</b> Households without Radio
	<b>Economic Constraints</b>	<b>78.2</b> Economic Dependency Ratio	<b>92.1%</b> Population in Poverty				
	<b>Gender Inequality</b>	<b>18.8%</b> Female Seats in Government	<b>1.43</b> Female to Male Secondary Education Enrollment	<b>0.57</b> Female to Male Labor Ratio			
	<b>Population Pressures</b>	<b>5.3%</b> Average Annual Population Change	<b>7.6%</b> Average Annual Urban Population Change				

<sup>23</sup> **Vulnerability:** The socioeconomic conditions that are associated with the susceptibility to disruptions in a country's normal functions.

## Coping Capacity (CC)

**Coping Capacity<sup>24</sup> Rank: 17 of 17 Departments (Score: 0.253)** RAAN exhibits weaker Coping Capacity in the areas of Infrastructure, Economic Capacity, and Governance. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Coping Capacity score.

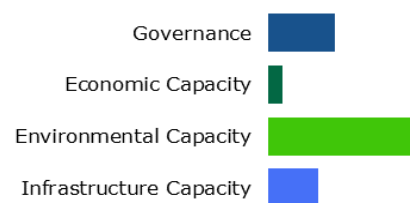


Table 16. Component scores for each coping capacity sub-component

	<b>Economic Capacity</b>	<b>2.7%</b> Households that Receive Remittances	<b>80.1%</b> Employment Rate (Male)	<b>34.8%</b> Employment Rate (Female)	<b>2.3%</b> Population in Highest Welfare Quintile	<b>\$198.8</b> Annual Nominal Global Revenue per Capita
	<b>Governance</b>	<b>88.3%</b> Crime Complaints Cleared	<b>1090.3</b> Crime Rate per 100k Persons	<b>96.0%</b> Households without Garbage Collection	<b>22.7%</b> Voter Participation (2016 Election)	
	<b>Environmental Capacity</b>	<b>36.2%</b> Protected or Reforested Land				
	<b>Infrastructure Capacity</b>					
	<b>Health Care Capacity</b>		<b>6.9</b> Hospital Beds per 10,000 Persons	<b>12.5</b> Nurses per 10,000 Persons	<b>6.4</b> Physicians per 10,000 Persons	<b>30.1 km</b> Average Distance to Nearest Hospital
	<b>Communications Capacity</b>		<b>2.2%</b> Households with Access to Fixed Phone Line	<b>52.8%</b> Households with Access to Mobile Phone		<b>60%</b> Children Completed Immunization Schedule
	<b>Transportation Capacity</b>		<b>44.2 km</b> Average Distance to Nearest Port or Airport	<b>0.06 km</b> Total Length of Road per km <sup>2</sup> (area)		

<sup>24</sup> **Coping Capacity:** The systems, means, and abilities of a country to absorb and respond to events that could potentially disrupt normal function.

Lack of Resilience (LR)

Lack of Resilience<sup>25</sup> Rank: 1 of 17 Departments (Score: 0.744)

Región Autónoma de la Costa Caribe Norte’s score and ranking are due to very high Vulnerability combined with very low Coping Capacity scores.

Table 17. The three thematic areas with the weakest relative scores



Multi-Hazard Risk (MHR)

Multi-Hazard Risk<sup>26</sup> Rank: 1 of 17 Departments (Score: 0.586)

Región Autónoma de la Costa Caribe Norte’s score and ranking are due to high Multi-Hazard Exposure combined with very low Vulnerability and high Coping Capacity scores.

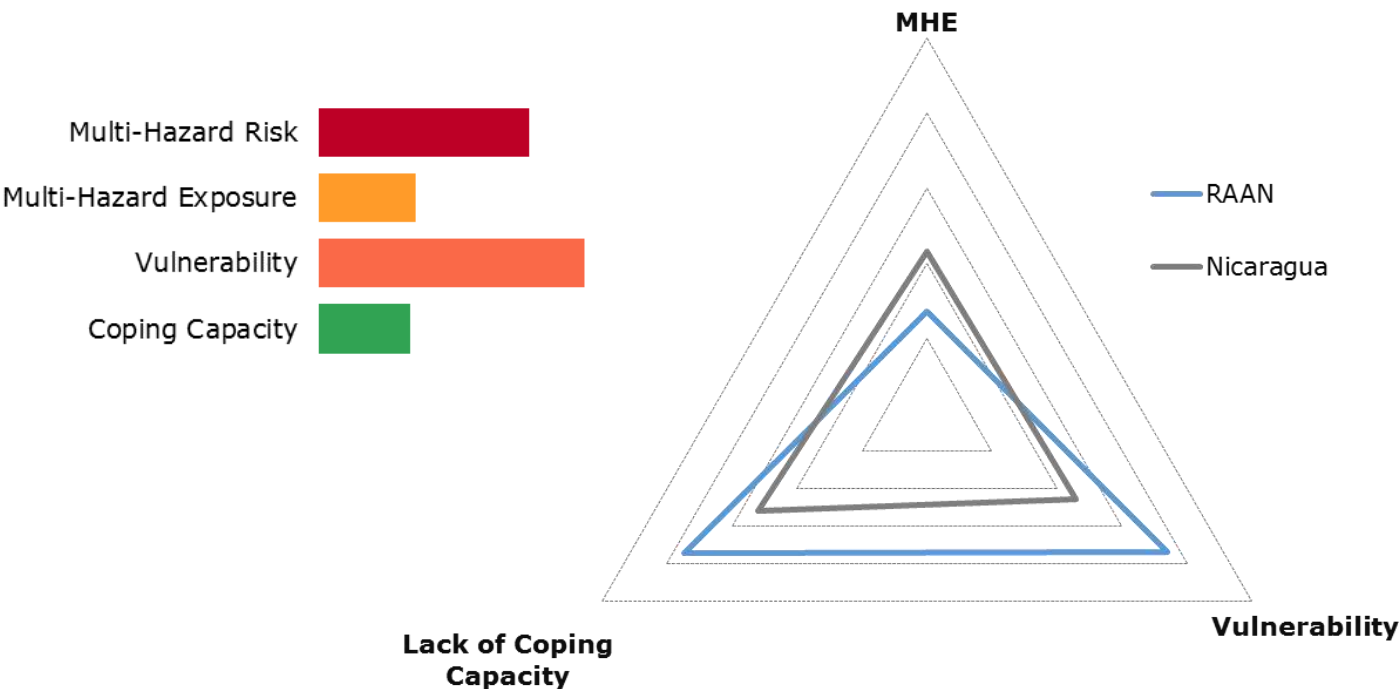


Figure 27. Department Multi-Hazard Risk component scores compared to overall average country scores

<sup>25</sup> **Lack of Resilience:** The susceptibility to impact from the short-term inability to absorb, respond to, and recover from disruptions to a country’s normal function. This index provides a hazard-independent look at current socioeconomic conditions.

<sup>26</sup> **Multi-Hazard Risk:** The likelihood of losses or disruptions to a country’s normal function due to interaction between multi-hazard exposure, socioeconomic vulnerability, and coping capacity.



## Successes



### Knowledge recovery

Incorporating local knowledge into disaster management practices to promote community engagement.



### Very low environmental stress

Ranked 16 of 17 departments, low environmental stress indicates that natural resources and agriculture will be more resilient to the effects of a disaster and may recover faster

## Recommendations

01

### Reduce clean water vulnerability

Invest in public water and sewer infrastructure to ensure equitable access to safe, clean drinking water and sanitation.

02

### Alleviate economic constraints

Focus investments to reduce poverty and encourage business development and education programs to increase stable and viable economic opportunities in the region.

03

### Plan for urban growth

Ensure local economies, resources, and infrastructure can adequately support the growing population by anticipating urban population pressures and necessary resources.



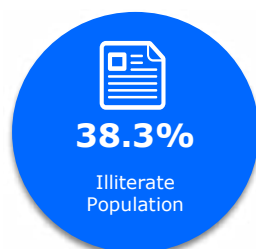
## Department: Región Autónoma de la Costa Caribe Sur (RAAS)



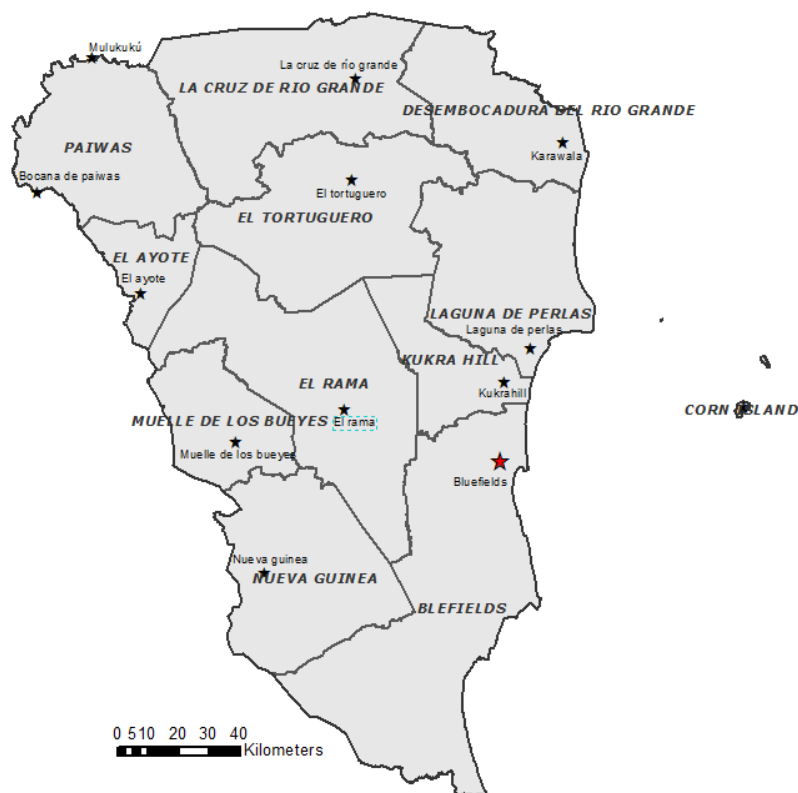
Department Capital: Bluefields

Area: 27,546 km<sup>2</sup>

Región Autónoma de la Costa Caribe Sur is the second largest territory in Nicaragua, located in the southeast of the country. It is primarily known for the Corn Islands, nature reserves, and its May Pole festivities.



Municipality	Population
Paiwas	36,085
La Cruz de Río Grande	38,639
Desembocadura de Río Grande	3,938
Laguna de Perlas	17,468
El Tortuguero	49,627
El Rama	58,331
El Ayote	17,535
Muelle de los Bueyes	24,251
Kukrahill	9,737
Corn Island	7,515
Bluefields	49,719
Nueva Guinea	78,633



**Multi-Hazard Risk Rank:  
Very High (2 of 17)**

**Lack of Resilience Rank:  
Very High (2 of 17)**

### RVA Component Scores

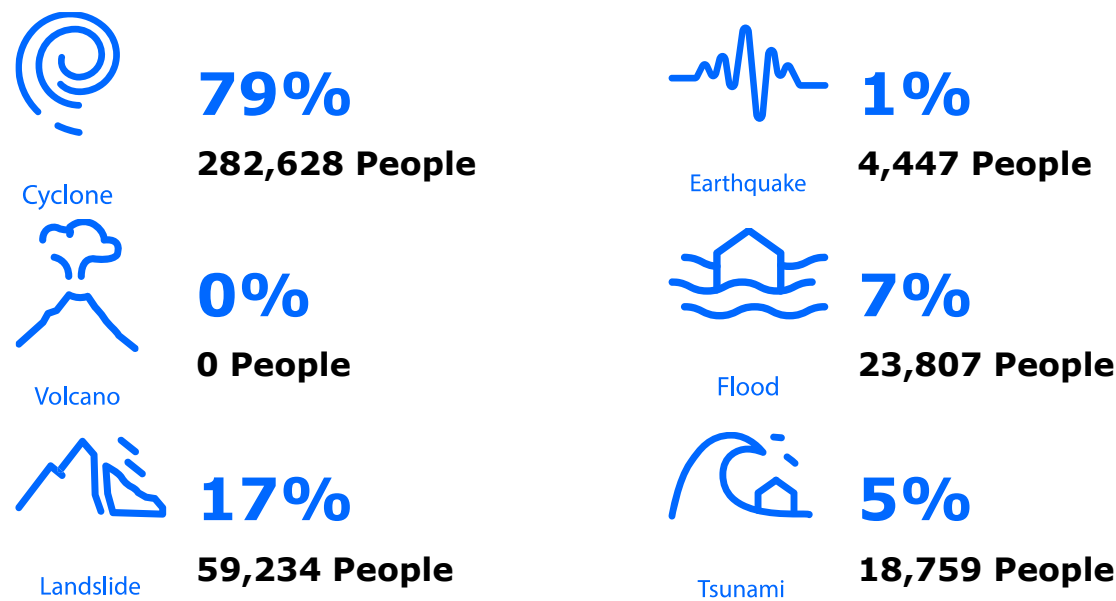
Table 18. Department scores and ranks (compared across departments) for each index

Multi-Hazard Risk		Lack of Resilience		Multi-Hazard Exposure		Vulnerability		Coping Capacity	
Very High		Very High		Low		Very High		Very Low	
Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)
0.575	2	0.724	2	0.275	11	0.705	3	0.256	16

Multi-Hazard Exposure (MHE)

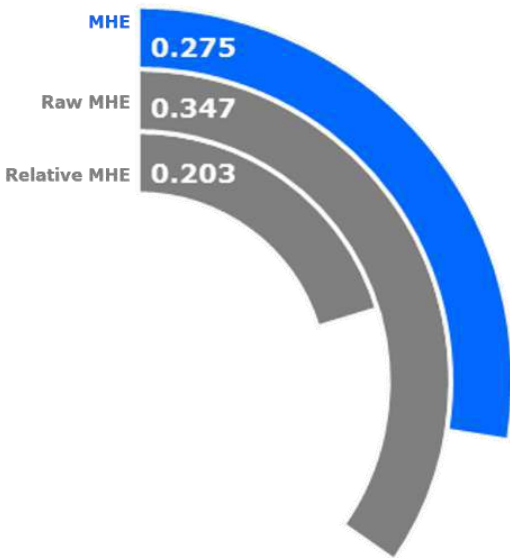
Multi-Hazard Exposure<sup>27</sup> Rank: 11 of 17 Departments (Score: 0.275)

Table 19. Estimated ambient population<sup>28</sup> exposed to each hazard



**Response: Hurricane Otto**

Hurricane Otto made landfall in southern Nicaragua on November 24, 2016, as a Category 2 major hurricane. RAAS’s response to Hurricane Otto allowed for the identification of disaster-management strengths and challenges for the region. Twenty-four hours before landfall, the at-risk population was evacuated without incident. SINAPRED attributed the calm, orderly response from residents to the frequency of drills and exercises conducted at both the national and subnational levels, as well as the practice of including communities in their own disaster preparedness measures. No lives were lost to Hurricane Otto in Nicaragua. However, it was noted that a lack of resources was evident for managing the overall response in RAAS.



<sup>27</sup> Multi-Hazard Exposure: Average exposure of the population to hazards.  
<sup>28</sup> Ambient Population: 24-hour average estimate of the population in each department. Ambient population typically differs from census population.

## Vulnerability (V)

### Vulnerability<sup>29</sup> Rank: 3 of 17 Departments

(Score: 0.705) Vulnerability in Región

Autónoma de la Costa Caribe Sur is primarily driven by very high Gender Inequality, Economic Constraints, Vulnerable Health Status, and Clean Water Vulnerability. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Vulnerability score.

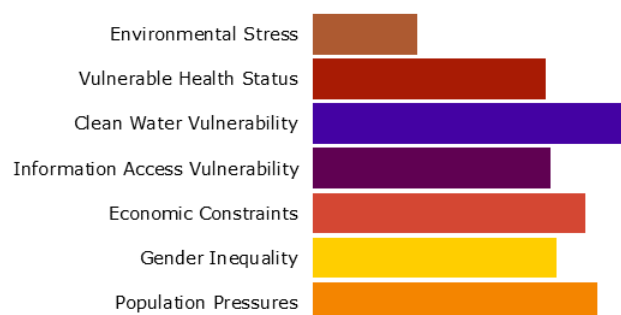









Table 20. Component scores for each vulnerability sub-component

	<b>Environmental Stress</b>	<b>0%</b> Province at Drought Risk	<b>14.7%</b> Erosion Risk	<b>101.3</b> Livestock per km <sup>2</sup>			
	<b>Vulnerable Health Status</b>	<b>14.4</b> Infant Mortality Rate	<b>125.1</b> Maternal Mortality Rate	<b>67.4 yrs</b> Average Life Expectancy	<b>2%</b> Acute Malnutrition (Children < 5)	<b>2.2%</b> Population Disabled	
	<b>Clean Water Vulnerability</b>	<b>14.3%</b> Households with Access to Improved Water	<b>13.7%</b> Households with Access to Flush Toilets				
	<b>Information Access Vulnerability</b>	<b>38.3%</b> Illiteracy	<b>4.3 yrs</b> Average Years of Schooling	<b>82.1%</b> Primary School Enrollment	<b>96.5%</b> Households without Internet	<b>49.5%</b> Households without TV	<b>35.7%</b> Households without Radio
	<b>Economic Constraints</b>	<b>68.1</b> Economic Dependency Ratio	<b>89.5%</b> Population in Poverty				
	<b>Gender Inequality</b>	<b>25%</b> Female Seats in Government	<b>1.37</b> Female to Male Secondary Education Enrollment	<b>0.62</b> Female to Male Labor Ratio			
	<b>Population Pressures</b>	<b>2.56%</b> Average Annual Population Change	<b>4.53%</b> Average Annual Urban Population Change				

<sup>29</sup> **Vulnerability:** The socioeconomic conditions that are associated with the susceptibility to disruptions in a country's normal functions.

## Coping Capacity (CC)

**Coping Capacity<sup>30</sup> Rank: 16 of 17 Departments (Score: 0.256)** Región Autónoma de la Costa Caribe Sur exhibits weaker Coping Capacity in the areas of Infrastructure, Economic Capacity, and Governance. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Coping Capacity score.

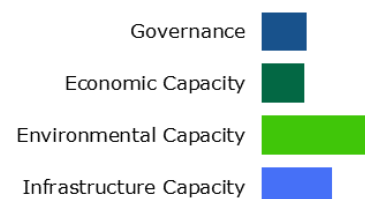









Table 21. Component scores for each coping capacity sub-component

	<b>Economic Capacity</b>	<b>5.1%</b> Households that Receive Remittances	<b>85.4%</b> Employment Rate (Male)	<b>32.5%</b> Employment Rate (Female)	<b>7.2%</b> Population in Highest Welfare Quintile	<b>\$248.3</b> Annual Nominal Global Revenue per Capita
	<b>Governance</b>	<b>85.4%</b> Crime Complaints Cleared	<b>1305.6</b> Crime Rate per 100k Persons	<b>84.7%</b> Households without Garbage Collection	<b>17.4%</b> Voter Participation (2016 Election)	
	<b>Environmental Capacity</b>	<b>28.9%</b> Protected or Reforested Land				
	<b>Infrastructure Capacity</b>					
	<b>Health Care Capacity</b>		<b>6.7</b> Hospital Beds per 10,000 Persons	<b>13.8</b> Nurses per 10,000 Persons	<b>8.7</b> Physicians per 10,000 Persons	<b>41.2 km</b> Average Distance to Nearest Hospital
	<b>Communications Capacity</b>		<b>5.2%</b> Households with Access to Fixed Phone Line	<b>74.7%</b> Households with Access to Mobile Phone		
	<b>Transportation Capacity</b>		<b>60.8 km</b> Average Distance to Nearest Port or Airport	<b>0.05 km</b> Total Length of Road per km <sup>2</sup> (area)		

<sup>30</sup> **Coping Capacity:** The systems, means, and abilities of a country to absorb and respond to events that could potentially disrupt normal function.

Lack of Resilience (LR)

Lack of Resilience<sup>31</sup> Rank: 2 of 17 Departments (Score: 0.724)

Región Autónoma de la Costa Caribe Sur’s score and ranking are due to very high Vulnerability combined with very low Coping Capacity scores.

Table 22. The three thematic areas with the weakest relative scores



Multi-Hazard Risk (MHR)

Multi-Hazard Risk<sup>32</sup> Rank: 2 of 17 Departments (Score: 0.575)

Región Autónoma de la Costa Caribe Sur’s score and ranking are due to low Multi-Hazard Exposure combined with very high Vulnerability and very low Coping Capacity scores.

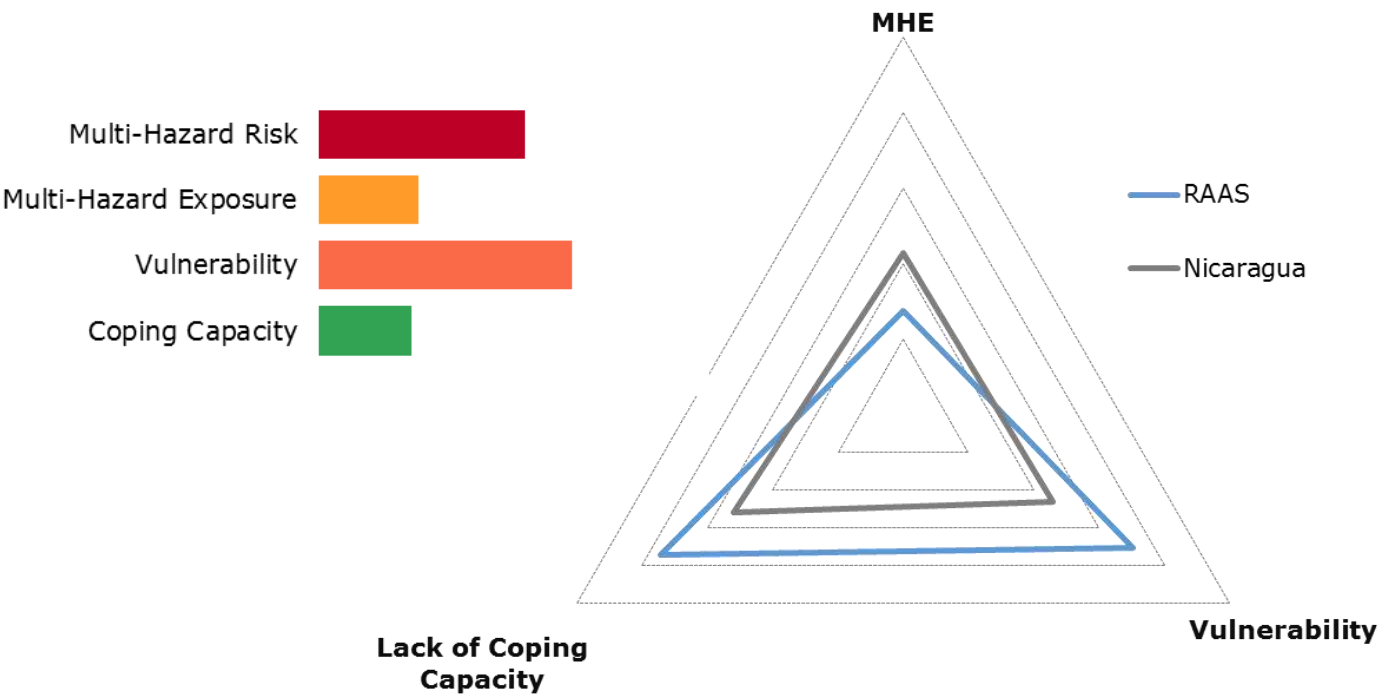


Figure 28. Department Multi-Hazard Risk component scores compared to overall average country scores

<sup>31</sup> **Lack of Resilience:** The susceptibility to impact from the short-term inability to absorb, respond to, and recover from disruptions to a country’s normal function. This index provides a hazard-independent look at current socioeconomic conditions.

<sup>32</sup> **Multi-Hazard Risk:** The likelihood of losses or disruptions to a country’s normal function due to interaction between multi-hazard exposure, socioeconomic vulnerability, and coping capacity.

## Successes



### Responsive population

Engage with drills and exercises, and willing to evacuate to promote a successful response.



### Low environmental stress

Ranked 13 of 17 departments, low environmental stress indicates that natural resources and agriculture will be more resilient to the effects of a disaster and may recover faster.

## Recommendations

01

### Resource assessment

Conduct an assessment to document and track subnational disaster management resources, including facilities (e.g., EOCs and command posts, warehouses) and equipment critical to disaster management activities to enhance understanding of capabilities and needs, justify budget increases, and inform contingency planning for the territories.

02

### Reduce clean water vulnerability

Similar to RAAN, invest in public water and sewer infrastructure to ensure equitable access to safe, clean drinking water and sanitation.

03

### Improve governance

Provide additional support for local police, firefighters, and emergency medical resources to improve public safety and increase crime-clearance rates. In addition, promote civic engagement and voter participation in local and national elections to improve public voice and accountability. Finally, seek partnerships with the private sector to increase the provision of services, such as garbage collection.

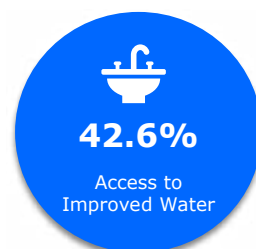
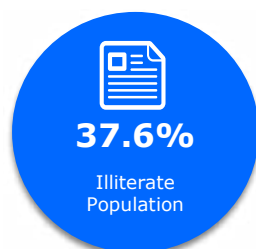
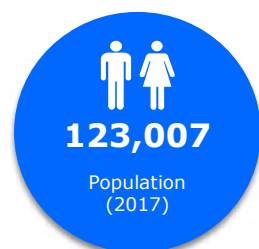
## Department: Río San Juan



Department Capital: San Carlos

Area: 7,540 km<sup>2</sup>

Río San Juan is in the southeastern part of Nicaragua and is primarily known for its national wildlife refuges, the San Juan River, and its historic colonial sites.



Municipality	Population
Morrito	7,457
El Almendro	14,567
San Miguelito	18,472
San Carlos	46,241
El Castillo	33,734
San Juan de Nicaragua	2,536



**Multi-Hazard Risk Rank:  
High (3 of 17)**

**Lack of Resilience Rank:  
High (4 of 17)**

## RVA Component Scores

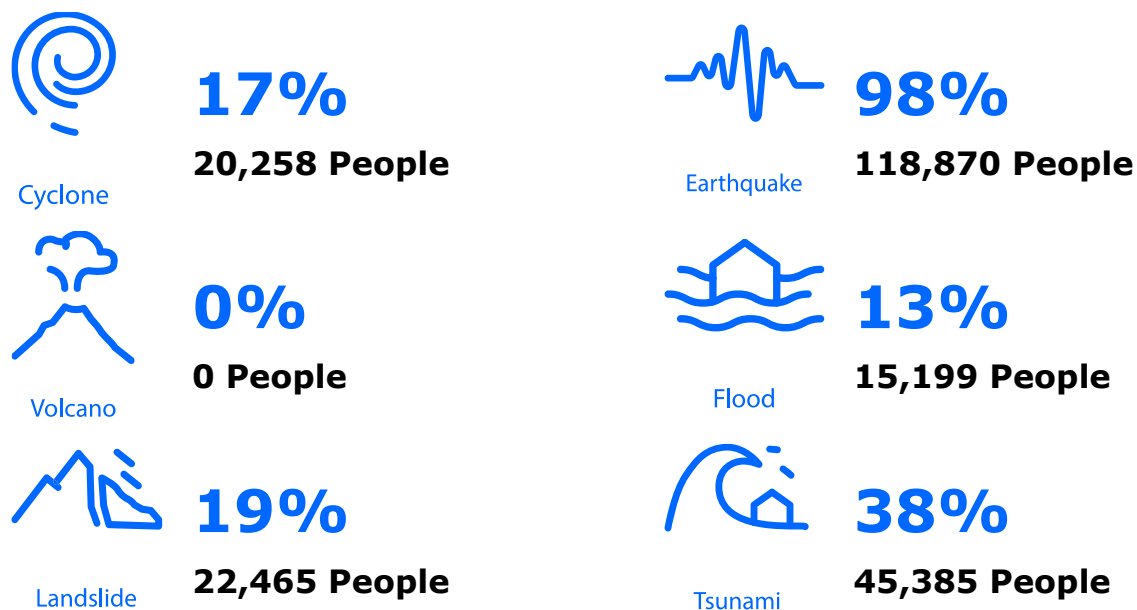
Table 23. Department scores and ranks (compared across departments) for each index

Multi-Hazard Risk		Lack of Resilience		Multi-Hazard Exposure		Vulnerability		Coping Capacity	
High		High		Low		High		Low	
Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)
0.515	3	0.615	4	0.316	10	0.666	4	0.436	10

## Multi-Hazard Exposure (MHE)

**Multi-Hazard Exposure<sup>33</sup> Rank: 10 of 17 Departments (Score: 0.316)**

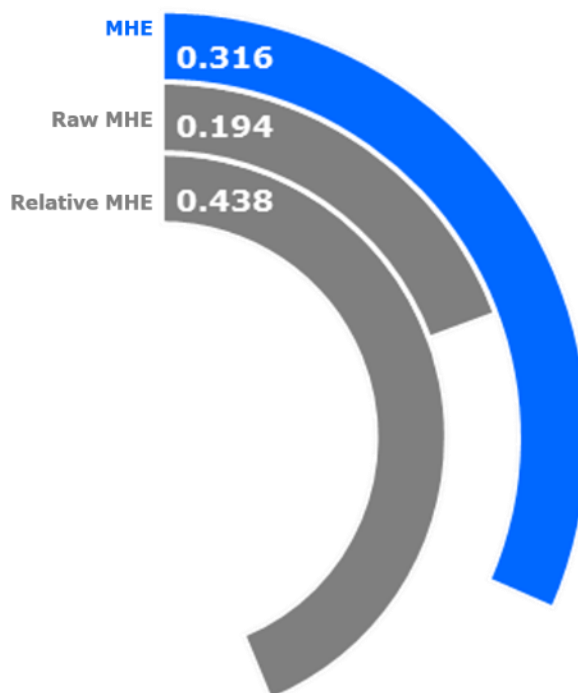
Table 24. Estimated ambient population<sup>34</sup> exposed to each hazard



### Case Study:

In 2016 the Nordic Development Fund completed a project designed to increase resilience and watersheds to climate change impacts through natural resources management, design and construction of small-scale infrastructure, and development of climate change capacity. Since the project was completed farmers have increased their agricultural production by 18% and enhanced their resilience to drought during the dry season.

<https://www.ndf.fi/project/disaster-management-and-climate-change-project-ndf-c17>



<sup>33</sup> **Multi-Hazard Exposure:** Average exposure of the population to hazards.

<sup>34</sup> **Ambient Population:** 24-hour average estimate of the population in each department. Ambient population typically differs from census population.



## Vulnerability (V)

**Vulnerability<sup>35</sup> Rank: 4 of 17 Departments (Score: 0.666)** Vulnerability in Río San Juan is primarily driven by high Vulnerable Health Status, Population Pressures, and Information Access Vulnerability. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Vulnerability score.

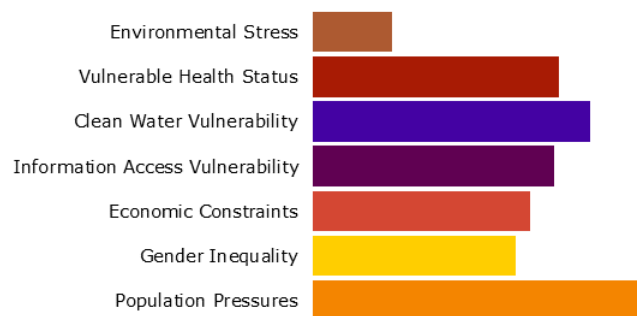









Table 25. Component scores for each vulnerability sub-component

	<b>Environmental Stress</b>	<b>0%</b> Province at Drought Risk	<b>7.6%</b> Erosion Risk	<b>96.2</b> Livestock per km <sup>2</sup>			
	<b>Vulnerable Health Status</b>	<b>19.6</b> Infant Mortality Rate	<b>35.1</b> Maternal Mortality Rate	<b>71.8 yrs</b> Average Life Expectancy	<b>3.7%</b> Acute Malnutrition (Children < 5)	<b>2.8%</b> Population Disabled	
	<b>Clean Water Vulnerability</b>	<b>42.6%</b> Households with Access to Improved Water	<b>7%</b> Households with Access to Flush Toilets				
	<b>Information Access Vulnerability</b>	<b>37.6%</b> Illiteracy	<b>4.4 yrs</b> Average Years of Schooling	<b>84%</b> Primary School Enrollment	<b>98.5%</b> Households without Internet	<b>48.3%</b> Households without TV	<b>37.1%</b> Households without Radio
	<b>Economic Constraints</b>	<b>63.2</b> Economic Dependency Ratio	<b>82.9%</b> Population in Poverty				
	<b>Gender Inequality</b>	<b>50%</b> Female Seats in Government	<b>1.22</b> Female to Male Secondary Education Enrollment	<b>0.60</b> Female to Male Labor Ratio			
	<b>Population Pressures</b>	<b>3.31%</b> Average Annual Population Change	<b>4.38%</b> Average Annual Urban Population Change				

<sup>35</sup> **Vulnerability:** The socioeconomic conditions that are associated with the susceptibility to disruptions in a country's normal functions.

## Coping Capacity (CC)

**Coping Capacity<sup>36</sup> Rank: 10 of 17 Departments (Score: 0.436)** Río San Juan exhibits weaker Coping Capacity in the areas of Economic Capacity and Infrastructure. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Coping Capacity score.

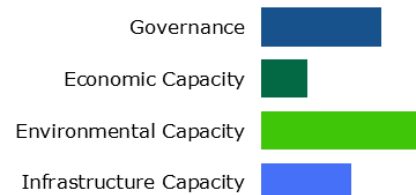


Table 26. Component scores for each coping capacity sub-component

	<b>Economic Capacity</b>	<b>2.7%</b> Households that Receive Remittances	<b>94.9%</b> Employment Rate (Male)	<b>37.8%</b> Employment Rate (Female)	<b>5.7%</b> Population in Highest Welfare Quintile	<b>\$180.1</b> Annual Nominal Global Revenue per Capita
	<b>Governance</b>	<b>91.2%</b> Crime Complaints Cleared	<b>956.6</b> Crime Rate per 100k Persons	<b>89.1%</b> Households without Garbage Collection	<b>57.7%</b> Voter Participation (2016 Election)	
	<b>Environmental Capacity</b>	<b>39.1%</b> Protected or Reforested Land				
	<b>Infrastructure Capacity</b>					
	<b>Health Care Capacity</b>		<b>5.9</b> Hospital Beds per 10,000 Persons	<b>20.6</b> Nurses per 10,000 Persons	<b>9.6</b> Physicians per 10,000 Persons	<b>39.7 km</b> Average Distance to Nearest Hospital
	<b>Communications Capacity</b>		<b>2.9%</b> Households with Access to Fixed Phone Line	<b>76.1%</b> Households with Access to Mobile Phone		
	<b>Transportation Capacity</b>		<b>47.6 km</b> Average Distance to Nearest Port or Airport	<b>0.09 km</b> Total Length of Road per km <sup>2</sup> (area)		

<sup>36</sup> **Coping Capacity:** The systems, means, and abilities of a country to absorb and respond to events that could potentially disrupt normal function.

Lack of Resilience (LR)

Lack of Resilience<sup>37</sup> Rank: 4 of 17 Departments (Score: 0.615)

Río San Juan’s score and ranking are due to high Vulnerability combined with low Coping Capacity scores.

Table 27. The three thematic areas with the weakest relative scores



Multi-Hazard Risk (MHR)

Multi-Hazard Risk<sup>38</sup> Rank: 3 of 17 Departments (Score: 0.515)

Río San Juan’s score and ranking are due to low Multi-Hazard Exposure combined with high Vulnerability and low Coping Capacity scores.

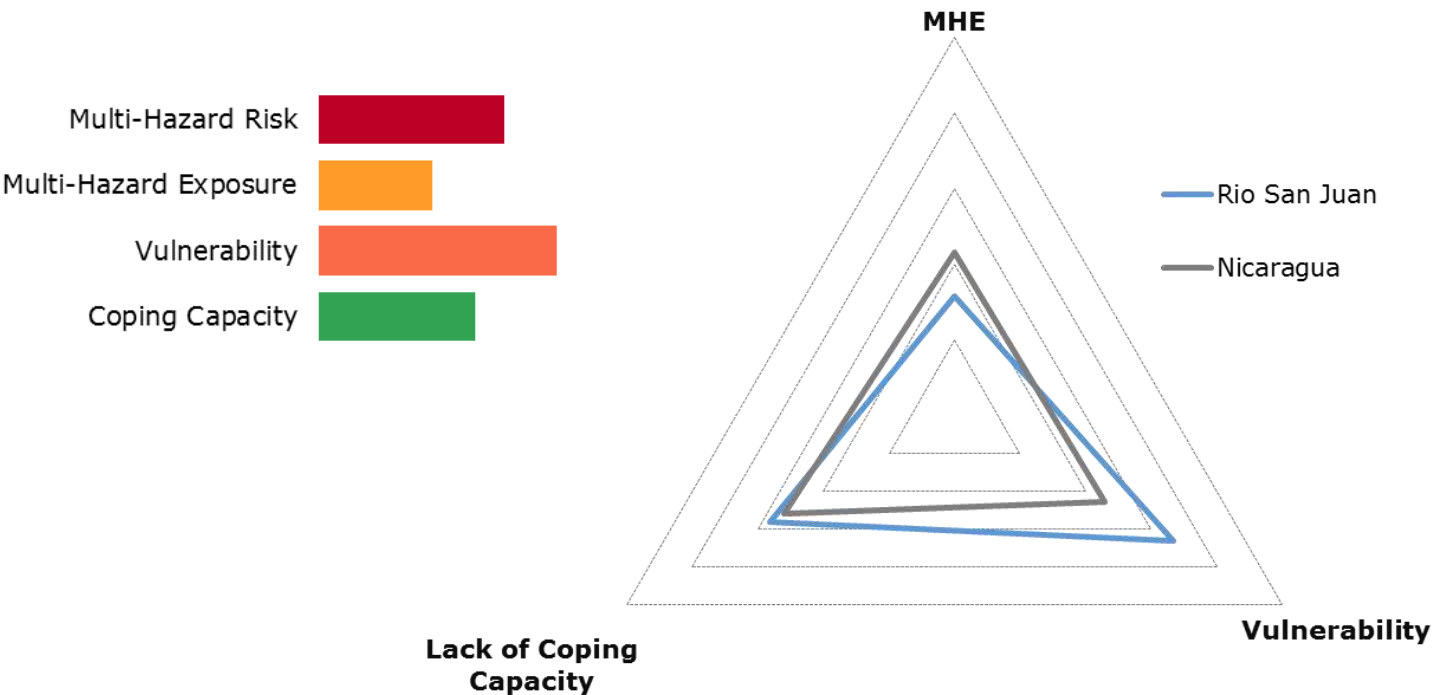


Figure 29. Department Multi-Hazard Risk component scores compared to overall average country scores

<sup>37</sup> **Lack of Resilience:** The susceptibility to impact from the short-term inability to absorb, respond to, and recover from disruptions to a country’s normal function. This index provides a hazard-independent look at current socioeconomic conditions.

<sup>38</sup> **Multi-Hazard Risk:** The likelihood of losses or disruptions to a country’s normal function due to interaction between multi-hazard exposure, socioeconomic vulnerability, and coping capacity.

## Successes



### Low environmental stress

Ranked 15 of 17 departments, low environmental stress indicates that natural resources and agriculture will be more resilient to the effects of a disaster and may recover faster.

## Recommendations

01

### Build health care capacity

Focus investments to increase access to health care and preventative medicine, as well as transportation to improve connectivity and ensure that health services can be reached by the entire population.

02

### Plan for a growing population

Ensure local economies, resources, and infrastructure can adequately support the growing population. Anticipate areas where additional growth is likely and estimate the resources necessary for sustainable growth.

03

### Reduce clean water vulnerability

Invest in public water and sewer infrastructure to ensure equitable access to safe, clean drinking water and sanitation.

## Department: Managua



Department Capital: Managua

Area: 3,465 km<sup>2</sup>

Managua is located in western Nicaragua on the southwestern shore of Lake Managua. It includes Nicaragua's capital city of Managua and is the economic, political, educational, and cultural center of the nation.



Municipality	Population
San Francisco Libre	11,109
Tipitapa	144,700
Mateare	52,679
Villa El Carmen	36,035
Ciudad Sandino	102,383
Managua	1,057,296
Ticuantepe	38,874
El Crucero	15,488
San Rafael del Sur	48,766

**Multi-Hazard Risk Rank:  
High (4 of 17)**

**Lack of Resilience Rank:  
Very Low (17 of 17)**



## RVA Component Scores

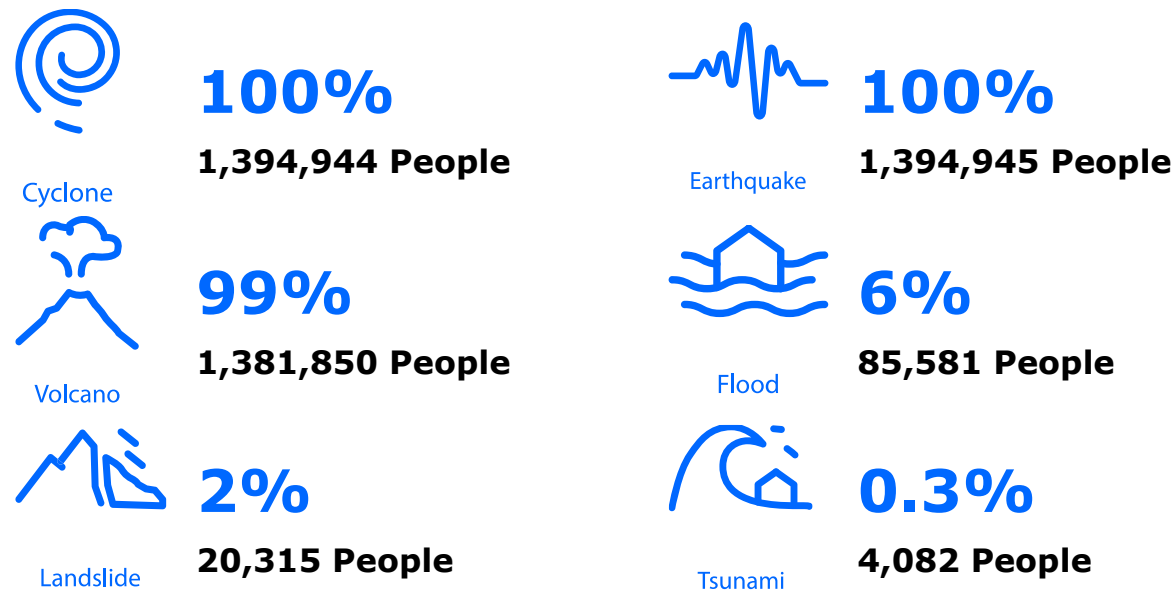
Table 28. Department scores and ranks (compared across departments) for each index

Multi-Hazard Risk		Lack of Resilience		Multi-Hazard Exposure		Vulnerability		Coping Capacity	
High		Very Low		Very High		Very Low		High	
Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)
0.515	4	0.314	17	0.915	1	0.221	17	0.592	5

Multi-Hazard Exposure (MHE)

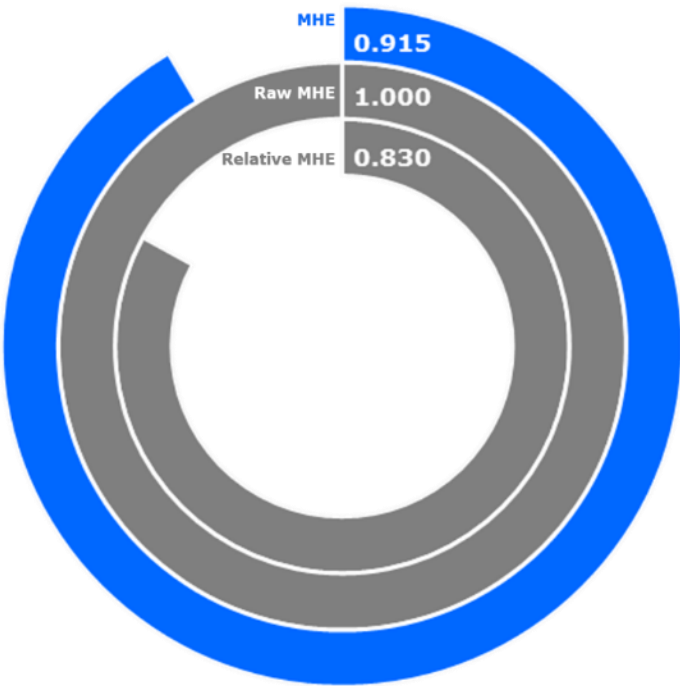
Multi-Hazard Exposure<sup>39</sup> Rank: 1 of 17 Departments (Score: 0.915)

Table 29. Estimated ambient population<sup>40</sup> exposed to each hazard



More Ambulances for Managua

According to interviews with the Nicaraguan Red Cross, the population in Managua increases from 1.6 million to 2.5 million during daylight hours. This rise in human numbers puts a strain on emergency resources, particularly ambulances. Managua has 12 ambulances designated for emergency response, falling short of the minimum estimated number of 25 ambulances needed to meet the standard of 1 ambulance per every 100,000 people. Although the Ministry of Health has 25 ambulances, only 15 are usable and these are dedicated to the transportation of patients between hospitals. This is just one example of a resource shortfall for an effective disaster-management system.



<sup>39</sup> Multi-Hazard Exposure: Average exposure of the population to hazards.

<sup>40</sup> Ambient Population: 24-hour average estimate of the population in each department. Ambient population typically differs from census population.

## Vulnerability (V)

**Vulnerability<sup>41</sup> Rank: 17 of 17 Departments (Score: 0.221)** Vulnerability in Managua is primarily driven by Environmental Stress. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Vulnerability score.

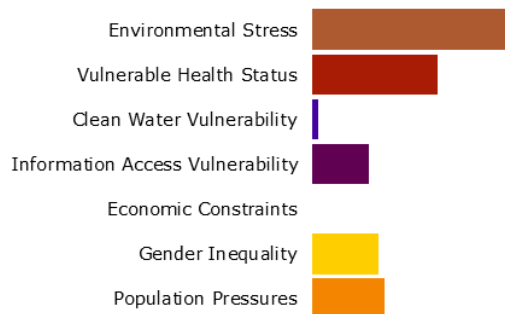









Table 30. Component scores for each vulnerability sub-component

	<b>Environmental Stress</b>	<b>100%</b> Province at Drought Risk	<b>27.8%</b> Erosion Risk	<b>81.1</b> Livestock per km <sup>2</sup>		
	<b>Vulnerable Health Status</b>	<b>15.7</b> Infant Mortality Rate	<b>12.8</b> Maternal Mortality Rate	<b>77.3 yrs</b> Average Life Expectancy	<b>2.6%</b> Acute Malnutrition (Children < 5)	<b>1.8%</b> Population Disabled
	<b>Clean Water Vulnerability</b>	<b>90.5%</b> Households with Access to Improved Water	<b>61.6%</b> Households with Access to Flush Toilets			
	<b>Information Access Vulnerability</b>	<b>10.0%</b> Illiteracy	<b>7.4 yrs</b> Average Years of Schooling	<b>86.6%</b> Primary School Enrollment	<b>89.9%</b> Households without Internet	<b>8.5%</b> Households without TV
	<b>Economic Constraints</b>	<b>49.2</b> Economic Dependency Ratio	<b>48.7%</b> Population in Poverty			
	<b>Gender Inequality</b>	<b>32.1%</b> Female Seats in Government	<b>1.27</b> Female to Male Secondary Education Enrollment	<b>0.19</b> Female to Male Labor Ratio		
	<b>Population Pressures</b>	<b>1.75%</b> Average Annual Population Change	<b>2.05%</b> Average Annual Urban Population Change			

<sup>41</sup> **Vulnerability:** The socioeconomic conditions that are associated with the susceptibility to disruptions in a country's normal functions.

## Coping Capacity (CC)

**Coping Capacity<sup>42</sup> Rank: 5 of 17 Departments (Score: 0.592)** Managua exhibits weaker Coping Capacity in the areas of Environmental Capacity and Governance. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Coping Capacity score.

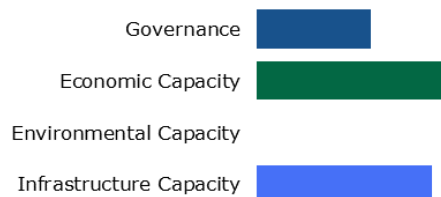


Table 31. Component scores for each coping capacity sub-component

	<b>Economic Capacity</b>	<b>10.4%</b> Households that Receive Remittances	<b>79.7%</b> Employment Rate (Male)	<b>64.6%</b> Employment Rate (Female)	<b>36.8%</b> Population in Highest Welfare Quintile	<b>\$5,994</b> Annual Nominal Global Revenue per Capita
	<b>Governance</b>	<b>87.8%</b> Crime Complaints Cleared	<b>2400.1</b> Crime Rate per 100k Persons	<b>29.3%</b> Households without Garbage Collection	<b>72.1%</b> Voter Participation (2016 Election)	
	<b>Environmental Capacity</b>	<b>3.9%</b> Protected or Reforested Land				
	<b>Infrastructure Capacity</b>					
	<b>Health Care Capacity</b>		<b>11.1</b> Hospital Beds per 10,000 Persons	<b>13.8</b> Nurses per 10,000 Persons	<b>12.4</b> Physicians per 10,000 Persons	<b>16.8 km</b> Average Distance to Nearest Hospital
	<b>Communications Capacity</b>		<b>29.6%</b> Households with Access to Fixed Phone Line	<b>85.4%</b> Households with Access to Mobile Phone		
	<b>Transportation Capacity</b>		<b>15.3 km</b> Average Distance to Nearest Port or Airport	<b>0.43 km</b> Total Length of Road per km <sup>2</sup> (area)		

<sup>42</sup> **Coping Capacity:** The systems, means, and abilities of a country to absorb and respond to events that could potentially disrupt normal function.



Lack of Resilience (LR)

Lack of Resilience<sup>43</sup> Rank: 17 of 17 Departments (Score: 0.314)

Managua’s score and ranking are due to very low Vulnerability combined with high Coping Capacity scores.

Table 32. The three thematic areas with the weakest relative scores



Multi-Hazard Risk (MHR)

Multi-Hazard Risk<sup>44</sup> Rank: 4 of 17 Departments (Score: 0.515)

Managua’s Multi-Hazard Risk score and ranking are driven primarily by very high Multi-Hazard Exposure combined with very low Vulnerability and high Coping Capacity scores.

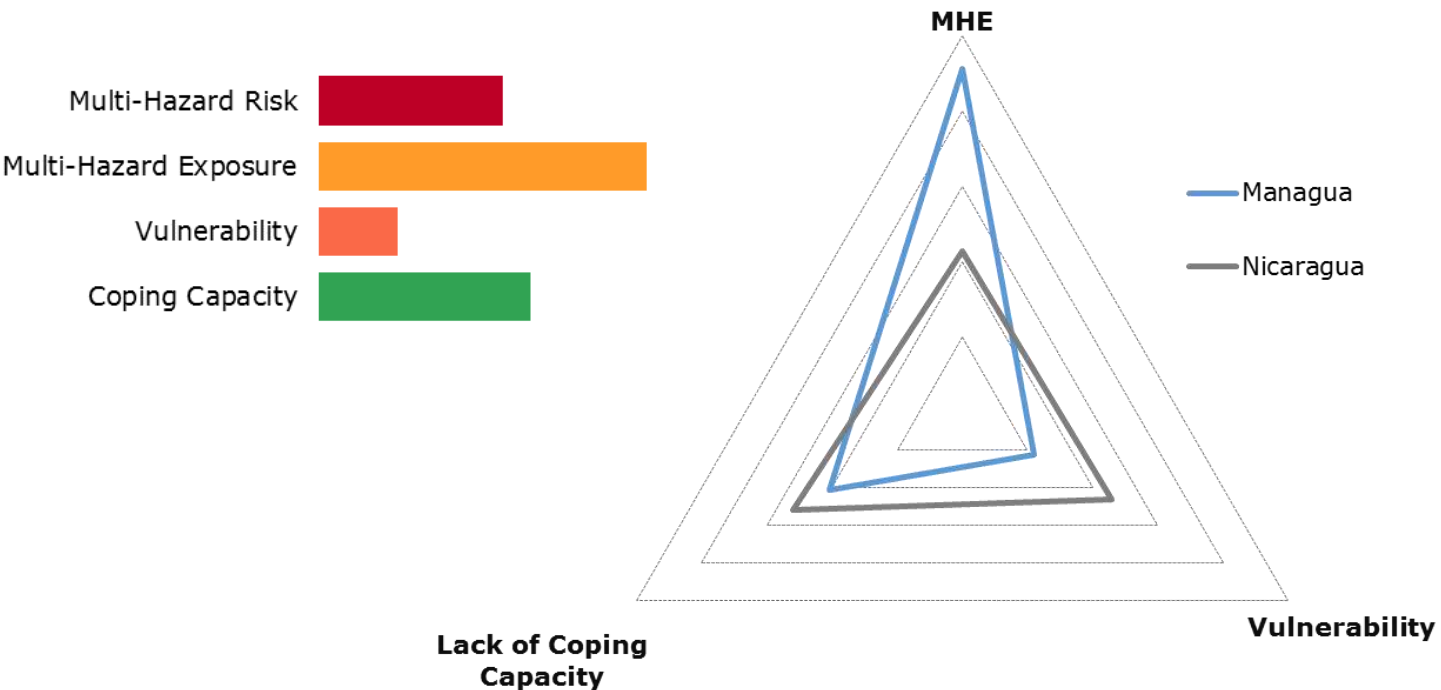


Figure 30. Department Multi-Hazard Risk component scores compared to overall average country scores

<sup>43</sup> **Lack of Resilience:** The susceptibility to impact from the short-term inability to absorb, respond to, and recover from disruptions to a country’s normal function. This index provides a hazard-independent look at current socioeconomic conditions.

<sup>44</sup> **Multi-Hazard Risk:** The likelihood of losses or disruptions to a country’s normal function due to interaction between multi-hazard exposure, socioeconomic vulnerability, and coping capacity.

## Successes



### **Lowest overall vulnerability**

Ranked 17 of 17 departments, low overall vulnerability indicates that Managua department is less susceptible to the negative impacts of a disaster and will likely recover faster after an event.



### **Lowest economic constraints, clean water vulnerability, and information access vulnerability**

Ranked 17 of 17 departments in each subcomponent, indicating a highly resilient population.



### **Highest communications capacity**

Ranked 1 of 17 departments, well developed communication networks facilitate the coordinated action among local, departmental, and national actors.

## Recommendations

**01**

### **Institutionalize multi-hazard planning and education**

Multi-Hazard Risk in Managua is driven primarily by exposure. Develop a departmental multi-hazard mitigation plan to acknowledge exposure to multiple hazards. Engage the public in this process to promote an understanding of multi-hazard risk.

**02**

### **Invest in public safety and crime prevention**

Provide additional support for local police, firefighters, and emergency medical resources to improve public safety and decrease crime rates.

**03**

### **Reduce environmental stress**

Invest in drought- and erosion-mitigation projects to reduce environmental stress and degradation.

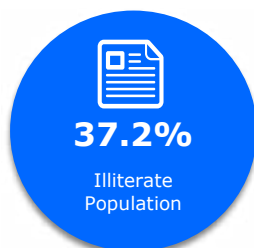
## Department: Jinotega



Department Capital: Jinotega

Area: 9,222 km<sup>2</sup>

Jinotega is in the north-central region of Nicaragua. The department produces 80% of Nicaragua's coffee for global export, as well as providing hydropower to much of the country via Lake Apanas.



Municipality	Population
Wiwilí de Jinotega	82,317
El Cuá	65,711
San Jose del Bocay	63,132
Sta. María de Pantasma	46,566
San Rafael del Norte	22,028
San Sebastián de Yalí	35,358
La Concordia	7,273
Jinotega	134,657

**Multi-Hazard Risk Rank:  
High (5 of 17)**

**Lack of Resilience Rank:  
Very High (3 of 17)**



## RVA Component Scores

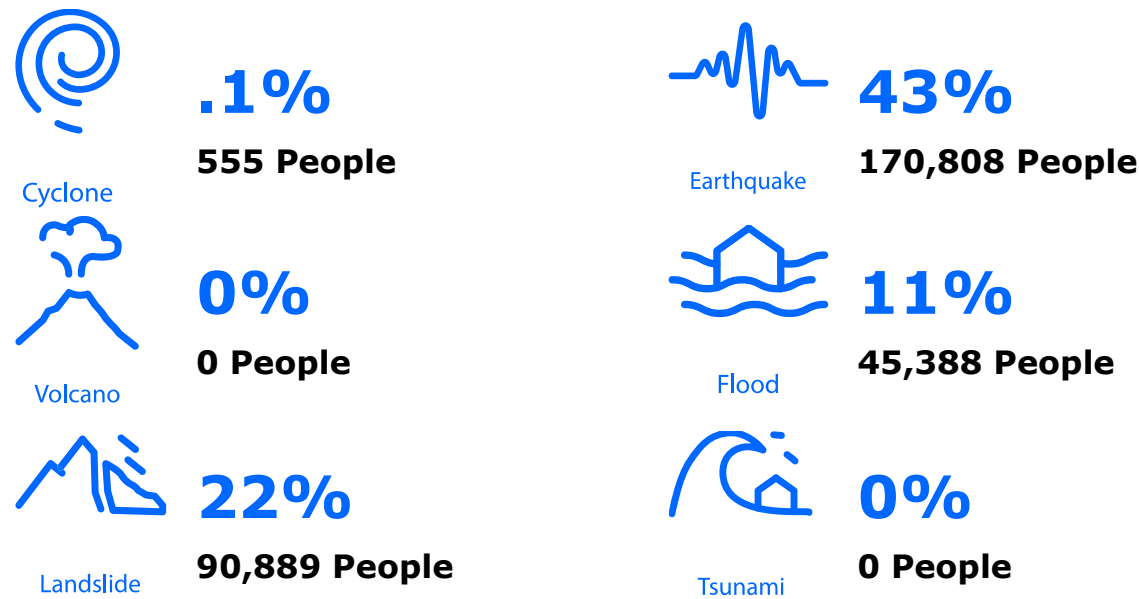
Table 33. Department scores and ranks (compared across departments) for each index

Multi-Hazard Risk		Lack of Resilience		Multi-Hazard Exposure		Vulnerability		Coping Capacity	
High		Very High		Very Low		Very High		Low	
Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)
0.498	5	0.651	3	0.190	14	0.728	2	0.425	11

Multi-Hazard Exposure (MHE)

Multi-Hazard Exposure<sup>45</sup> Rank: 14 of 17 Departments (Score: 0.190)

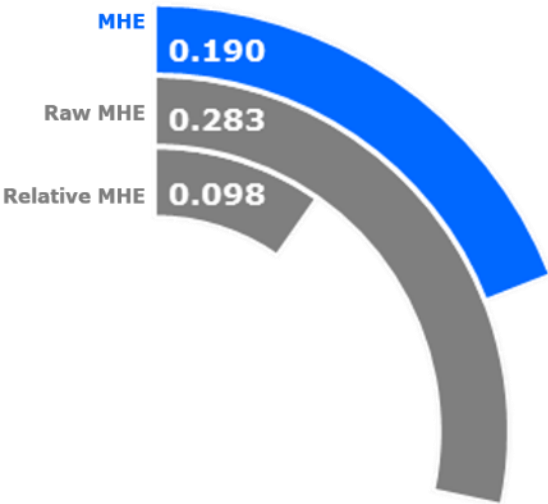
Table 34. Estimated ambient population<sup>46</sup> exposed to each hazard



Case Study

Jinotega is a highly food insecure department. WFP is currently running a program that provides access to education with a daily meal to pre and primary school children. Along with a meal, children are provided a nutritional education, gardens, and improvements to school infrastructure. WFP hopes increase the disaster resilience of these vulnerable communities.

<https://reliefweb.int/sites/reliefweb.int/files/resource/s/Nicaragua%20Country%20Brief%20February%202017%20OIM.pdf>



<sup>45</sup> Multi-Hazard Exposure: Average exposure of the population to hazards.

<sup>46</sup> Ambient Population: 24-hour average estimate of the population in each department. Ambient population typically differs from census population.

## Vulnerability (V)

**Vulnerability<sup>47</sup> Rank: 2 of 17 Departments (Score: 0.728)** Vulnerability in Jinotega is primarily driven by very high Information Access Vulnerability, Gender Inequality, Economic Constraints, Vulnerable Health Status, Population Pressures, and Clean Water Vulnerability. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Vulnerability score.

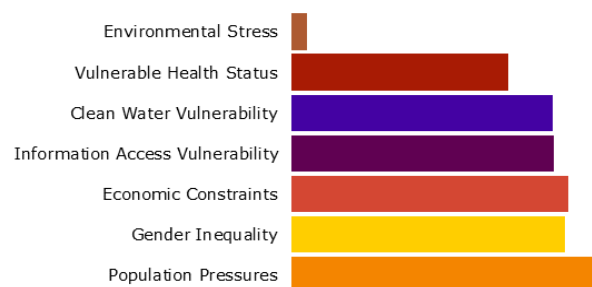









Table 35. Component scores for each vulnerability sub-component

	<b>Environmental Stress</b>	<b>7.8%</b> Province at Drought Risk	<b>11.6%</b> Erosion Risk	<b>59.1</b> Livestock per km <sup>2</sup>			
	<b>Vulnerable Health Status</b>	<b>17.2</b> Infant Mortality Rate	<b>115.0</b> Maternal Mortality Rate	<b>68.7 yrs</b> Average Life Expectancy	<b>1.3%</b> Acute Malnutrition (Children < 5)	<b>2.3%</b> Population Disabled	
	<b>Clean Water Vulnerability</b>	<b>36.5%</b> Households with Access to Improved Water	<b>9.4%</b> Households with Access to Flush Toilets				
	<b>Information Access Vulnerability</b>	<b>37.2%</b> Illiteracy	<b>3.9 yrs</b> Average Years of Schooling	<b>74.8%</b> Primary School Enrollment	<b>98.7%</b> Households without Internet	<b>57.2%</b> Households without TV	<b>29.1%</b> Households without Radio
	<b>Economic Constraints</b>	<b>76.6</b> Economic Dependency Ratio	<b>83.5%</b> Population in Poverty				
	<b>Gender Inequality</b>	<b>37.5%</b> Female Seats in Government	<b>1.2</b> Female to Male Secondary Education Enrollment	<b>0.67</b> Female to Male Labor Ratio			
	<b>Population Pressures</b>	<b>3.23%</b> Average Annual Population Change	<b>4.48%</b> Average Annual Urban Population Change				

<sup>47</sup> **Vulnerability:** The socioeconomic conditions that are associated with the susceptibility to disruptions in a country's normal functions.

## Coping Capacity (CC)

**Coping Capacity<sup>48</sup> Rank: 11 of 17 Departments (Score: 0.425)** Jinotega exhibits weaker Coping Capacity in the areas of Economic Capacity and Infrastructure. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Coping Capacity score.

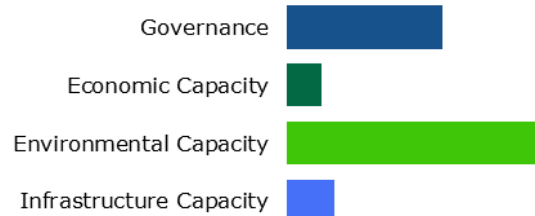









Table 36. Component scores for each coping capacity sub-component

	<b>Economic Capacity</b>	<b>2.2%</b> Households that Receive Remittances	<b>91.5%</b> Employment Rate (Male)	<b>30.2%</b> Employment Rate (Female)	<b>4.7%</b> Population in Highest Welfare Quintile	<b>\$255.0</b> Annual Nominal Global Revenue per Capita
	<b>Governance</b>	<b>92.9%</b> Crime Complaints Cleared	<b>582.6</b> Crime Rate per 100k Persons	<b>84.1%</b> Households without Garbage Collection	<b>47.4%</b> Voter Participation (2016 Election)	
	<b>Environmental Capacity</b>	<b>52.9%</b> Protected or Reforested Land				
	<b>Infrastructure Capacity</b>					
	<b>Health Care Capacity</b>		<b>7.6</b> Hospital Beds per 10,000 Persons	<b>8.8</b> Nurses per 10,000 Persons	<b>7.1</b> Physicians per 10,000 Persons	<b>32.5 km</b> Average Distance to Nearest Hospital
	<b>Communications Capacity</b>		<b>2.2%</b> Households with Access to Fixed Phone Line	<b>47.5%</b> Households with Access to Mobile Phone		
	<b>Transportation Capacity</b>		<b>78.9 km</b> Average Distance to Nearest Port or Airport	<b>0.25 km</b> Total Length of Road per km <sup>2</sup> (area)		

<sup>48</sup> **Coping Capacity:** The systems, means, and abilities of a country to absorb and respond to events that could potentially disrupt normal function.

Lack of Resilience (LR)

Lack of Resilience<sup>49</sup> Rank: 3 of 17 Departments (Score: 0.651)

Jinotega’s score and ranking are due to very high Vulnerability combined with low Coping Capacity scores.

Table 37. The three thematic areas with the weakest relative scores



Information  
Access  
Vulnerability



Gender  
Inequality



Infrastructure  
Capacity

Multi-Hazard Risk (MHR)

Multi-Hazard Risk<sup>50</sup> Rank: 5 of 17 Departments (Score: 0.498)

Jinotega’s score and ranking are driven primarily by its very low Vulnerability and high Coping Capacity scores, despite having very low Multi-Hazard Exposure.

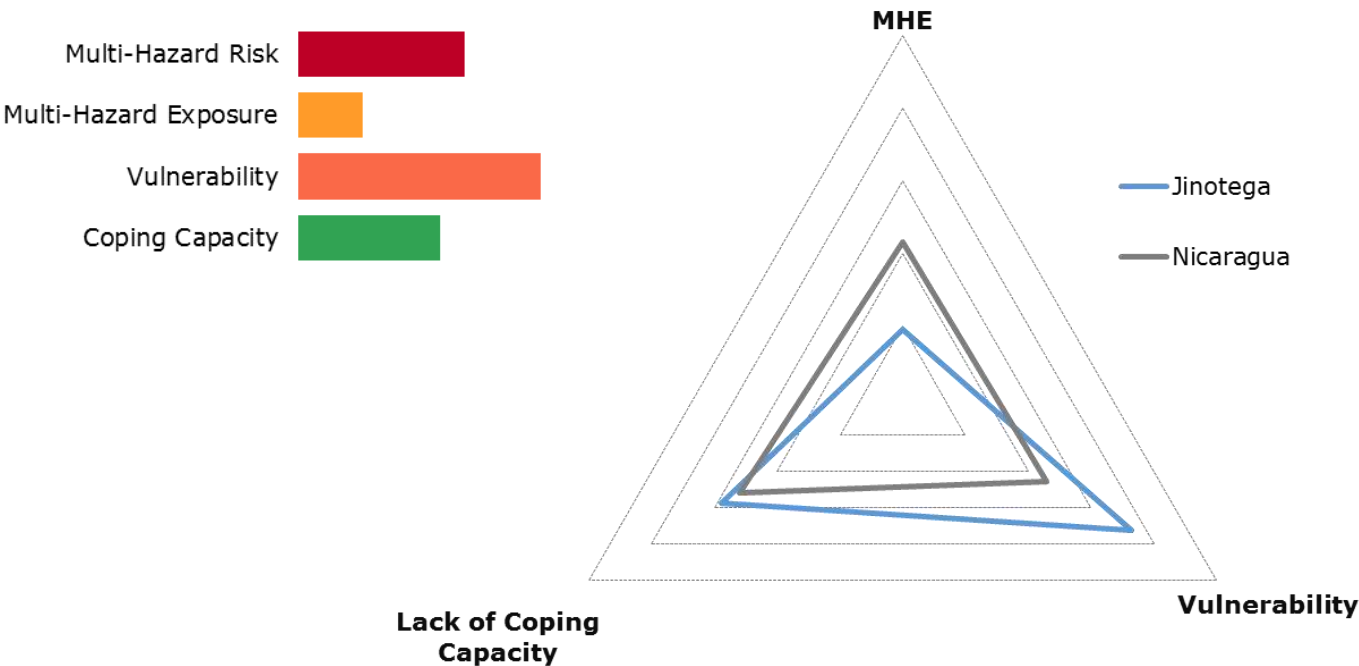


Figure 31. Department Multi-Hazard Risk component scores compared to overall average country scores

<sup>49</sup> **Lack of Resilience:** The susceptibility to impact from the short-term inability to absorb, respond to, and recover from disruptions to a country’s normal function. This index provides a hazard-independent look at current socioeconomic conditions.

<sup>50</sup> **Multi-Hazard Risk:** The likelihood of losses or disruptions to a country’s normal function due to interaction between multi-hazard exposure, socioeconomic vulnerability, and coping capacity.

## Successes



### **Lowest overall environmental stress**

Ranked 17 of 17 departments, low environmental stress indicates that natural resources and agriculture will be more resilient to the effects of a disaster and may recover faster.



### **High overall governance**

Ranked 4 of 17 departments, high governance could facilitate the implementation of disaster management initiatives into departmental and municipal communities.

## Recommendations

**01**

### **Increase information access**

Invest in educational programs, including non-traditional, community-based approaches to increase educational attainment and adult literacy. Support comprehensive efforts to increase access to information mediums (phone, internet, TV, radio) and distribute disaster-preparedness and hazard-warning information in multiple formats and across multiple platforms, ensuring that vulnerable communities receive easily understandable and actionable disaster-related information.

**02**

### **Promote Gender Equality**

Support equal educational enrollment at all levels; access to the labor market, wages and credit; and political representation to reduce vulnerability.



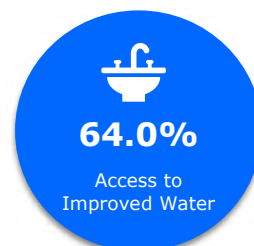
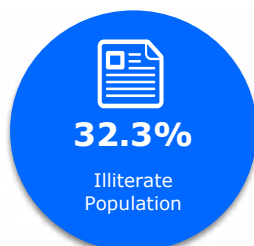
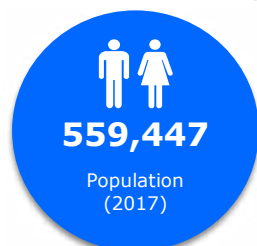
## Department: Matagalpa



Department Capital: Matagalpa

Area: 6,804 km<sup>2</sup>

Matagalpa is located in central Nicaragua and is the second-largest department in population size. It is one of the most mountainous departments and the most diversified in terms of production of goods.



Municipality	Population
Rancho Grande	39,054
Río Blanco	35,454
El Tuma-La Dalia	72,700
San Isidro	19,760
Sébaco	37,097
Matagalpa	155,835
San Ramón	38,201
Matiguás	47,239
Muy Muy	16,857
Esquipulas	18,095
San Dionisio	18,637
Terrabona	14,349
Ciudad Darío	46,169



**Multi-Hazard Risk Rank:  
High (6 of 17)**

**Lack of Resilience Rank:  
High (5 of 17)**

## RVA Component Scores

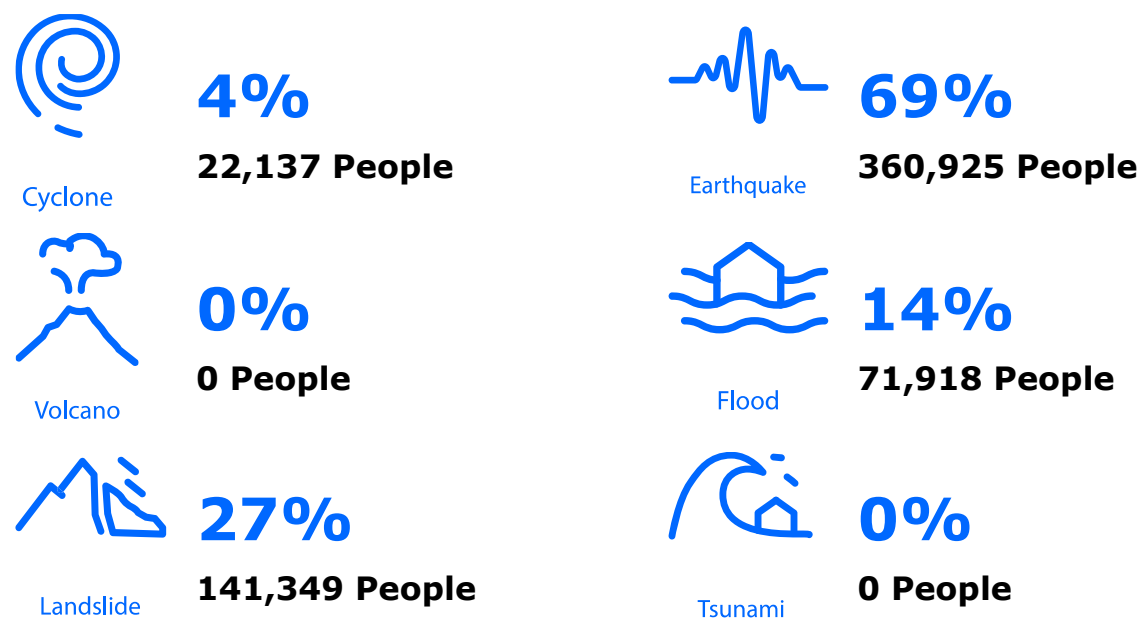
Table 38. Department scores and ranks (compared across departments) for each index

Multi-Hazard Risk		Lack of Resilience		Multi-Hazard Exposure		Vulnerability		Coping Capacity	
High		High		Medium		Medium		Very Low	
Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)
0.495	6	0.572	5	0.341	8	0.512	7	0.369	15

Multi-Hazard Exposure (MHE)

Multi-Hazard Exposure<sup>51</sup> Rank: 8 of 17 Departments (Score: 0.341)

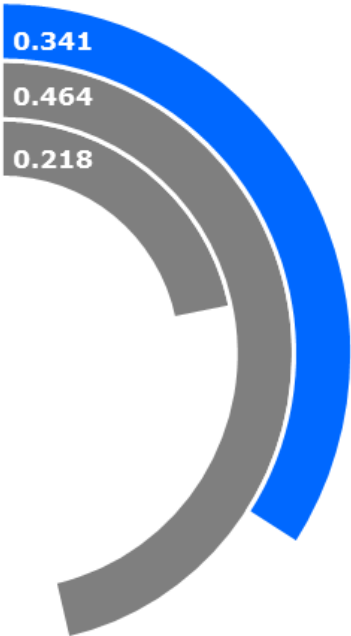
Table 39. Estimated ambient population<sup>52</sup> exposed to each hazard



**Early Warning in Matagalpa**

Matagalpa designed and recently instituted a Joint Early Warning System (EWS) for flood risk management. Through automated tools and equipment, the EWS was designed to provide information in real time in order to effectively “alert and communicate to the population about the possible occurrence of phenomenon possibly causing natural disasters, principally flooding in the city of Managua.” The EWS is operated and monitored by local community organizations and is a strong example of the positive outcomes of community engagement in disaster management.

*Operation of the EWS in the City of Matagalpa, Nicaragua (January 2016)*



<sup>51</sup> Multi-Hazard Exposure: Average exposure of the population to hazards.  
<sup>52</sup> Ambient Population: 24-hour average estimate of the population in each department. Ambient population typically differs from census population.

## Vulnerability (V)

### Vulnerability<sup>53</sup> Rank: 7 of 17 Departments

(Score: 0.512) Vulnerability in Matagalpa is primarily driven by Population Pressures and Economic Constraints. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Vulnerability score.

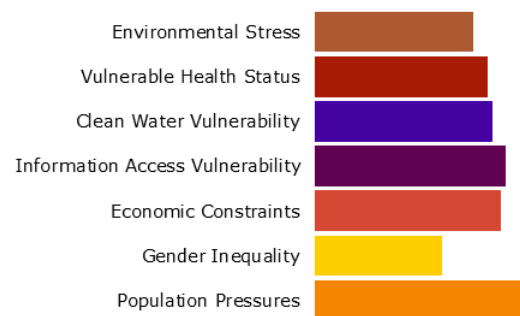









Table 40. Component scores for each vulnerability sub-component

	<b>Environmental Stress</b>	<b>30.1%</b> Province at Drought Risk	<b>40.6%</b> Erosion Risk	<b>86.3</b> Livestock per km <sup>2</sup>			
	<b>Vulnerable Health Status</b>	<b>16.1</b> Infant Mortality Rate	<b>24.6</b> Maternal Mortality Rate	<b>67.9 yrs</b> Average Life Expectancy	<b>1.2%</b> Acute Malnutrition (Children<5)	<b>1.3%</b> Population Disabled	
	<b>Clean Water Vulnerability</b>	<b>64%</b> Households with Access to Improved Water	<b>24.4%</b> Households with Access to Flush Toilets				
	<b>Information Access Vulnerability</b>	<b>32.3%</b> Illiteracy	<b>4.95 yrs</b> Average Years of Schooling	<b>84.5%</b> Primary School Enrollment	<b>94.6%</b> Households without Internet	<b>36.8%</b> Households without TV	<b>45.8%</b> Households without Radio
	<b>Economic Constraints</b>	<b>63.6</b> Economic Dependency Ratio	<b>74.4%</b> Population in Poverty				
	<b>Gender Inequality</b>	<b>46.2%</b> Female Seats in Government	<b>1.19</b> Female to Male Secondary Education Enrollment	<b>0.49</b> Female to Male Labor Ratio			
	<b>Population Pressures</b>	<b>2.56%</b> Average Annual Population Change	<b>3.38%</b> Average Annual Urban Population Change				

<sup>53</sup> **Vulnerability:** The socioeconomic conditions that are associated with the susceptibility to disruptions in a country's normal functions.

## Coping Capacity (CC)

**Coping Capacity<sup>54</sup> Rank: 15 of 17 Departments (Score: 0.369)** Matagalpa exhibits weaker Coping Capacity in the areas of Infrastructure and Governance. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Coping Capacity score.

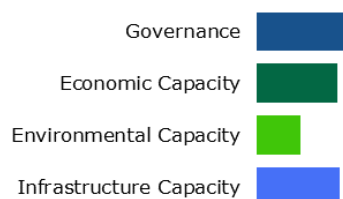


Table 41. Component scores for each coping capacity sub-component

	<b>Economic Capacity</b>	<b>5.2%</b> Households that Receive Remittances	<b>87.9%</b> Employment Rate (Male)	<b>44.7%</b> Employment Rate (Female)	<b>15.3%</b> Population in Highest Welfare Quintile	<b>\$637.7</b> Annual Nominal Global Revenue per Capita
	<b>Governance</b>	<b>88.4%</b> Crime Complaints Cleared	<b>1469.7</b> Crime Rate per 100k Persons	<b>71.2%</b> Households without Garbage Collection	<b>57%</b> Voter Participation (2016 Election)	
	<b>Environmental Capacity</b>	<b>13.1%</b> Protected or Reforested Land				
	<b>Infrastructure Capacity</b>					
	<b>Health Care Capacity</b>		<b>5.8</b> Hospital Beds per 10,000 Persons	<b>7.8</b> Nurses per 10,000 Persons	<b>5.8</b> Physicians per 10,000 Persons	<b>18.8 km</b> Average Distance to Nearest Hospital
	<b>Communications Capacity</b>		<b>10.6%</b> Households with Access to Fixed Phone Line	<b>68.5%</b> Households with Access to Mobile Phone		
	<b>Transportation Capacity</b>		<b>76.7 km</b> Average Distance to Nearest Port or Airport	<b>0.43 km</b> Total Length of Road per km <sup>2</sup> (area)		

<sup>54</sup> **Coping Capacity:** The systems, means, and abilities of a country to absorb and respond to events that could potentially disrupt normal function.

Lack of Resilience (LR)

Lack of Resilience<sup>55</sup> Rank: 5 of 17 Departments (Score: 0.572)

Matagalpa’s score and ranking are due to medium Vulnerability combined with very low Coping Capacity scores.

Table 42. The three thematic areas with the weakest relative scores



Multi-Hazard Risk (MHR)

Multi-Hazard Risk<sup>56</sup> Rank: 6 of 17 Departments (Score: 0.495)

Matagalpa’s score and ranking are due to medium Multi-Hazard Exposure combined with very low Vulnerability and medium Coping Capacity scores.

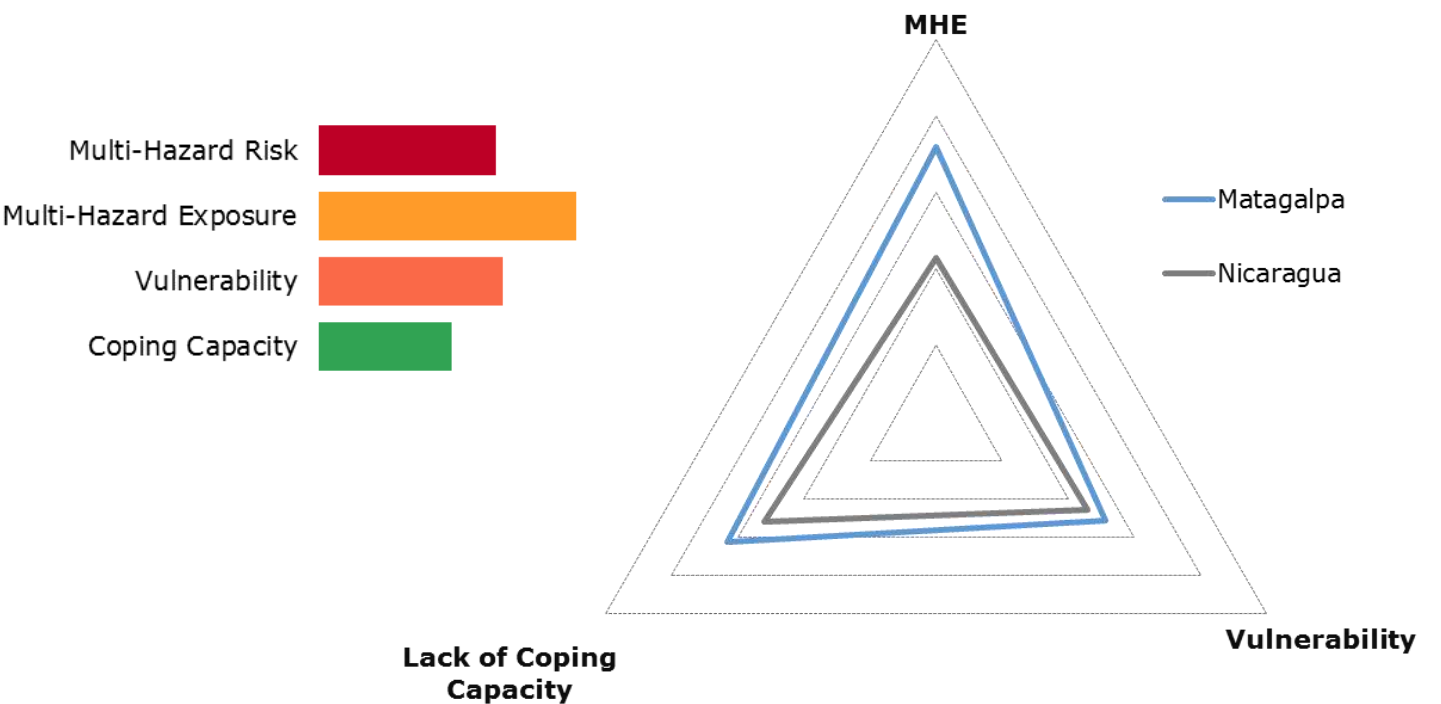


Figure 32. Department Multi-Hazard Risk component scores compared to overall average country scores

<sup>55</sup> **Lack of Resilience:** The susceptibility to impact from the short-term inability to absorb, respond to, and recover from disruptions to a country’s normal function. This index provides a hazard-independent look at current socioeconomic conditions.

<sup>56</sup> **Multi-Hazard Risk:** The likelihood of losses or disruptions to a country’s normal function due to interaction between multi-hazard exposure, socioeconomic vulnerability, and coping capacity.

## Successes



### Relatively low gender inequality

Driven by relative gender parity in government representation and secondary education enrollment. Low gender inequality indicates that vulnerable populations are more likely to have their needs met under 'normal' conditions and may be less susceptible during times of disaster

## Recommendations

01

### Plan for a growing population

As recommended for departments with similar vulnerability profiles, ensure that local economies, resources, and infrastructure can adequately support the growing population. Anticipate areas where additional growth is likely and estimate the resources necessary for sustainable growth.

02

### Increase economic capacity

Foster small-business development and invest in business education and human capital to raise economic stability.

03

### Invest in infrastructure

Limited infrastructure inhibits the capacity to communicate and exchange information, in addition to limiting the physical distribution of goods and services in Matagalpa. Increased access to health care and preventative medicine will improve health status and quality of life. Health-care, transportation, and communication infrastructures require upgrading and investment to increase connectivity and welfare in the department. Focused investments in these areas will increase coping capacity and resilience.

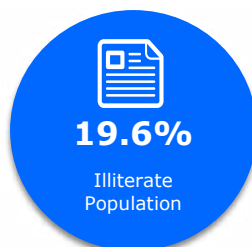
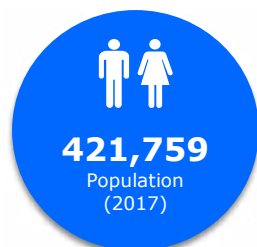
## Department: Chinandega



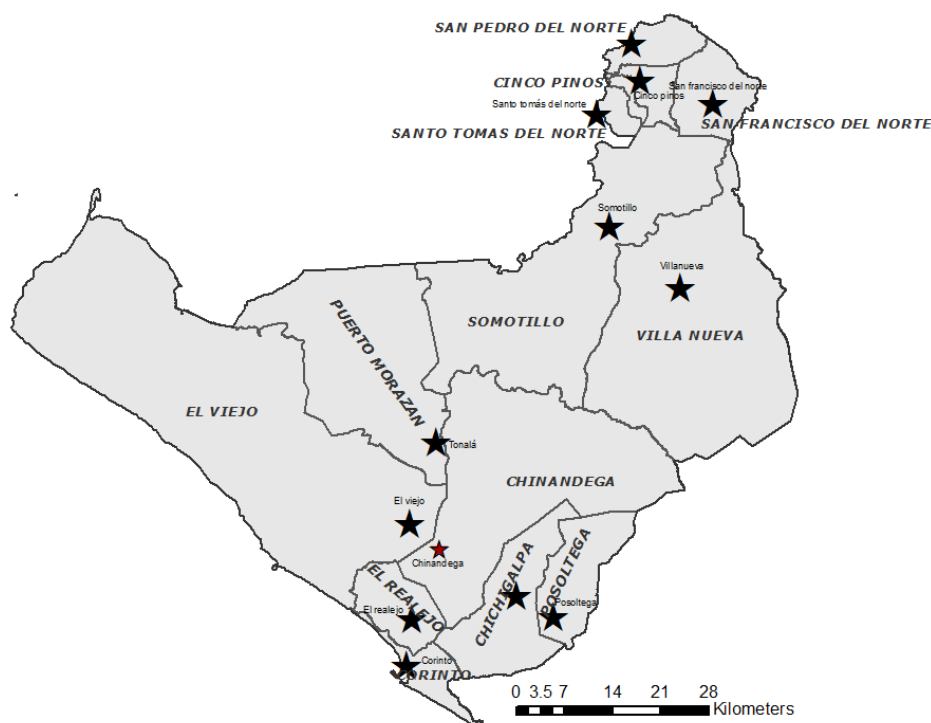
Department Capital: Chinandega

Area: 4,822 km<sup>2</sup>

Chinandega is a northwestern province located on the border with Honduras. Chinandega is primarily an agricultural department and is home to the country's largest sugar mills and rum factory.



Municipality	Population
San Pedro del Norte	5,146
San Francisco del Norte	7,340
Cinco Pinos	7,262
Santo Tomás del Norte	8,332
El Viejo	87,783
Puerto Morazán	16,152
Somotillo	33,223
Villanueva	28,400
Chinandega	133,808
El Realejo	10,008
Corinto	18,351
Chichigalpa	46,787
Posoltega	19,167



**Multi-Hazard Risk Rank:  
High (7 of 17)**

**Lack of Resilience Rank:  
Low (12 of 17)**

## RVA Component Scores

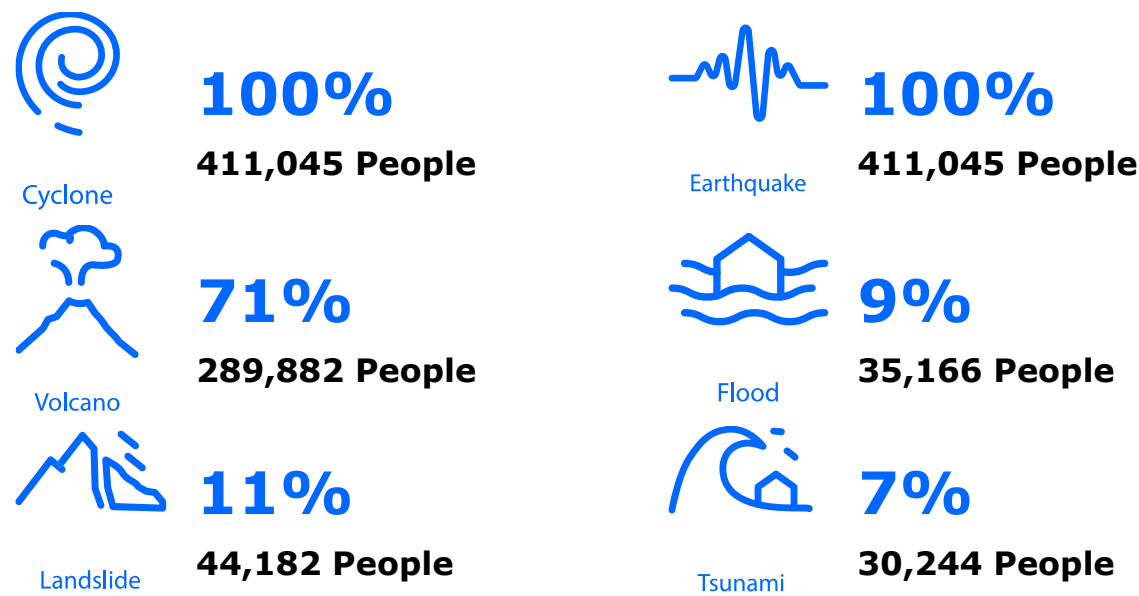
Table 43. Department scores and ranks (compared across departments) for each index

Multi-Hazard Risk		Lack of Resilience		Multi-Hazard Exposure		Vulnerability		Coping Capacity	
High		Low		Very High		Low		High	
Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)
0.494	7	0.376	12	0.729	3	0.329	11	0.577	6

Multi-Hazard Exposure (MHE)

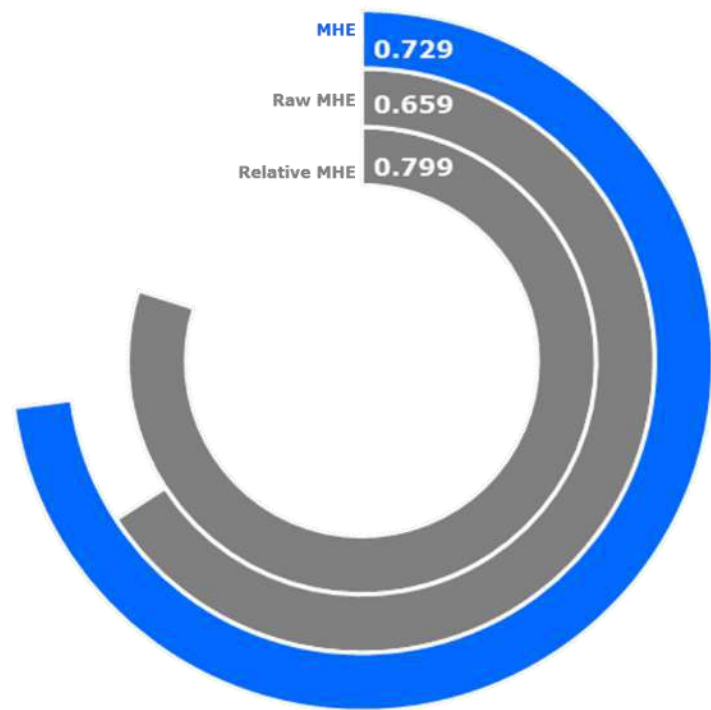
Multi-Hazard Exposure<sup>57</sup> Rank: 3 of 17 Departments (Score: 0.729)

Table 44. Estimated ambient population<sup>58</sup> exposed to each hazard



**San Cristobal Volcano**

The Department of Chinandega contains the highest, as well as one of the most active, volcanos in Nicaragua. San Cristobal Volcano, also known as El Viego, frequently experiences minor to mid-level eruptions. INETER monitors activity at San Cristobal routinely, and the Department of Chinandega is prepared for a major evacuation in the event of a significant eruption.



<sup>57</sup> Multi-Hazard Exposure: Average exposure of the population to hazards.








<sup>58</sup> Ambient Population: 24-hour average estimate of the population in each department. Ambient population typically differs from census population.

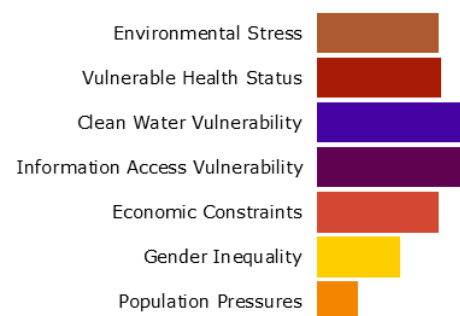


## Vulnerability (V)

**Vulnerability<sup>59</sup> Rank: 11 of 17 Departments**  
**(Score: 0.329)** Vulnerability in Chinandega is primarily driven by Vulnerable Health Status and Population Pressures. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Vulnerability score.

Table 45. Component scores for each vulnerability sub-component

	<b>Environmental Stress</b>	<b>13.4%</b> Province at Drought Risk	<b>32.1%</b> Erosion Risk	<b>85.7</b> Livestock per km <sup>2</sup>			
	<b>Vulnerable Health Status</b>	<b>11.7</b> Infant Mortality Rate	<b>10.4</b> Maternal Mortality Rate	<b>71.9 yrs</b> Average Life Expectancy	<b>1.9%</b> Acute Malnutrition (Children <5)	<b>1.9%</b> Population Disabled	
	<b>Clean Water Vulnerability</b>	<b>68.9%</b> Households with Access to Improved Water	<b>29.3%</b> Households with Access to Flush Toilets				
	<b>Information Access Vulnerability</b>	<b>19.6%</b> Illiteracy	<b>5.9 yrs</b> Average Years of Schooling	<b>88.3%</b> Primary School Enrollment	<b>95.7%</b> Households without Internet	<b>20.7%</b> Households without TV	<b>63.1%</b> Households without Radio
	<b>Economic Constraints</b>	<b>56.8</b> Economic Dependency Ratio	<b>68.2%</b> Population in Poverty				
	<b>Gender Inequality</b>	<b>42.3%</b> Female Seats in Government	<b>1.19</b> Female to Male Secondary Education Enrollment	<b>0.34</b> Female to Male Labor Ratio			
	<b>Population Pressures</b>	<b>1.33%</b> Average Annual Population Change	<b>2.08%</b> Average Annual Urban Population Change				



<sup>59</sup> **Vulnerability:** The socioeconomic conditions that are associated with the susceptibility to disruptions in a country's normal functions.

## Coping Capacity (CC)

**Coping Capacity<sup>60</sup> Rank: 6 of 17 Departments (Score: 0.577)** Chinandega exhibits weaker Coping Capacity in the areas of Health Care and Communications Infrastructure. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Coping Capacity score.

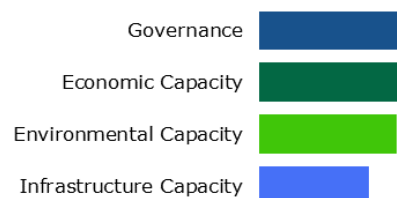


Table 46. Component scores for each coping capacity sub-component

	<b>Economic Capacity</b>	<b>11.4%</b> Households that Receive Remittances	<b>82.1%</b> Employment Rate (Male)	<b>53.9%</b> Employment Rate (Female)	<b>14.5%</b> Population in Highest Welfare Quintile	<b>\$2,358</b> Annual Nominal Global Revenue per Capita
	<b>Governance</b>	<b>89.9%</b> Crime Complaints Cleared	<b>896.3</b> Crime Rate per 100k Persons	<b>64.1%</b> Households without Garbage Collection	<b>68.6%</b> Voter Participation (2016 Election)	
	<b>Environmental Capacity</b>	<b>33.0%</b> Protected or Reforested Land				
	<b>Infrastructure Capacity</b>					
	<b>Health Care Capacity</b>		<b>8.8</b> Hospital Beds per 10,000 Persons	<b>14.9</b> Nurses per 10,000 Persons	<b>8.4</b> Physicians per 10,000 Persons	<b>20.5 km</b> Average Distance to Nearest Hospital
	<b>Communications Capacity</b>		<b>9.1%</b> Households with Access to Fixed Phone Line	<b>71.2%</b> Households with Access to Mobile Phone		
	<b>Transportation Capacity</b>		<b>36.2 km</b> Average Distance to Nearest Port or Airport	<b>0.30 km</b> Total Length of Road per km <sup>2</sup> (area)		

<sup>60</sup> **Coping Capacity:** The systems, means, and abilities of a country to absorb and respond to events that could potentially disrupt normal function.

Lack of Resilience (LR)

Lack of Resilience<sup>61</sup> Rank: 12 of 17 Departments (Score: 0.376)

Chinandega’s score and ranking are due to low Vulnerability combined with high Coping Capacity scores.

Table 47. The three thematic areas with the weakest relative scores



Multi-Hazard Risk (MHR)

Multi-Hazard Risk<sup>62</sup> Rank: 7 of 17 Departments (Score: 0.494)

Chinandega’s score and ranking are due to very high Multi-Hazard Exposure combined with low Vulnerability and high Coping Capacity scores.

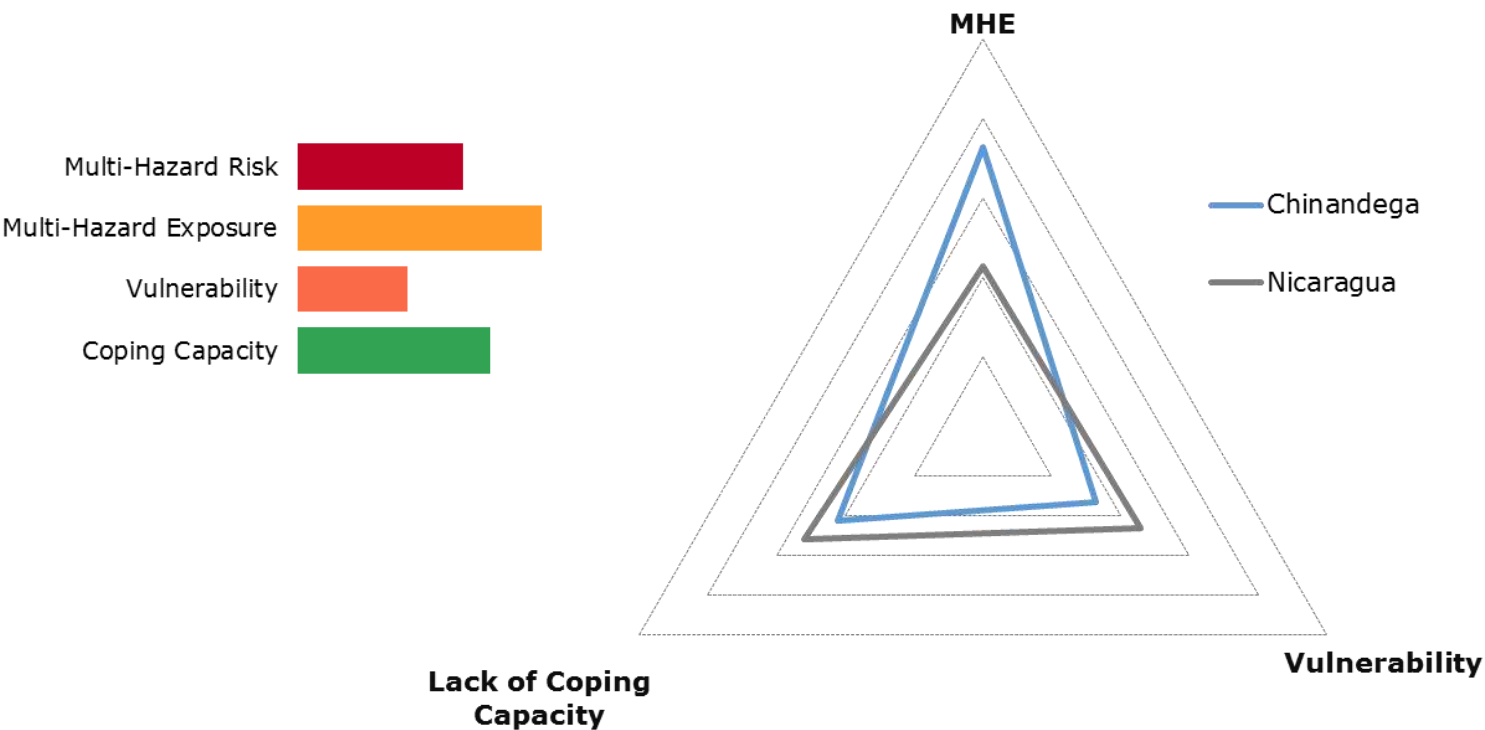


Figure 33. Department Multi-Hazard Risk component scores compared to overall average country scores

<sup>61</sup> **Lack of Resilience:** The susceptibility to impact from the short-term inability to absorb, respond to, and recover from disruptions to a country’s normal function. This index provides a hazard-independent look at current socioeconomic conditions.

<sup>62</sup> **Multi-Hazard Risk:** The likelihood of losses or disruptions to a country’s normal function due to interaction between multi-hazard exposure, socioeconomic vulnerability, and coping capacity.

## Successes



### Very low population pressures

Ranked 15 of 17 departments, limited population change allows disaster managers to form accurate evacuation, sheltering, and resource plans.



### High overall governance

Ranked 2 of 17 departments, high governance could facilitate the implementation of disaster management initiatives into departmental and municipal communities.

## Recommendations

01

### Invest in infrastructure

Similar to Matagalpa, limited infrastructure inhibits the capacity to communicate and exchange information, in addition to limiting the physical distribution of goods and services, and restricting access to health care in Chinandega. Health-care, transportation and communication infrastructures require upgrading and investment to increase connectivity and welfare in the department. Focused investments in these areas will increase coping capacity and resilience.

02

### Institutionalize multi-hazard planning and education

Multi-Hazard Risk in Chinandega is driven primarily by exposure. Develop a departmental multi-hazard mitigation plan to acknowledge exposure to multiple hazards. Engage the public in this process to promote an understanding of multi-hazard risk.

## Department: Granada



Department Capital: Granada

Area: 1,040 km<sup>2</sup>

Granada is one of North America's oldest cities and is the oldest city in Nicaragua. Located along the coast of Lake Nicaragua, Granada is known for colonial-era architecture, nature reserves, and its bewitched villages.



Municipality	Population
Diriá	7,144
Diriomo	27,593
Granada	129,217
Nandaime	41,034

**Multi-Hazard Risk Rank:  
Medium (8 of 17)**

**Lack of Resilience Rank:  
Very Low (16 of 17)**



## RVA Component Scores

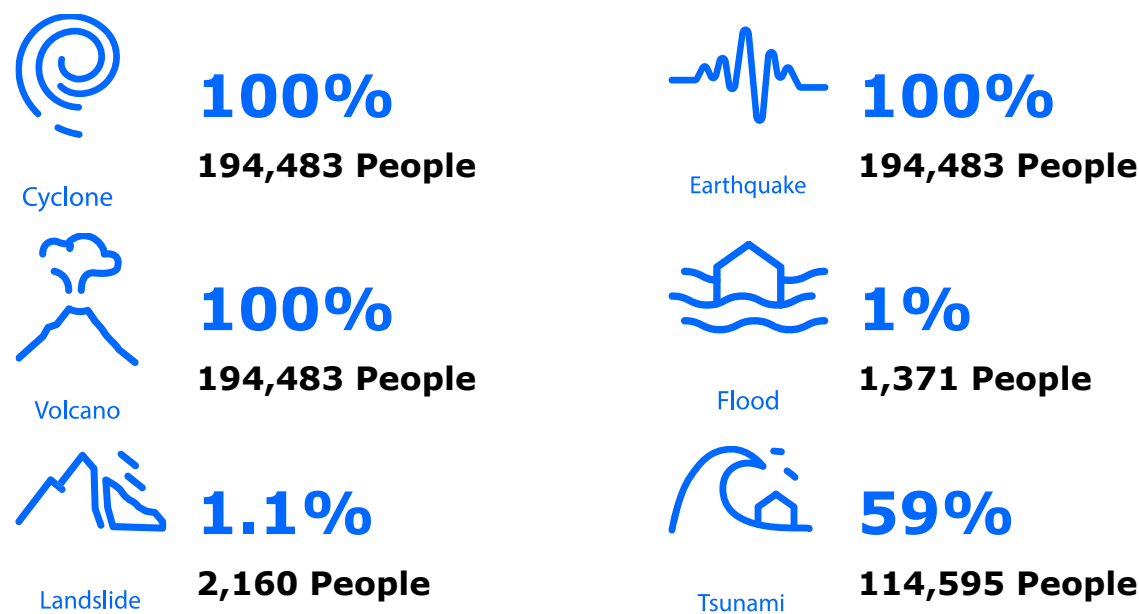
Table 48. Department scores and ranks (compared across departments) for each index

Multi-Hazard Risk		Lack of Resilience		Multi-Hazard Exposure		Vulnerability		Coping Capacity	
Medium		Very Low		Very High		Low		Very High	
Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)
0.474	8	0.334	16	0.754	2	0.324	12	0.656	1

Multi-Hazard Exposure (MHE)

Multi-Hazard Exposure<sup>63</sup> Rank: 2 of 17 Departments (Score: 0.754)

Table 49. Estimated ambient population<sup>64</sup> exposed to each hazard

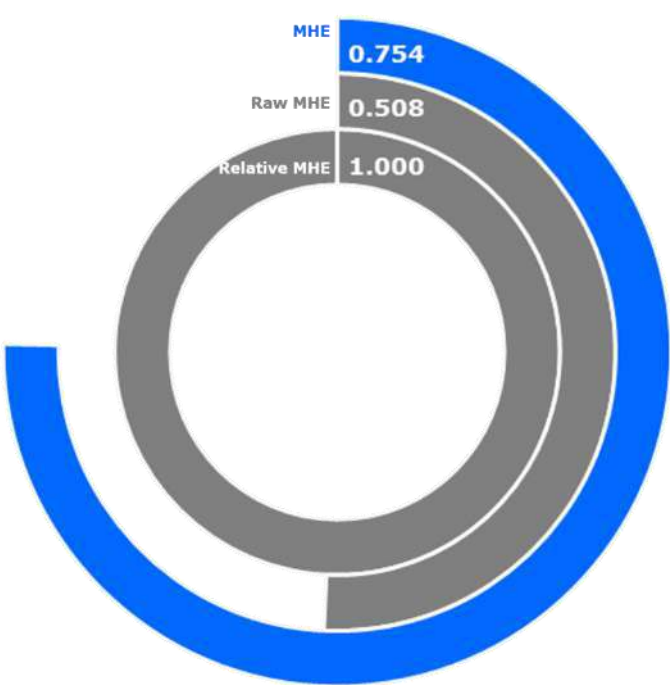


**Case Study: Cocibolca Development Program**

World Vision is working in Granada to improve the well-being of children using a long-term approach focused on the underlying causes of poverty. Activities within the program include:

- Growing community gardens;
- Educating parents on childhood illness;
- Tutoring primary school students; and
- Training community members on emergency preparedness and other response activities.

<https://www.ngoaidmap.org/projects/14755>



<sup>63</sup> Multi-Hazard Exposure: Average exposure of the population to hazards.  
<sup>64</sup> Ambient Population: 24-hour average estimate of the population in each department. Ambient population typically differs from census population.

## Vulnerability (V)

**Vulnerability<sup>65</sup> Rank: 12 of 17 Departments (Score: 0.324)** Vulnerability in Granada is primarily driven by Population Pressures and Environmental Stress. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Vulnerability score.

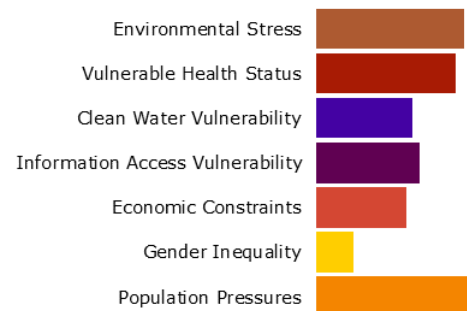









Table 50. Component scores for each vulnerability sub-component

	<b>Environmental Stress</b>	<b>100%</b> Province at Drought Risk	<b>12.9%</b> Erosion Risk	<b>69.8</b> Livestock per km <sup>2</sup>			
	<b>Vulnerable Health Status</b>	<b>11.0</b> Infant Mortality Rate	<b>24.4</b> Maternal Mortality Rate	<b>76 yrs</b> Average Life Expectancy	<b>5.1%</b> Acute Malnutrition (Children < 5)	<b>1.7%</b> Population Disabled	
	<b>Clean Water Vulnerability</b>	<b>80.7%</b> Households with Access to Improved Water	<b>39.2%</b> Households with Access to Flush Toilets				
	<b>Information Access Vulnerability</b>	<b>16.3%</b> Illiteracy	<b>6.9 yrs</b> Average Years of Schooling	<b>86.0%</b> Primary School Enrollment	<b>91.0%</b> Households without Internet	<b>10.0%</b> Households without TV	<b>74.7%</b> Households without Radio
	<b>Economic Constraints</b>	<b>56.1</b> Economic Dependency Ratio	<b>61.1%</b> Population in Poverty				
	<b>Gender Inequality</b>	<b>50.0%</b> Female Seats in Government	<b>1.17</b> Female to Male Secondary Education Enrollment	<b>0.29</b> Female to Male Labor Ratio			
	<b>Population Pressures</b>	<b>2.25%</b> Average Annual Population Change	<b>2.88%</b> Average Annual Urban Population Change				

<sup>65</sup> **Vulnerability:** The socioeconomic conditions that are associated with the susceptibility to disruptions in a country's normal functions.

## Coping Capacity (CC)

**Coping Capacity<sup>66</sup> Rank: 1 of 17 Departments (Score: 0.656)** Granada exhibits weaker Coping Capacity in the areas of Health Care Capacity and Governance. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Coping Capacity score.

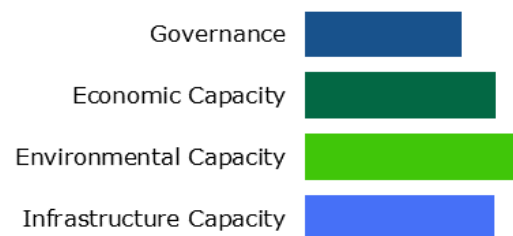









Table 51. Component scores for each coping capacity sub-component

	<b>Economic Capacity</b>	<b>13.2%</b> Households that Receive Remittances	<b>79.3%</b> Employment Rate (Male)	<b>56.4%</b> Employment Rate (Female)	<b>26.4%</b> Population in Highest Welfare Quintile	<b>\$1,747</b> Annual Nominal Global Revenue per Capita
	<b>Governance</b>	<b>91.0%</b> Crime Complaints Cleared	<b>1881.0</b> Crime Rate per 100k Persons	<b>47.9%</b> Households without Garbage Collection	<b>67.9%</b> Voter Participation (2016 Election)	
	<b>Environmental Capacity</b>	<b>42.8%</b> Protected or Reforested Land				
	<b>Infrastructure Capacity</b>					
	<b>Health Care Capacity</b>		<b>7.8</b> Hospital Beds per 10,000 Persons	<b>13.8</b> Nurses per 10,000 Persons	<b>10.1</b> Physicians per 10,000 Persons	<b>11.9 km</b> Average Distance to Nearest Hospital
	<b>Communications Capacity</b>		<b>18.3%</b> Households with Access to Fixed Phone Line	<b>86.2%</b> Households with Access to Mobile Phone		
	<b>Transportation Capacity</b>		<b>19.4 km</b> Average Distance to Nearest Port or Airport	<b>0.50 km</b> Total Length of Road per km <sup>2</sup> (area)		

<sup>66</sup> **Coping Capacity:** The systems, means, and abilities of a country to absorb and respond to events that could potentially disrupt normal function.



Lack of Resilience (LR)

Lack of Resilience<sup>67</sup> Rank: 16 of 17 Departments (Score: 0.334)

Granada’s score and ranking are due to low Vulnerability combined with very high Coping Capacity scores.

Table 52. The three thematic areas with the weakest relative scores



Multi-Hazard Risk (MHR)

Multi-Hazard Risk<sup>68</sup> Rank: 8 of 17 Departments (Score: 0.474)

Granada’s Multi-Hazard Risk score and ranking are driven primarily by very high Multi-Hazard Exposure combined with very low Vulnerability and high Coping Capacity scores.

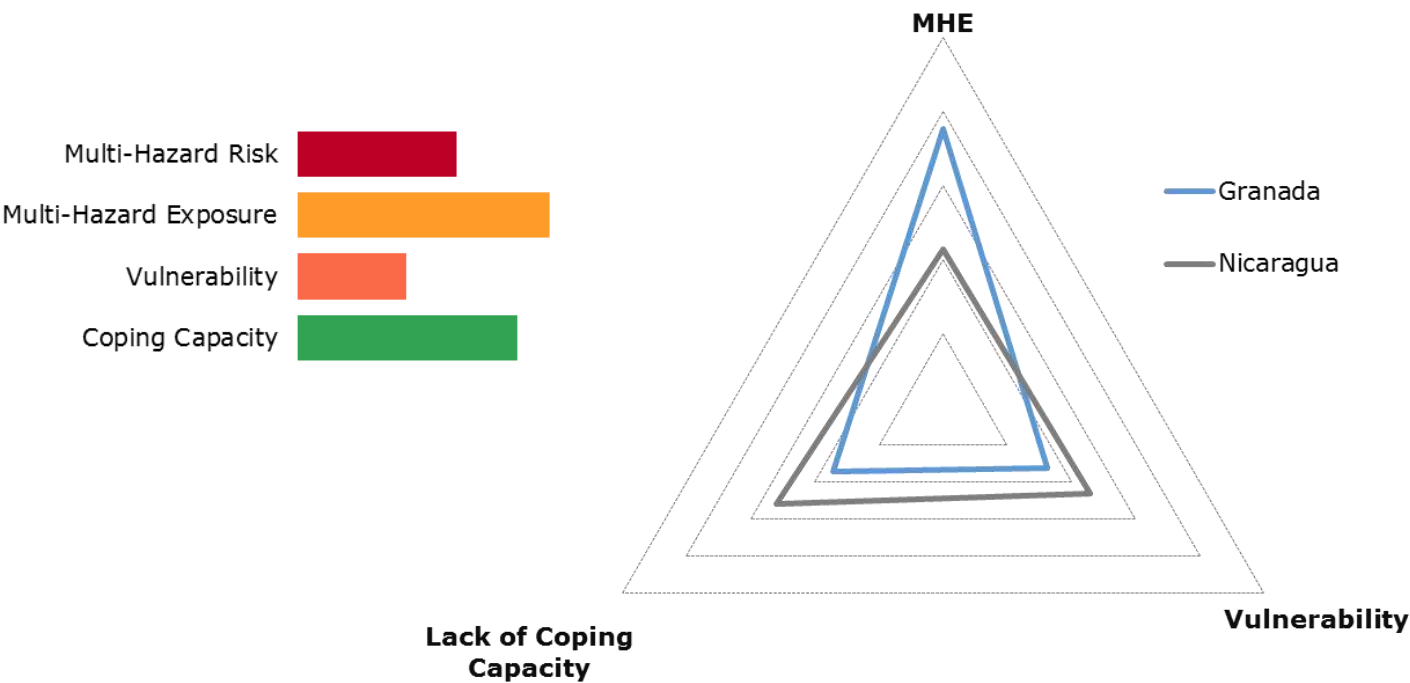


Figure 34. Department Multi-Hazard Risk component scores compared to overall average country scores

<sup>67</sup> **Lack of Resilience:** The susceptibility to impact from the short-term inability to absorb, respond to, and recover from disruptions to a country’s normal function. This index provides a hazard-independent look at current socioeconomic conditions.

<sup>68</sup> **Multi-Hazard Risk:** The likelihood of losses or disruptions to a country’s normal function due to interaction between multi-hazard exposure, socioeconomic vulnerability, and coping capacity.

## Successes



### Highest coping capacity

Ranked 1 of 17 departments, high coping capacity indicates the department's ability, using existing skills and resources, to face and manage adverse conditions, emergencies, or disasters.



### Very low gender inequality

Ranked 15 of 17 departments, low gender inequality indicates that vulnerable populations are more likely to have their needs met under 'normal' conditions and may be less susceptible during times of disaster.

## Recommendations

01

### Institutionalize multi-hazard planning and education

Like the departments of Managua and Chinandega, Multi-Hazard Risk in Granada is driven primarily by exposure. Develop a departmental multi-hazard mitigation plan to acknowledge exposure to multiple hazards. Engage the public in this process to promote an understanding of multi-hazard risk.

02

### Invest in public safety and crime prevention

Provide additional support for local police, firefighters, and emergency medical resources to improve public safety and decrease crime rates.

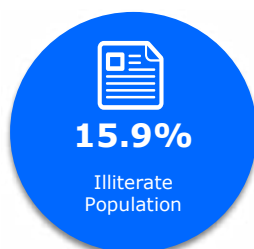
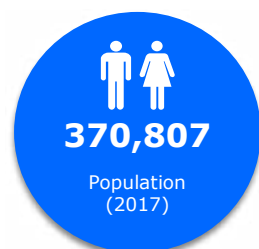
## Department: Masaya



Department Capital: Masaya

Area: 611 km<sup>2</sup>

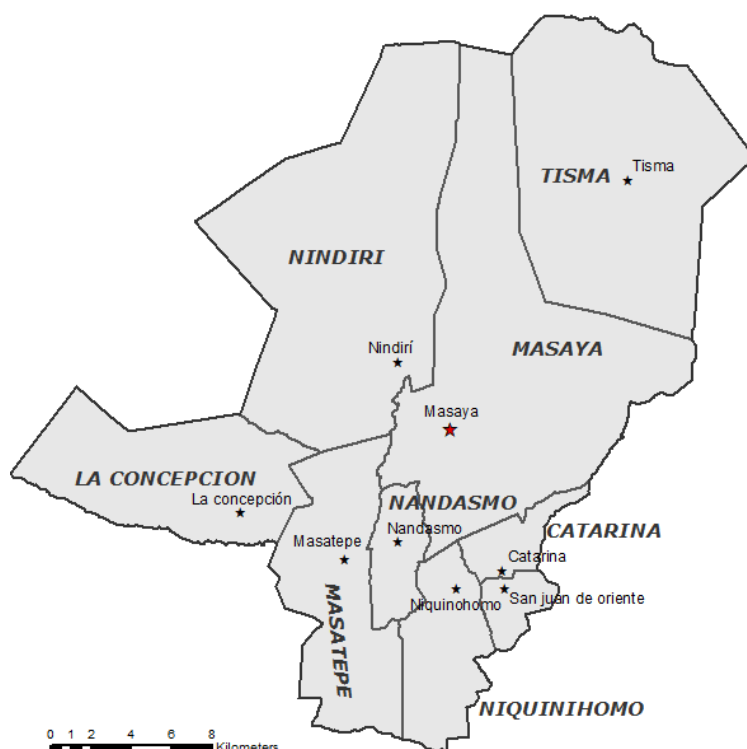
Masaya is Nicaragua's smallest department. The department is known for being "La Cuna Del Folklore" (The Cradle of Folklore) and has an active volcano within its boundaries, Masaya Volcano.



Municipality	Population
Nindirí	53,811
Masaya	177,269
Tisma	12,200
La Concepción	41,716
Masatepe	38,655
Nandasmo	14,787
Catarina	8,723
San Juan de Oriente	7,216
Niquinohomo	16,430

**Multi-Hazard Risk Rank:  
Medium (9 of 17)**

**Lack of Resilience Rank:  
Low (13 of 17)**



## RVA Component Scores

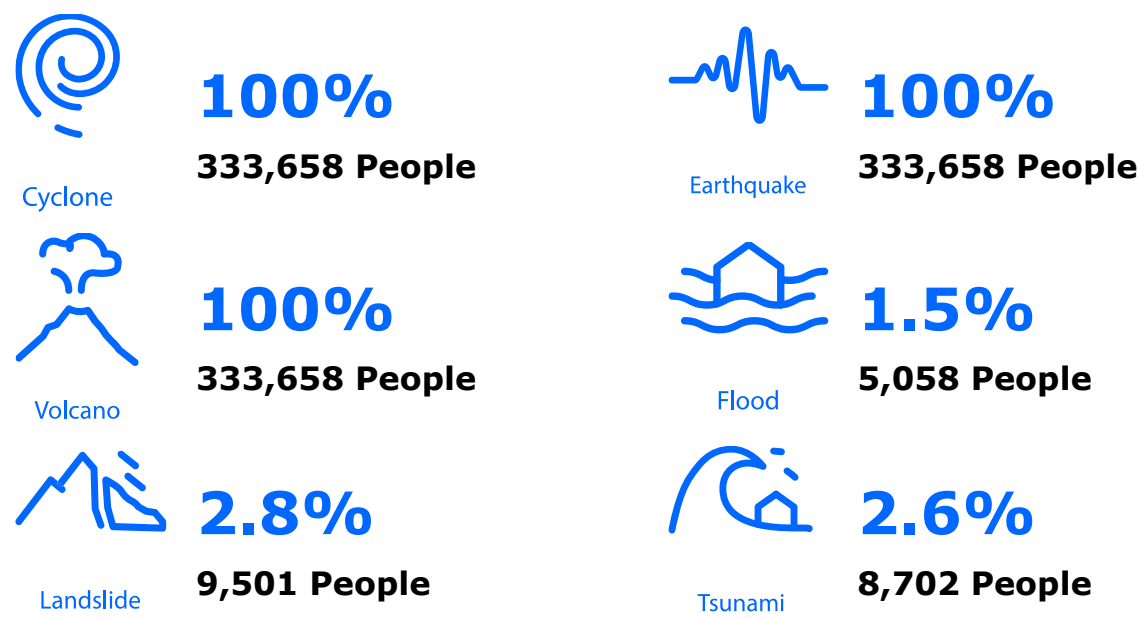
Table 53. Department scores and ranks (compared across departments) for each index

Multi-Hazard Risk		Lack of Resilience		Multi-Hazard Exposure		Vulnerability		Coping Capacity	
Medium		Low		High		Very Low		High	
Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)
0.473	9	0.349	13	0.720	4	0.307	15	0.609	4

Multi-Hazard Exposure (MHE)

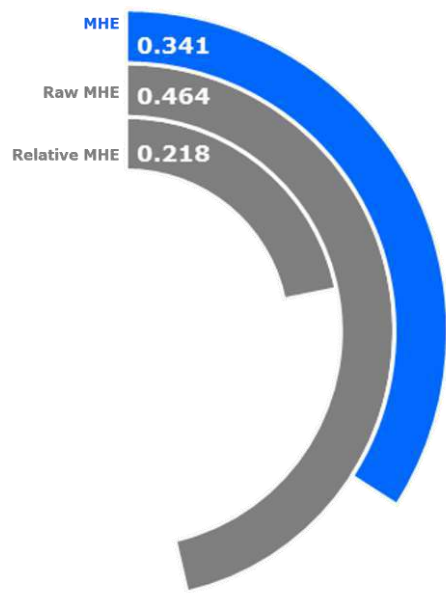
Multi-Hazard Exposure<sup>69</sup> Rank: 4 of 17 Departments (Score: 0.720)

Table 54. Estimated ambient population<sup>70</sup> exposed to each hazard



**Case Study**

Masaya has 19 critical communities that become isolated after four hours of rain. Once it has been raining for four hours, Medical and police brigades are activated. These brigades are constantly training and exercising for disaster events. During Hurricane Otto, the population was evacuated to safe areas and there was no loss of life.



<sup>69</sup> Multi-Hazard Exposure: Average exposure of the population to hazards.  
<sup>70</sup> Ambient Population: 24-hour average estimate of the population in each department. Ambient population typically differs from census population.

## Vulnerability (V)

**Vulnerability<sup>71</sup> Rank: 15 of 17 Departments (Score: 0.307)** Vulnerability in Masaya is primarily driven by Environmental Stress. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Vulnerability score.

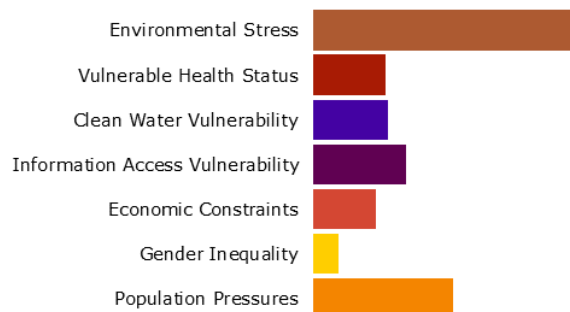









Table 55. Component scores for each vulnerability sub-component

	<b>Environmental Stress</b>	<b>100%</b> Province at Drought Risk	<b>27.2%</b> Erosion Risk	<b>112.7</b> Livestock per km <sup>2</sup>			
	<b>Vulnerable Health Status</b>	<b>12.0</b> Infant Mortality Rate	<b>14.0</b> Maternal Mortality Rate	<b>74.9 yrs</b> Average Life Expectancy	<b>0.2%</b> Acute Malnutrition (Children < 5)	<b>1.3%</b> Population Disabled	
	<b>Clean Water Vulnerability</b>	<b>93.5%</b> Households with Access to Improved Water	<b>37.4%</b> Households with Access to Flush Toilets				
	<b>Information Access Vulnerability</b>	<b>15.9%</b> Illiteracy	<b>6.7 yrs</b> Average Years of Schooling	<b>89.4%</b> Primary School Enrollment	<b>93.0%</b> Households without Internet	<b>10.3%</b> Households without TV	<b>62.9%</b> Households without Radio
	<b>Economic Constraints</b>	<b>53.5</b> Economic Dependency Ratio	<b>58.2%</b> Population in Poverty				
	<b>Gender Inequality</b>	<b>50.0%</b> Female Seats in Government	<b>1.16</b> Female to Male Secondary Education Enrollment	<b>0.18</b> Female to Male Labor Ratio			
	<b>Population Pressures</b>	<b>1.96%</b> Average Annual Population Change	<b>2.91%</b> Average Annual Urban Population Change				

<sup>71</sup> **Vulnerability:** The socioeconomic conditions that are associated with the susceptibility to disruptions in a country's normal functions.

## Coping Capacity (CC)

**Coping Capacity<sup>72</sup> Rank: 4 of 17 Departments (Score: 0.609)** Masaya exhibits weaker Coping Capacity in the area of Health Care Capacity. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Coping Capacity score.

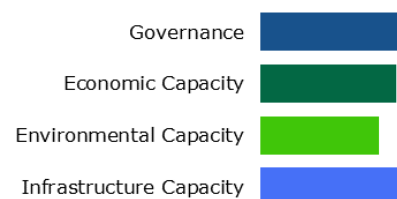


Table 56. Component scores for each coping capacity sub-component

	<b>Economic Capacity</b>	<b>6.3%</b> Households that Receive Remittances	<b>76.2%</b> Employment Rate (Male)	<b>62.8%</b> Employment Rate (Female)	<b>20.2%</b> Population in Highest Welfare Quintile	<b>\$2,713</b> Annual Nominal Global Revenue per Capita
	<b>Governance</b>	<b>93.9%</b> Crime Complaints Cleared	<b>1292.8</b> Crime Rate per 100k Persons	<b>68.2%</b> Households without Garbage Collection	<b>53.6%</b> Voter Participation (2016 Election)	
	<b>Environmental Capacity</b>	<b>29.1%</b> Protected or Reforested Land				
	<b>Infrastructure Capacity</b>					
	<b>Health Care Capacity</b>		<b>6.0</b> Hospital Beds per 10,000 Persons	<b>8.6</b> Nurses per 10,000 Persons	<b>5.7</b> Physicians per 10,000 Persons	<b>8.36 km</b> Average Distance to Nearest Hospital
	<b>Communications Capacity</b>		<b>14.7%</b> Households with Access to Fixed Phone Line	<b>80.5%</b> Households with Access to Mobile Phone		
	<b>Transportation Capacity</b>		<b>16.1 km</b> Average Distance to Nearest Port or Airport	<b>1.05 km</b> Total Length of Road per km <sup>2</sup> (area)		

<sup>72</sup> **Coping Capacity:** The systems, means, and abilities of a country to absorb and respond to events that could potentially disrupt normal function.

Lack of Resilience (LR)

Lack of Resilience<sup>73</sup> Rank: 13 of 17 Departments (Score: 0.349)

Masaya’s score and ranking are due to very low Vulnerability combined with high Coping Capacity scores.

Table 57. The three thematic areas with the weakest relative scores



Multi-Hazard Risk (MHR)

Multi-Hazard Risk<sup>74</sup> Rank: 9 of 17 Departments (Score: 0.473)

Masaya’s score and ranking are due to high Multi-Hazard Exposure combined with very low Vulnerability and high Coping Capacity scores.

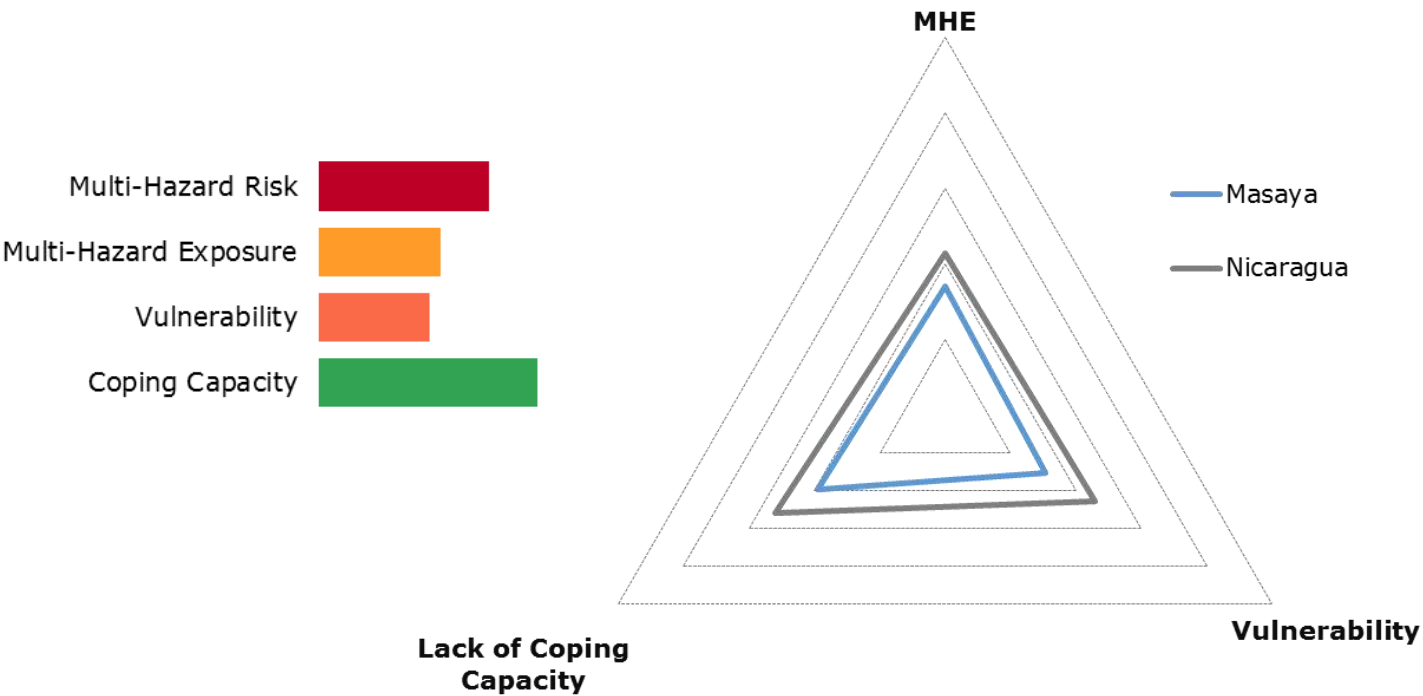


Figure 35. Department Multi-Hazard Risk component scores compared to overall average country scores

<sup>73</sup> **Lack of Resilience:** The susceptibility to impact from the short-term inability to absorb, respond to, and recover from disruptions to a country’s normal function. This index provides a hazard-independent look at current socioeconomic conditions.

<sup>74</sup> **Multi-Hazard Risk:** The likelihood of losses or disruptions to a country’s normal function due to interaction between multi-hazard exposure, socioeconomic vulnerability, and coping capacity.

## Successes



### **Lowest gender inequality**

Ranked 17 of 17 departments, low gender inequality indicates that vulnerable populations are more likely to have their needs met under 'normal' conditions and may be less susceptible during times of disaster.



### **Lowest vulnerable health status**

Ranked 17 of 17 departments, low health vulnerability indicates a population that will be more resilient to the negative health impacts associated with major disaster events.



### **Highest transportation capacity**

Ranked 1 of 17 departments, well developed transportation networks facilitate the movement of goods and services, decreasing wait times for response and relief supplies.

## Recommendations

**01**

### **Reduce environmental stress**

Invest in drought- and erosion-mitigation projects, and sustainable livestock-management practices to reduce environmental stress and degradation.

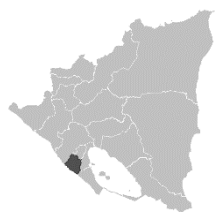
**02**

### **Invest in health infrastructure and resources**

Invest in physical and human resources in the health sector to improve health-care capacity in the department.



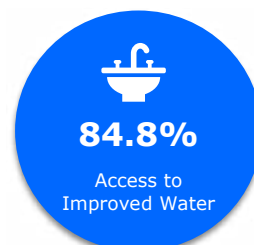
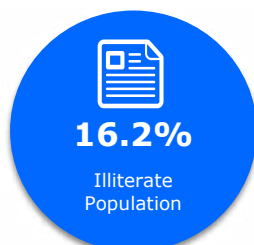
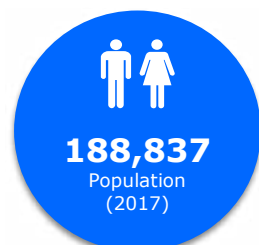
## Department: Carazo



Department Capital: Jinotepe

Area: 1,081 km<sup>2</sup>

Carazo is located on the Pacific Coast of Nicaragua and is known for its sea-turtle wildlife reserves, volcanic rock quarries, and agricultural production.



Municipality	Population
San Marcos	32,671
Jinotepe	47,616
Dolores	8,488
Diriamba	64,647
El Rosario	7,616
La Paz de Carazo	5,658
Santa Teresa	18,098
La Conquista	4,043



**Multi-Hazard Risk Rank:  
Medium (10 of 17)**

**Lack of Resilience Rank:  
Low (11 of 17)**

## RVA Component Scores

Table 58. Department scores and ranks (compared across departments) for each index

Multi-Hazard Risk		Lack of Resilience		Multi-Hazard Exposure		Vulnerability		Coping Capacity	
Medium		Low		High		Low		Medium	
Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)
0.469	10	0.388	11	0.632	6	0.322	13	0.546	7

## Multi-Hazard Exposure (MHE)

**Multi-Hazard Exposure<sup>75</sup> Rank: 6 of 17 Departments (Score: 0.632)**

Table 59. Estimated ambient population<sup>76</sup> exposed to each hazard



Cyclone

**100%**

**181,946 People**



Volcano

**100%**

**181,630 People**



Landslide

**1.1%**

**2,026 People**



Earthquake

**100%**

**181,946 People**



Flood

**2.9%**

**5,196 People**



Tsunami

**0.3%**

**580 People**

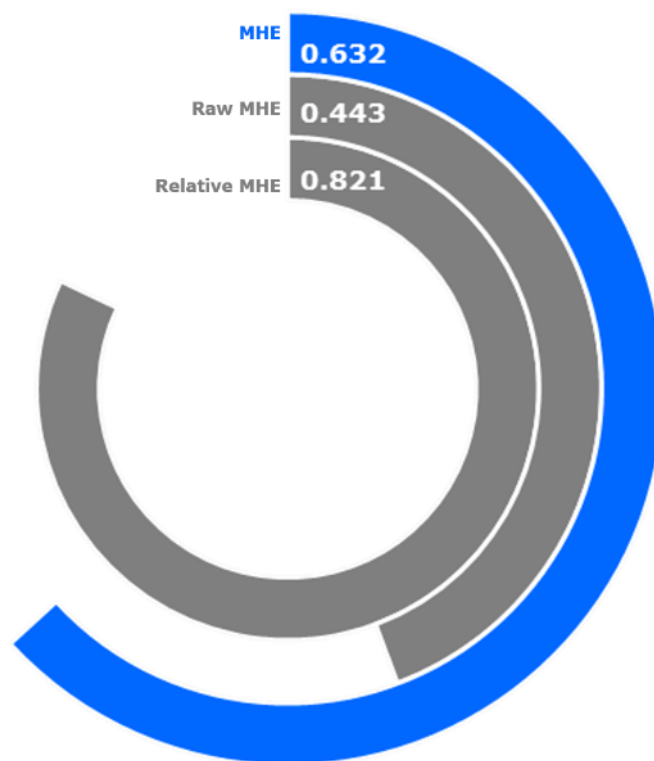
### Case Study: Namotivas Development Program

World Vision is working in Carazo to improve the well-being of children using a long-term approach focused on the underlying causes of poverty.

Activities within the program include:

- Growing community gardens;
- Educating parents on childhood illness;
- Tutoring primary school students; and
- Training community members on emergency preparedness and other response activities.

<https://www.ngoaidmap.org/projects/14893>



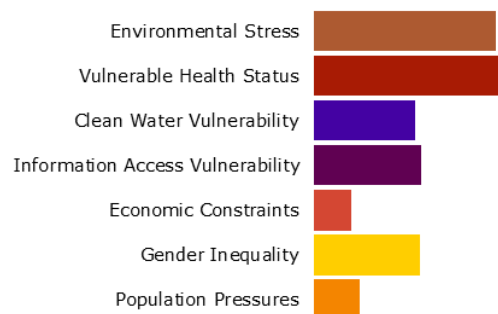
<sup>75</sup> Multi-Hazard Exposure: Average exposure of the population to hazards.








<sup>76</sup> Ambient Population: 24-hour average estimate of the population in each department. Ambient population typically differs from census population.

## Vulnerability (V)

**Vulnerability<sup>77</sup> Rank: 13 of 17 Departments (Score: 0.322)** Vulnerability in Carazo is primarily driven by Vulnerable Health Status and Environmental Stress. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Vulnerability score.

Table 60. Component scores for each vulnerability sub-component



	<b>Environmental Stress</b>	<b>100%</b> Province at Drought Risk	<b>30.0%</b> Erosion Risk	<b>69.3</b> Livestock per km <sup>2</sup>		
	<b>Vulnerable Health Status</b>	<b>15.0</b> Infant Mortality Rate	<b>25.0</b> Maternal Mortality Rate	<b>73.4 yrs</b> Average Life Expectancy	<b>3.3%</b> Acute Malnutrition (Children <5)	<b>2.9%</b> Population Disabled
	<b>Clean Water Vulnerability</b>	<b>84.8%</b> Households with Access to Improved Water	<b>35.0%</b> Households with Access to Flush Toilets			
	<b>Information Access Vulnerability</b>	<b>16.2%</b> Illiteracy	<b>6.9 yrs</b> Average Years of Schooling	<b>88.4%</b> Primary School Enrollment	<b>94.8%</b> Households without Internet	<b>11.9%</b> Households without TV
	<b>Economic Constraints</b>	<b>50.8</b> Economic Dependency Ratio	<b>55.9%</b> Population in Poverty			
	<b>Gender Inequality</b>	<b>43.8%</b> Female Seats in Government	<b>0.86</b> Female to Male Secondary Education Enrollment	<b>0.29</b> Female to Male Labor Ratio		
	<b>Population Pressures</b>	<b>1.49%</b> Average Annual Population Change	<b>1.97%</b> Average Annual Urban Population Change			

<sup>77</sup> **Vulnerability:** The socioeconomic conditions that are associated with the susceptibility to disruptions in a country's normal functions.

## Coping Capacity (CC)

**Coping Capacity<sup>78</sup> Rank: 7 of 17 Departments (Score: 0.546)** Carazo exhibits weaker Coping Capacity in the areas of Environmental Capacity and Governance. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Coping Capacity score.

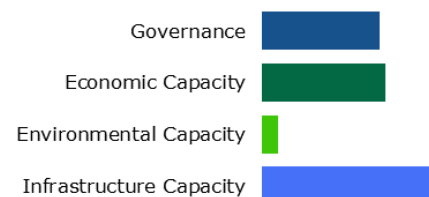


Table 61. Component scores for each coping capacity sub-component

	<b>Economic Capacity</b>	<b>9.6%</b> Households that Receive Remittances	<b>83.0%</b> Employment Rate (Male)	<b>58.8%</b> Employment Rate (Female)	<b>23.4%</b> Population in Highest Welfare Quintile	<b>\$766.7</b> Annual Nominal Global Revenue per Capita
	<b>Governance</b>	<b>91.5%</b> Crime Complaints Cleared	<b>2172.3</b> Crime Rate per 100k Persons	<b>53.3%</b> Households without Garbage Collection	<b>62.5%</b> Voter Participation (2016 Election)	
	<b>Environmental Capacity</b>	<b>7.3%</b> Protected or Reforested Land				
	<b>Infrastructure Capacity</b>					
	<b>Health Care Capacity</b>		<b>13.8</b> Hospital Beds per 10,000 Persons	<b>20.6</b> Nurses per 10,000 Persons	<b>10.8</b> Physicians per 10,000 Persons	<b>13.0 km</b> Average Distance to Nearest Hospital
	<b>Communications Capacity</b>		<b>12.5%</b> Households with Access to Fixed Phone Line	<b>79.3%</b> Households with Access to Mobile Phone		
	<b>Transportation Capacity</b>		<b>26.5 km</b> Average Distance to Nearest Port or Airport	<b>0.79 km</b> Total Length of Road per km <sup>2</sup> (area)		

<sup>78</sup> **Coping Capacity:** The systems, means, and abilities of a country to absorb and respond to events that could potentially disrupt normal function.

Lack of Resilience (LR)

Lack of Resilience<sup>79</sup> Rank: 11 of 17 Departments (Score: 0.388)

Carazo’s score and ranking are due to low Vulnerability combined with medium Coping Capacity scores.

Table 62. The three thematic areas with the weakest relative scores



Multi-Hazard Risk (MHR)

Multi-Hazard Risk<sup>80</sup> Rank: 10 of 17 Departments (Score: 0.469)

Carazo’s score and ranking are a product of high Multi-Hazard Exposure combined with low Vulnerability and medium Coping Capacity scores.

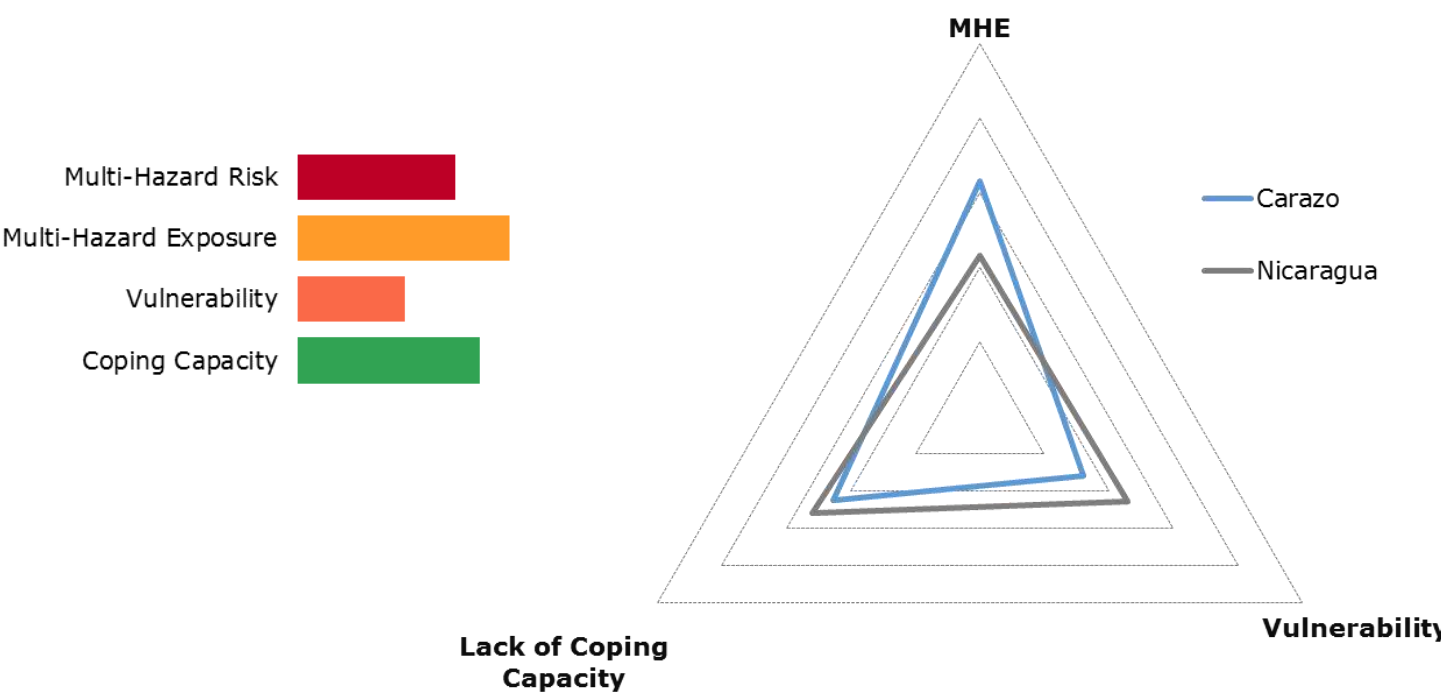


Figure 36. Department Multi-Hazard Risk component scores compared to overall average country scores

<sup>79</sup> **Lack of Resilience:** The susceptibility to impact from the short-term inability to absorb, respond to, and recover from disruptions to a country’s normal function. This index provides a hazard-independent look at current socioeconomic conditions.

<sup>80</sup> **Multi-Hazard Risk:** The likelihood of losses or disruptions to a country’s normal function due to interaction between multi-hazard exposure, socioeconomic vulnerability, and coping capacity.

## Successes



### Very low economic constraints

Ranked 16 of 17 departments, low economic constraints indicate that Carazo may be able to invest in additional mitigation and preparedness measures at the local and community level.



### Highest overall infrastructure capacity

Ranked 1 of 17 departments, well developed infrastructure – communication, health care, transportation – facilitates the exchange of information, and physical distribution of goods and services to the population.



### Very low population pressures

Ranked 14 of 17 departments, limited population change allows disaster managers to form accurate evacuation, sheltering, and resource plans.

## Recommendations

01

### Invest in public safety and crime prevention

Provide additional support for local police, firefighters, and emergency medical resources to improve public safety and decrease crime rates.

02

### Reduce vulnerable health status

Invest in public welfare services to decrease malnutrition, support the disabled population, and decrease infant and maternal mortality.

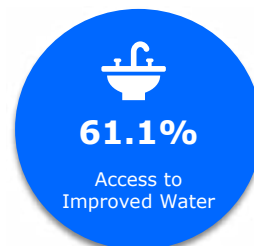
## Department: Rivas



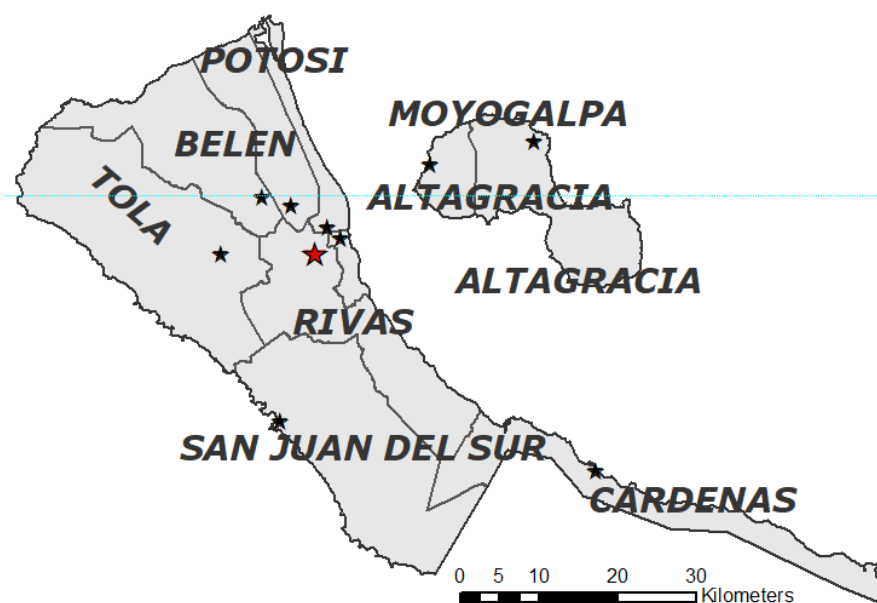
Department Capital: Rivas

Area: 2,162 km<sup>2</sup>

Rivas is located in the isthmus that separates Lake Nicaragua and the Pacific Ocean. It is well known for the beaches of San Juan del Sur and the volcanic island of Ometepe.



Municipality	Population
Tola	23,350
Belén	18,330
Potosí	13,163
Buenos Aires	5,703
Moyogalpa	10,330
Altagracia	22,455
San Jorge	8,792
Rivas	48,014
San Juan del Sur	15,733
Cárdenas	7,501



**Multi-Hazard Risk Rank:  
Medium (11 of 17)**

**Lack of Resilience Rank:  
Low (10 of 17)**

## RVA Component Scores

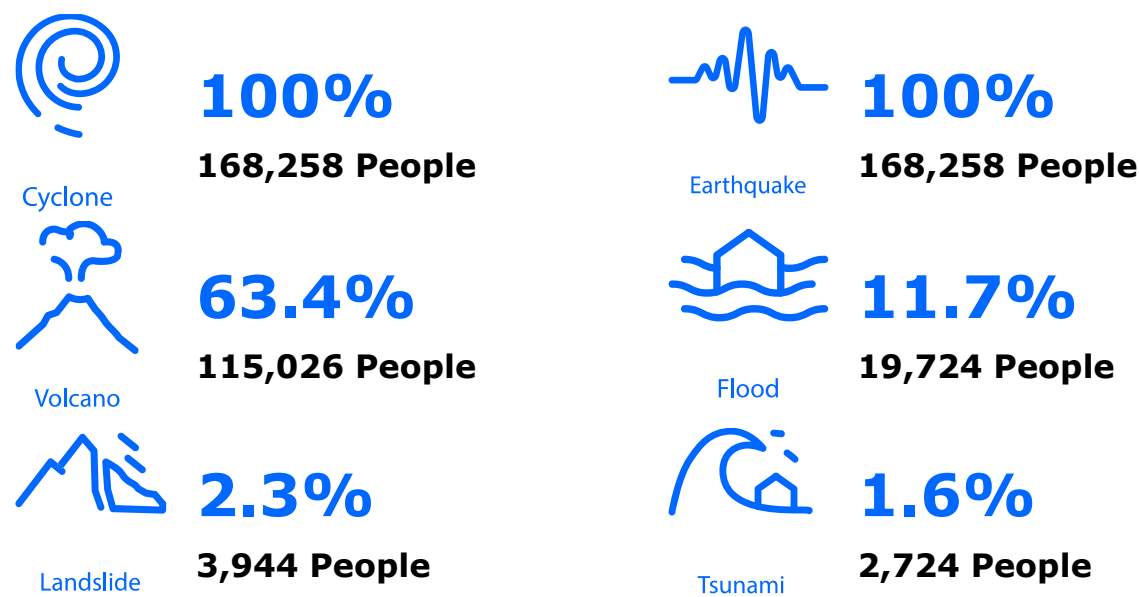
Table 63. Department scores and ranks (compared across departments) for each index

Multi-Hazard Risk		Lack of Resilience		Multi-Hazard Exposure		Vulnerability		Coping Capacity	
Medium		Low		Medium		Low		Medium	
Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)
0.469	11	0.413	10	0.580	7	0.354	10	0.527	8

Multi-Hazard Exposure (MHE)

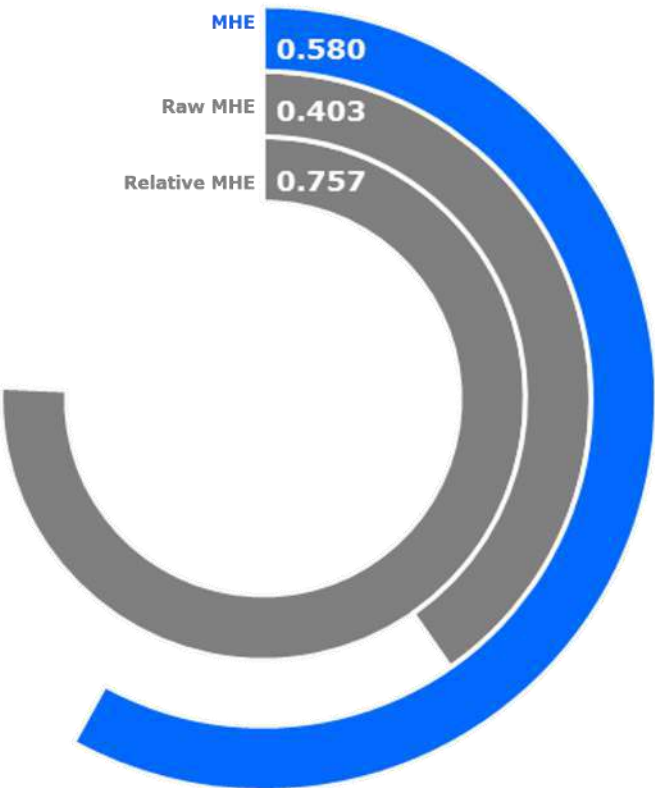
Multi-Hazard Exposure<sup>81</sup> Rank: 7 of 17 Departments (Score: 0.580)

Table 64. Estimated ambient population<sup>82</sup> exposed to each hazard



**Case Study: Rivas CODEPRED**

Riva’s CODEPRED follows an open participation model that helps to make the population aware of all hazards. Development of a prevention and preparedness culture over the last 10 years has helped to overcome the challenged that a lack of infrastructure and coping capacity presents. Exercises are conducted every 2-3 months and community level family plans are in development to build capacity from the ground up.



<sup>81</sup> Multi-Hazard Exposure: Average exposure of the population to hazards.  
<sup>82</sup> Ambient Population: 24-hour average estimate of the population in each department. Ambient population typically differs from census population.



## Vulnerability (V)

**Vulnerability<sup>83</sup> Rank: 10 of 17 Departments (Score: 0.354)** Vulnerability in Rivas is primarily driven by Environmental Stress and Clean Water Vulnerability. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Vulnerability score.

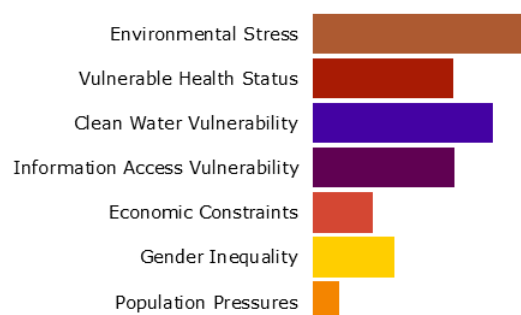









Table 65. Component scores for each vulnerability sub-component

	<b>Environmental Stress</b>	<b>89.7%</b> Province at Drought Risk	<b>41.5%</b> Erosion Risk	<b>81.4</b> Livestock per km <sup>2</sup>		
	<b>Vulnerable Health Status</b>	<b>12.2</b> Infant Mortality Rate	<b>27.0</b> Maternal Mortality Rate	<b>73.7 yrs</b> Average Life Expectancy	<b>0.7%</b> Acute Malnutrition (Children <5)	<b>3.3%</b> Population Disabled
	<b>Clean Water Vulnerability</b>	<b>61.1%</b> Households with Access to Improved Water	<b>25.7%</b> Households with Access to Flush Toilets			
	<b>Information Access Vulnerability</b>	<b>16.4%</b> Illiteracy	<b>6.1 yrs</b> Average Years of Schooling	<b>88.6%</b> Primary School Enrollment	<b>96.9%</b> Households without Internet	<b>14.8%</b> Households without TV
	<b>Economic Constraints</b>	<b>51.5</b> Economic Dependency Ratio	<b>60.5%</b> Population in Poverty			
	<b>Gender Inequality</b>	<b>45.0%</b> Female Seats in Government	<b>1.13</b> Female to Male Secondary Education Enrollment	<b>0.39</b> Female to Male Labor Ratio		
	<b>Population Pressures</b>	<b>1.37%</b> Average Annual Population Change	<b>1.79%</b> Average Annual Urban Population Change			

<sup>83</sup> **Vulnerability:** The socioeconomic conditions that are associated with the susceptibility to disruptions in a country's normal functions.

## Coping Capacity (CC)

**Coping Capacity<sup>84</sup> Rank: 8 of 17 Departments (Score: 0.527)** Rivas exhibits weaker Coping Capacity in the areas of Environmental Capacity and Governance. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Coping Capacity score.

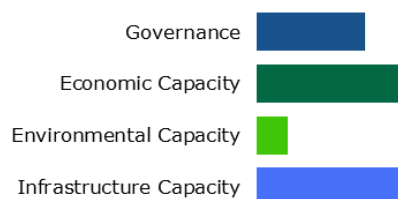









Table 66. Component scores for each coping capacity sub-component

	<b>Economic Capacity</b>	<b>9.1%</b> Households that Receive Remittances	<b>87.1%</b> Employment Rate (Male)	<b>52.8%</b> Employment Rate (Female)	<b>16.1%</b> Population in Highest Welfare Quintile	<b>\$2357</b> Annual Nominal Global Revenue per Capita
	<b>Governance</b>	<b>90.3%</b> Crime Complaints Cleared	<b>1592.3</b> Crime Rate per 100k Persons	<b>79.1%</b> Households without Garbage Collection	<b>66.6%</b> Voter Participation (2016 Election)	
	<b>Environmental Capacity</b>	<b>10.5%</b> Protected or Reforested Land				
	<b>Infrastructure Capacity</b>					
	<b>Health Care Capacity</b>		<b>12.1</b> Hospital Beds per 10,000 Persons	<b>21.6</b> Nurses per 10,000 Persons	<b>10.0</b> Physicians per 10,000 Persons	<b>14.9 km</b> Average Distance to Nearest Hospital
	<b>Communications Capacity</b>		<b>6.6%</b> Households with Access to Fixed Phone Line	<b>78.7%</b> Households with Access to Mobile Phone		
	<b>Transportation Capacity</b>		<b>15.9 km</b> Average Distance to Nearest Port or Airport	<b>0.45 km</b> Total Length of Road per km <sup>2</sup> (area)		

<sup>84</sup> **Coping Capacity:** The systems, means, and abilities of a country to absorb and respond to events that could potentially disrupt normal function.

Lack of Resilience (LR)

Lack of Resilience<sup>85</sup> Rank: 10 of 17 Departments (Score: 0.413)

Rivas’ score and ranking are due to low Vulnerability combined with medium Coping Capacity scores.

Table 67. The three thematic areas with the weakest relative scores



Multi-Hazard Risk (MHR)

Multi-Hazard Risk<sup>86</sup> Rank: 11 of 17 Departments (Score: 0.469)

Rivas’ score and ranking are due to medium Multi-Hazard Exposure combined with low Vulnerability and medium Coping Capacity scores.

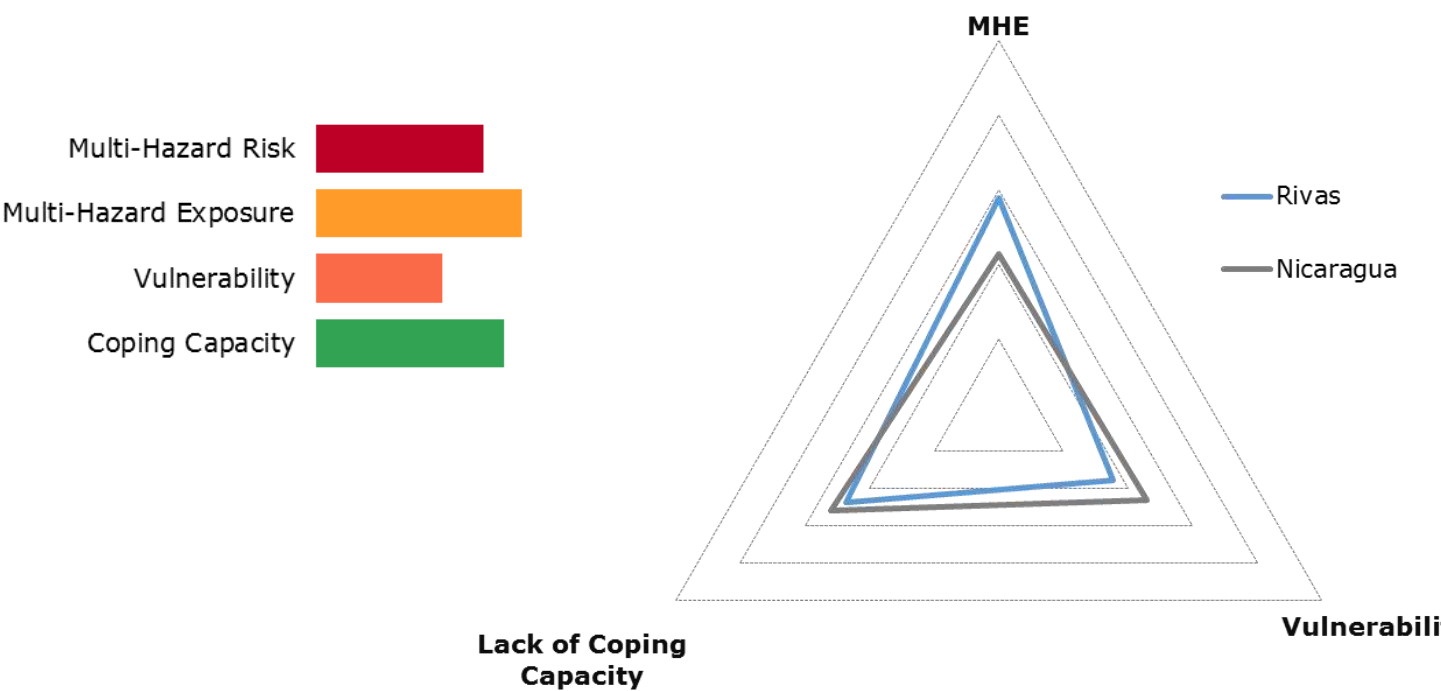


Figure 37. Department Multi-Hazard Risk component scores compared to overall average country scores

<sup>85</sup> **Lack of Resilience:** The susceptibility to impact from the short-term inability to absorb, respond to, and recover from disruptions to a country’s normal function. This index provides a hazard-independent look at current socioeconomic conditions.

<sup>86</sup> **Multi-Hazard Risk:** The likelihood of losses or disruptions to a country’s normal function due to interaction between multi-hazard exposure, socioeconomic vulnerability, and coping capacity.

## Successes



### Low economic constraints

Ranked 14 of 17 departments, low economic constraints indicate that Rivas may be able to invest in additional mitigation and preparedness measures at the local and community level.



### Very low population pressures

Ranked 16 of 17 departments, limited population change allows disaster managers to form accurate evacuation, sheltering, and resource plans.



### High health care capacity

Ranked 3 of 17 departments, high health care capacity indicates that the population will have access to healthcare services before, during, and after a disaster.

## Recommendations

01

### Reduce environmental stress

Invest in drought- and erosion-mitigation projects to reduce environmental stress and degradation.

02

### Improve governance

Provide additional support for local police, firefighters, and emergency medical resources to improve public safety and reduce crime rates. In addition, seek partnerships with the private sector to increase the provision of services, such as garbage collection.

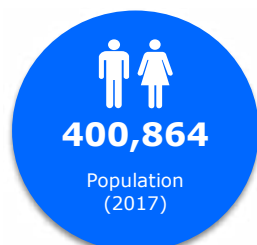
## Department: León



Department Capital: León

Area: 5,138 km<sup>2</sup>

León is located on the Pacific Coast of Nicaragua. This department is known for its historic cultural sites, volcanic mountains, and Pacific Coast beaches.



Municipality	Population
Achuapa	14,882
El Sauce	31,301
Santa Rosa del Peñón	10,745
El Jicaral	11,613
Larreynaga	32,584
Telica	25,708
Quezalguaque	9,649
León	194,924
La Paz Centro	31,833
Nagarote	37,625



**Multi-Hazard Risk Rank:**  
**Low (12 of 17)**

**Lack of Resilience Rank:**  
**Very Low (14 of 17)**

## RVA Component Scores

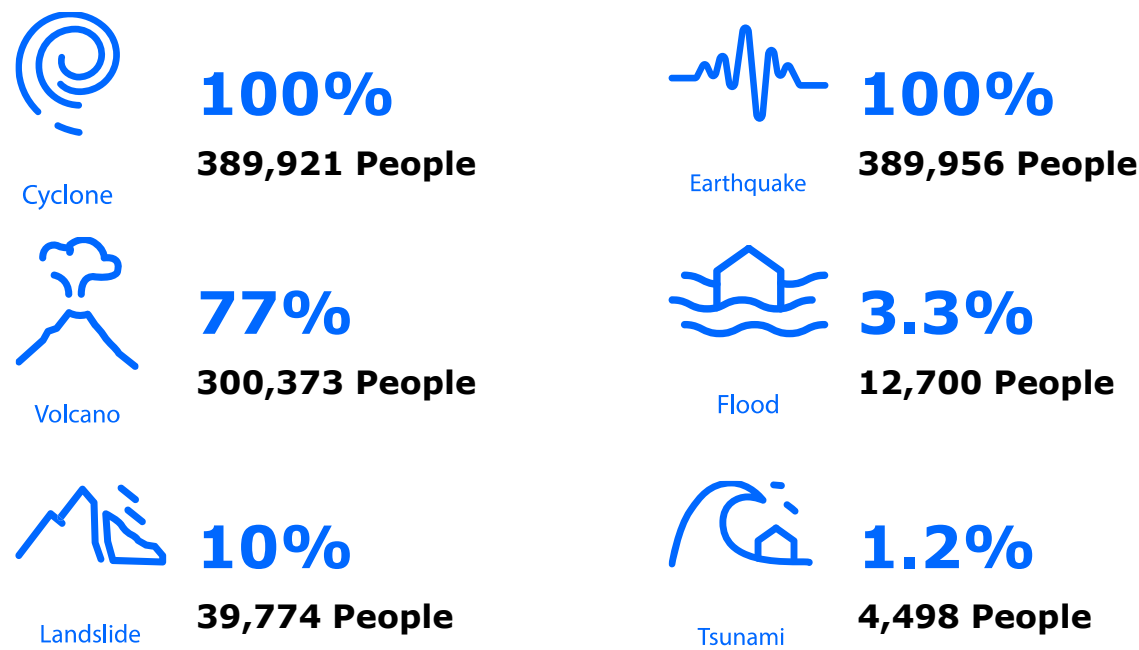
Table 68. Department scores and ranks (compared across departments) for each index

Multi-Hazard Risk		Lack of Resilience		Multi-Hazard Exposure		Vulnerability		Coping Capacity	
Low		Very Low		High		Very Low		Very High	
Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)
0.468	12	0.347	14	0.710	5	0.310	14	0.616	3

Multi-Hazard Exposure (MHE)

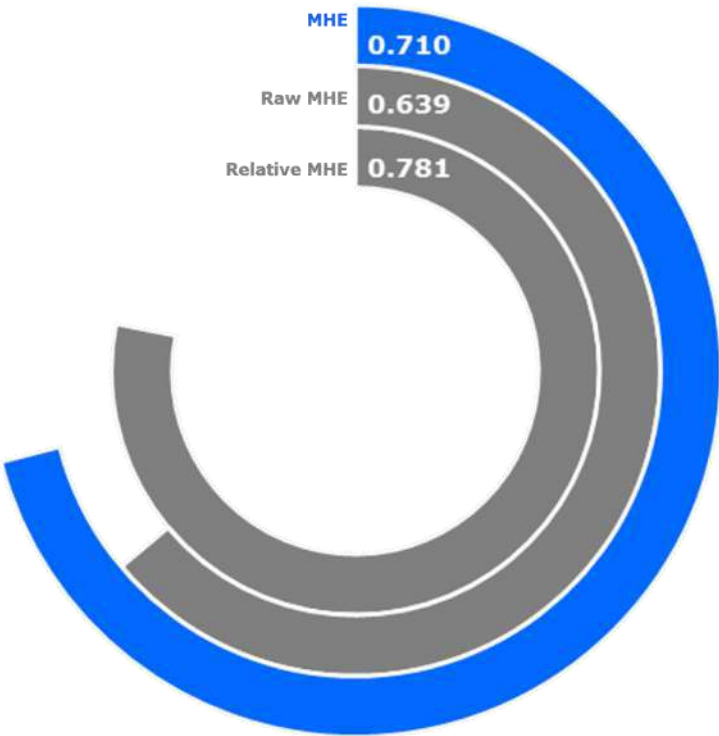
Multi-Hazard Exposure<sup>87</sup> Rank: 5 of 17 Departments (Score: 0.710)

Table 69. Estimated ambient population<sup>88</sup> exposed to each hazard



Case Study: León CODEPRED

The CODEPRED in León operates 24/7 regardless of activation level (i.e., ongoing response or no response). Employees at CODEPRED do 12 hours shifts. The response coordination group includes representatives from civil defense, national police, MINSA, fire department, MINED, and the volunteer fire department.

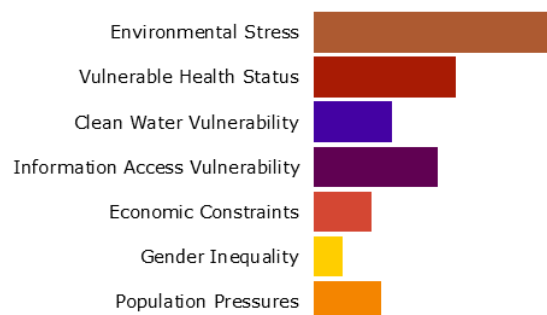









<sup>87</sup> Multi-Hazard Exposure: Average exposure of the population to hazards.  
<sup>88</sup> Ambient Population: 24-hour average estimate of the population in each department. Ambient population typically differs from census population.

## Vulnerability (V)

**Vulnerability<sup>89</sup> Rank: 14 of 17 Departments (Score: 0.310)** Vulnerability in León is primarily driven by Environmental Stress. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Vulnerability score.

Table 70. Component scores for each vulnerability sub-component



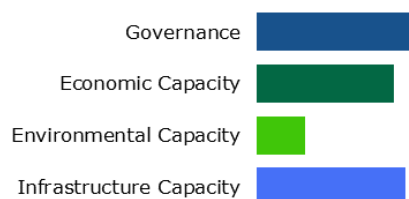
	<b>Environmental Stress</b>	<b>100%</b> Province at Drought Risk	<b>40.9%</b> Erosion Risk	<b>89.5</b> Livestock per km <sup>2</sup>		
	<b>Vulnerable Health Status</b>	<b>10.6</b> Infant Mortality Rate	<b>24.6</b> Maternal Mortality Rate	<b>76.5 yrs</b> Average Life Expectancy	<b>4.4%</b> Acute Malnutrition (Children < 5)	<b>2.5%</b> Population Disabled
	<b>Clean Water Vulnerability</b>	<b>81.1%</b> Households with Access to Improved Water	<b>44.8%</b> Households with Access to Flush Toilets			
	<b>Information Access Vulnerability</b>	<b>17.9%</b> Illiteracy	<b>6.6 yrs</b> Average Years of Schooling	<b>87.2%</b> Primary School Enrollment	<b>95.3%</b> Households without Internet	<b>14.8%</b> Households without TV
	<b>Economic Constraints</b>	<b>51.1</b> Economic Dependency Ratio	<b>60.5%</b> Population in Poverty			
	<b>Gender Inequality</b>	<b>50.0%</b> Female Seats in Government	<b>1.12</b> Female to Male Secondary Education Enrollment	<b>0.28</b> Female to Male Labor Ratio		
	<b>Population Pressures</b>	<b>1.55%</b> Average Annual Population Change	<b>2.24%</b> Average Annual Urban Population Change			

<sup>89</sup> **Vulnerability:** The socioeconomic conditions that are associated with the susceptibility to disruptions in a country's normal functions.

## Coping Capacity (CC)

**Coping Capacity<sup>90</sup> Rank: 3 of 17 Departments (Score: 0.616)** León exhibits weaker Coping Capacity in the area of Environmental Capacity. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Coping Capacity score.

Table 71. Component scores for each coping capacity sub-component



	<b>Economic Capacity</b>	<b>11.3%</b> Households that Receive Remittances	<b>77.5%</b> Employment Rate (Male)	<b>55.9%</b> Employment Rate (Female)	<b>25.9%</b> Population in Highest Welfare Quintile	<b>\$1,309</b> Annual Nominal Global Revenue per Capita
	<b>Governance</b>	<b>93.9%</b> Crime Complaints Cleared	<b>1230.1</b> Crime Rate per 100k Persons	<b>60.0%</b> Households without Garbage Collection	<b>70.7%</b> Voter Participation (2016 Election)	
	<b>Environmental Capacity</b>	<b>14.2%</b> Protected or Reforested Land				
	<b>Infrastructure Capacity</b>					
	<b>Health Care Capacity</b>		<b>11.1</b> Hospital Beds per 10,000 Persons	<b>16.0</b> Nurses per 10,000 Persons	<b>11.1</b> Physicians per 10,000 Persons	<b>19.2 km</b> Average Distance to Nearest Hospital
	<b>Communications Capacity</b>		<b>15.9%</b> Households with Access to Fixed Phone Line	<b>79.5%</b> Households with Access to Mobile Phone		
	<b>Transportation Capacity</b>		<b>29.5 km</b> Average Distance to Nearest Port or Airport	<b>0.40 km</b> Total Length of Road per km <sup>2</sup> (area)		

<sup>90</sup> **Coping Capacity:** The systems, means, and abilities of a country to absorb and respond to events that could potentially disrupt normal function.



Lack of Resilience (LR)

Lack of Resilience<sup>91</sup> Rank: 14 of 17 Departments (Score: 0.347)

León’s score and ranking are due to very low Vulnerability combined with very high Coping Capacity scores.

Table 72. The three thematic areas with the weakest relative scores



Multi-Hazard Risk (MHR)

Multi-Hazard Risk<sup>92</sup> Rank: 12 of 17 Departments (Score: 0.468)

León’s score and ranking are due to high Multi-Hazard Exposure combined with very low Vulnerability and very high Coping Capacity scores.

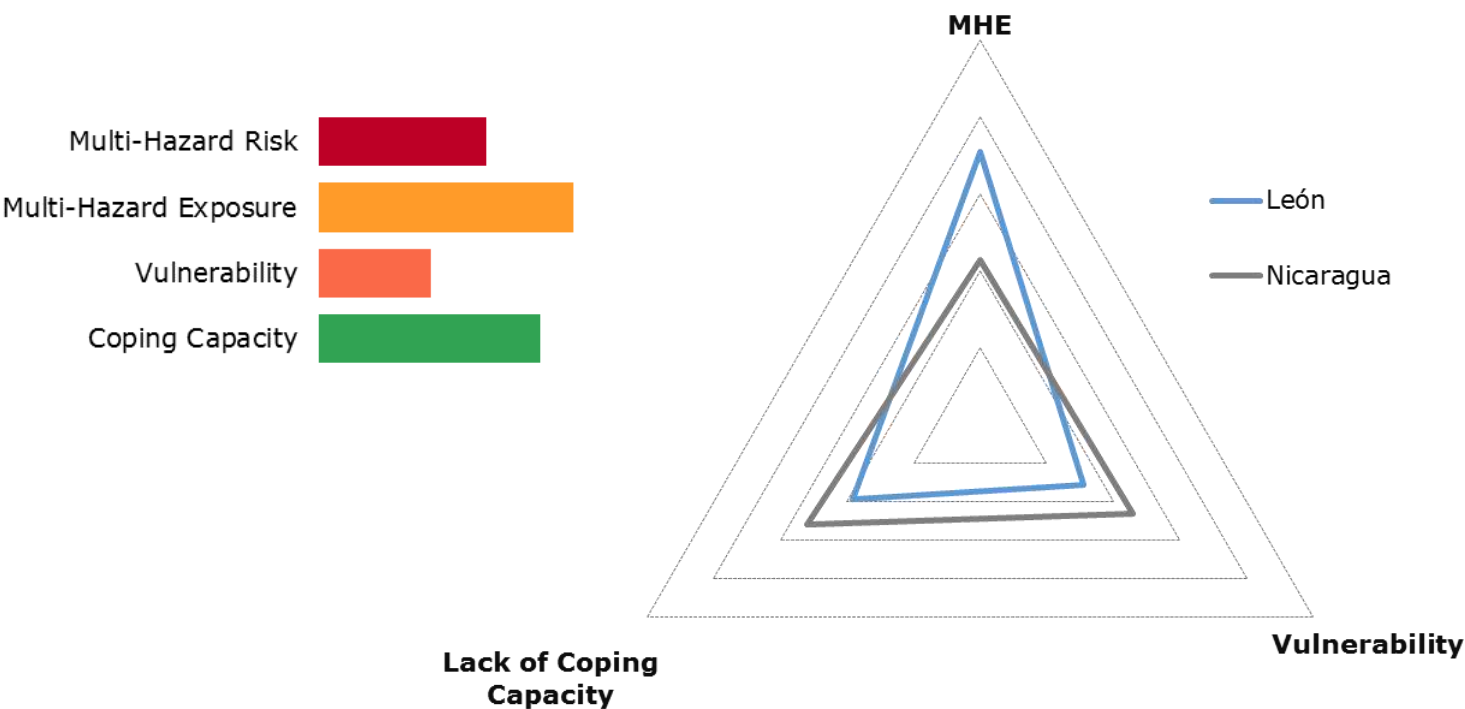


Figure 38. Department Multi-Hazard Risk component scores compared to overall average country scores

<sup>91</sup> **Lack of Resilience:** The susceptibility to impact from the short-term inability to absorb, respond to, and recover from disruptions to a country’s normal function. This index provides a hazard-independent look at current socioeconomic conditions.

<sup>92</sup> **Multi-Hazard Risk:** The likelihood of losses or disruptions to a country’s normal function due to interaction between multi-hazard exposure, socioeconomic vulnerability, and coping capacity.

## Successes



### Low overall vulnerability

Ranked 14 of 17 departments, low overall vulnerability indicates that León department is less susceptible to the negative impacts of a disaster and will likely recover faster after an event.



### Highest overall governance

Ranked 1 of 17 departments, high governance could facilitate the implementation of disaster management initiatives into departmental and municipal communities.

## Recommendations

01

### Reduce environmental stress

Invest in drought- and erosion-mitigation projects to reduce environmental stress and degradation.

02

### Reduce vulnerable health status

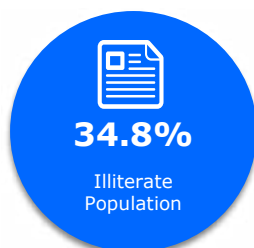
Invest in public welfare services to support the disabled population and reduce maternal mortality.

## Department: Boaco

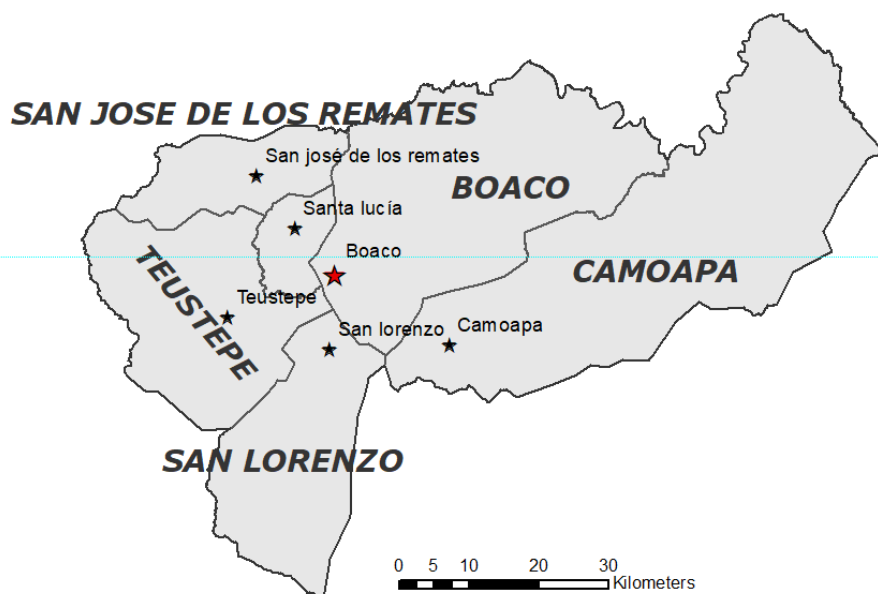
Department Capital: Boaco

Area: 4,177 km<sup>2</sup>

Located in central Nicaragua, Boaco features the mountain Monolito de Quizaltepe, as well as thriving agriculture, cattle, and craft industries.



Municipality	Population
San José de los Remates	8,447
Boaco	61,051
Camoapa	39,533
Santa Lucía	9,060
Teustepe	32,027
San Lorenzo	26,243



**Multi-Hazard Risk Rank:  
Low (13 of 17)**

**Lack of Resilience Rank:  
Medium (8 of 17)**

## RVA Component Scores

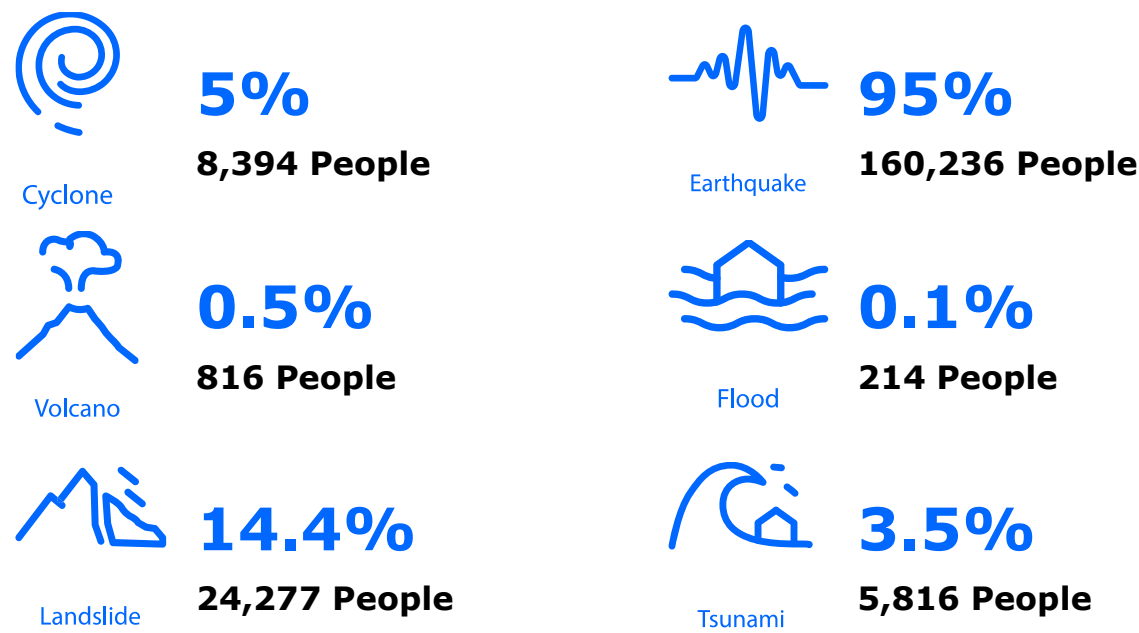
Table 73. Department scores and ranks (compared across departments) for each index

Multi-Hazard Risk		Lack of Resilience		Multi-Hazard Exposure		Vulnerability		Coping Capacity	
Low		Medium		Low		Medium		Very Low	
Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)
0.437	13	0.555	8	0.199	13	0.492	8	0.382	14

Multi-Hazard Exposure (MHE)

Multi-Hazard Exposure<sup>93</sup> Rank: 13 of 17 Departments (Score: 0.199)

Table 74. Estimated ambient population<sup>94</sup> exposed to each hazard



**Case Study: Clean Water, Sanitation & Education**

El Porvenir (NGO in Nicaragua) is working to enhance the resilience of women and young children through integrated clean water projects. El Porvenir works with local communities to ensure that Boaco’s watershed remains protected and sustainable. The organization is also working with schools to teach children basic health, clean water, and water management practices.

<https://www.ngoaidmap.org/projects/17857>










<sup>93</sup> Multi-Hazard Exposure: Average exposure of the population to hazards.

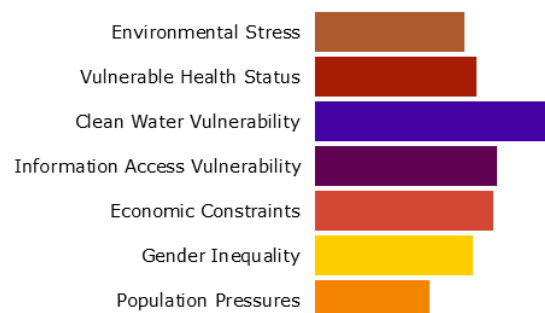
<sup>94</sup> Ambient Population: 24-hour average estimate of the population in each department. Ambient population typically differs from census population.

## Vulnerability (V)

**Vulnerability<sup>95</sup> Rank: 8 of 17 Departments (Score: 0.492)** Vulnerability in Boaco is primarily driven by Gender Inequality, Economic Constraints, and Clean Water Vulnerability. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Vulnerability score.

Table 75. Component scores for each vulnerability sub-component

	<b>Environmental Stress</b>	<b>45.2%</b> Province at Drought Risk	<b>11.5%</b> Erosion Risk	<b>101.0</b> Livestock per km <sup>2</sup>			
	<b>Vulnerable Health Status</b>	<b>12.0</b> Infant Mortality Rate	<b>49.1</b> Maternal Mortality Rate	<b>74.5 yrs</b> Average Life Expectancy	<b>1.6%</b> Acute Malnutrition (Children < 5)	<b>3.5%</b> Population Disabled	
	<b>Clean Water Vulnerability</b>	<b>41.2%</b> Households with Access to Improved Water	<b>20.1%</b> Households with Access to Flush Toilets				
	<b>Information Access Vulnerability</b>	<b>34.8%</b> Illiteracy	<b>4.8 yrs</b> Average Years of Schooling	<b>88.1%</b> Primary School Enrollment	<b>95.0%</b> Households without Internet	<b>34.7%</b> Households without TV	<b>42.1%</b> Households without Radio
	<b>Economic Constraints</b>	<b>61.1</b> Economic Dependency Ratio	<b>75.9%</b> Population in Poverty				
	<b>Gender Inequality</b>	<b>41.7%</b> Female Seats in Government	<b>1.09</b> Female to Male Secondary Education Enrollment	<b>0.53</b> Female to Male Labor Ratio			
	<b>Population Pressures</b>	<b>1.86%</b> Average Annual Population Change	<b>2.63%</b> Average Annual Urban Population Change				



<sup>95</sup> **Vulnerability:** The socioeconomic conditions that are associated with the susceptibility to disruptions in a country's normal functions.

## Coping Capacity (CC)

**Coping Capacity<sup>96</sup> Rank: 14 of 17 Departments (Score: 0.382)** Boaco exhibits weaker Coping Capacity in the areas of Environmental Capacity and Governance. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Coping Capacity score.

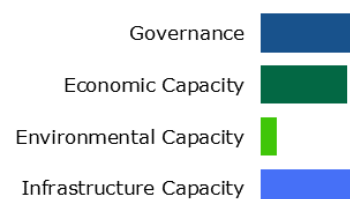


Table 76. Component scores for each coping capacity sub-component

	<b>Economic Capacity</b>	<b>6.6%</b> Households that Receive Remittances	<b>93.2%</b> Employment Rate (Male)	<b>43.4%</b> Employment Rate (Female)	<b>15.3%</b> Population in Highest Welfare Quintile	<b>\$261.8</b> Annual Nominal Global Revenue per Capita
	<b>Governance</b>	<b>88.0%</b> Crime Complaints Cleared	<b>1018.6</b> Crime Rate per 100k Persons	<b>81.3%</b> Households without Garbage Collection	<b>47.0%</b> Voter Participation (2016 Election)	
	<b>Environmental Capacity</b>	<b>7.4%</b> Protected or Reforested Land				
	<b>Infrastructure Capacity</b>					
	<b>Health Care Capacity</b>		<b>9.0</b> Hospital Beds per 10,000 Persons	<b>12.3</b> Nurses per 10,000 Persons	<b>7.8</b> Physicians per 10,000 Persons	<b>22.3 km</b> Average Distance to Nearest Hospital
	<b>Communications Capacity</b>		<b>9.8%</b> Households with Access to Fixed Phone Line	<b>72.7%</b> Households with Access to Mobile Phone		
	<b>Transportation Capacity</b>		<b>58.3 km</b> Average Distance to Nearest Port or Airport	<b>0.29 km</b> Total Length of Road per km <sup>2</sup> (area)		

<sup>96</sup> **Coping Capacity:** The systems, means, and abilities of a country to absorb and respond to events that could potentially disrupt normal function.

Lack of Resilience (LR)

Lack of Resilience<sup>97</sup> Rank: 8 of 17 Departments (Score: 0.555)

Boaco’s score and ranking are due to medium Vulnerability combined with very low Coping Capacity scores.

Table 77. The three thematic areas with the weakest relative scores



Multi-Hazard Risk (MHR)

Multi-Hazard Risk<sup>98</sup> Rank: 13 of 17 Departments (Score: 0.437)

Boaco’s score and ranking are due to low Multi-Hazard Exposure combined with medium Vulnerability and very low Coping Capacity scores.

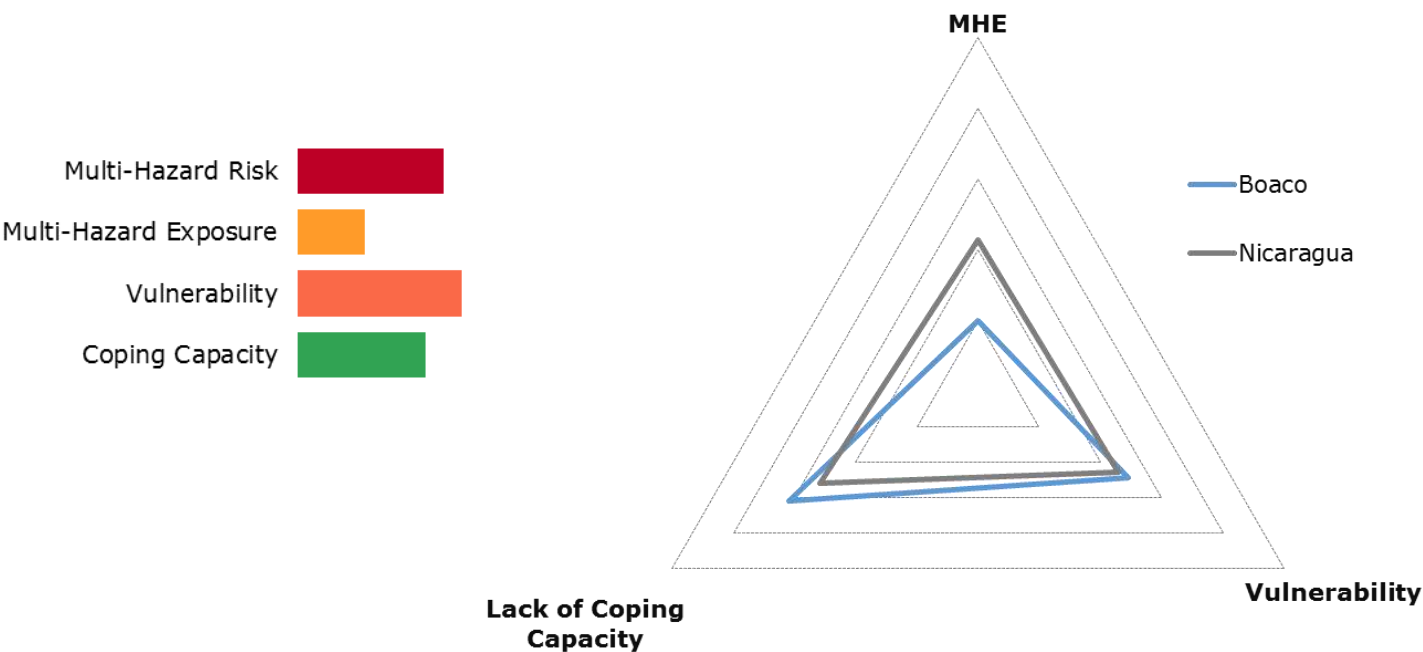


Figure 39. Department Multi-Hazard Risk component scores compared to overall average country scores

<sup>97</sup> **Lack of Resilience:** The susceptibility to impact from the short-term inability to absorb, respond to, and recover from disruptions to a country’s normal function. This index provides a hazard-independent look at current socioeconomic conditions.

<sup>98</sup> **Multi-Hazard Risk:** The likelihood of losses or disruptions to a country’s normal function due to interaction between multi-hazard exposure, socioeconomic vulnerability, and coping capacity.

## Successes



### Low population pressures

Ranked 11 of 17 departments, limited population change allows disaster managers to form accurate evacuation, sheltering, and resource plans.

## Recommendations

01

### Reduce clean water vulnerability

Invest in public water and sewer infrastructure to ensure equitable access to safe, clean drinking water and sanitation.

02

### Increase economic capacity

Foster small-business development and invest in business education and human capital to raise economic stability.

03

### Improve governance

Provide additional support for local police, firefighters, and emergency medical resources to improve public safety and increase crime clearance rates. In addition, promote civic engagement and voter participation in local and national elections to improve public voice and accountability. Finally, seek partnerships with the private sector to increase the provision of services, such as garbage collection.



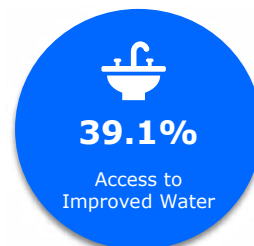
## Department: Madriz



Department Capital: Somoto

Area: 1,708 km<sup>2</sup>

Madriz is a small province located on the northern border of Nicaragua. Madriz is known for its pine and oak forests, coffee plantations, and artisanal handicrafts.



Municipality	Population
Somoto	38,582
Totogalpa	15,406
Telpaneca	23,075
San Juan de Río Coco	28,205
Palacagüina	15,539
Yalagüina	12,450
San Lucas	15,598
Las Sabanas	5,071
San José de Cusmapa	8,059



**Multi-Hazard Risk Rank:  
Low (14 of 17)**

**Lack of Resilience Rank:  
High (6 of 17)**

## RVA Component Scores

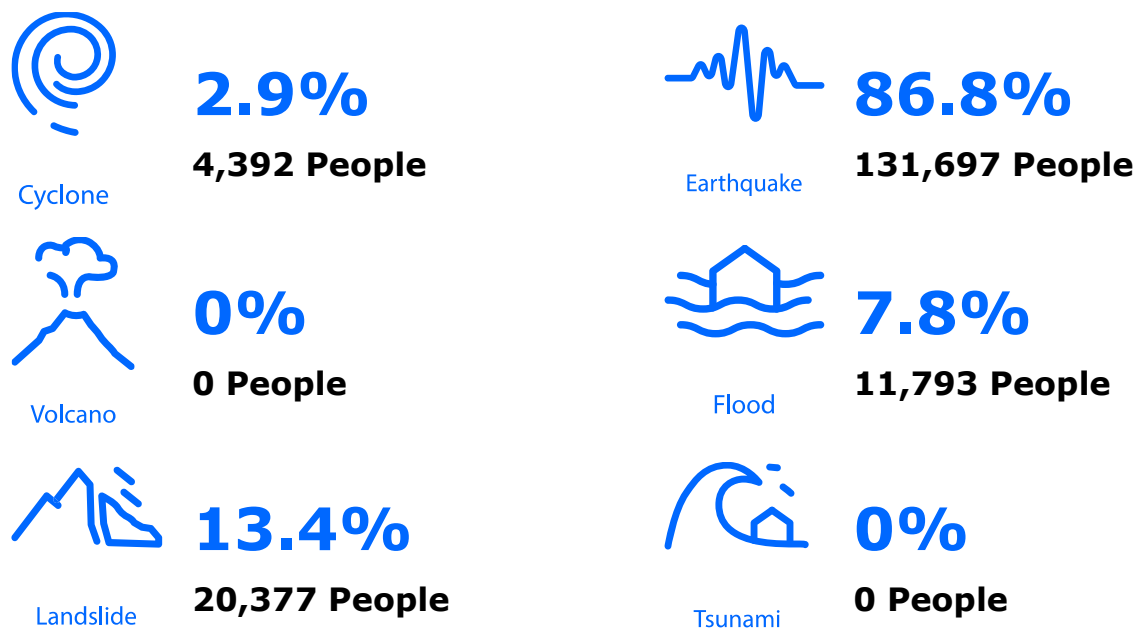
Table 78. Department scores and ranks (compared across departments) for each index

Multi-Hazard Risk		Lack of Resilience		Multi-Hazard Exposure		Vulnerability		Coping Capacity	
Low		High		Very Low		High		Low	
Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)
0.433	14	0.568	6	0.164	16	0.558	5	0.421	12

## Multi-Hazard Exposure (MHE)

**Multi-Hazard Exposure<sup>99</sup> Rank: 16 of 17 Departments (Score: 0.164)**

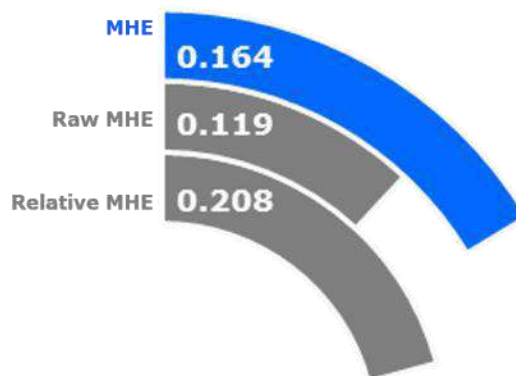
Table 79. Estimated ambient population<sup>100</sup> exposed to each hazard



### Case Study: Food Security in Madriz

Heifer International is working with local farmers to increase food security and climate change resilience. Thirty-eight cooperatives are working with Heifer to restore their main livelihood, coffee and food production, and rehabilitate 2,387 acres of farmland. The overall goal of the project is to strengthen food security and increase the household incomes of small farmers.

<https://www.ngoaidmap.org/projects/5043>



<sup>99</sup> **Multi-Hazard Exposure:** Average exposure of the population to hazards.

<sup>100</sup> **Ambient Population:** 24-hour average estimate of the population in each department. Ambient population typically differs from census population.

## Vulnerability (V)

**Vulnerability<sup>101</sup> Rank: 5 of 17 Departments (Score: 0.558)** Vulnerability in Madriz is primarily driven by high Environmental Stress and Clean Water Vulnerability. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Vulnerability score.

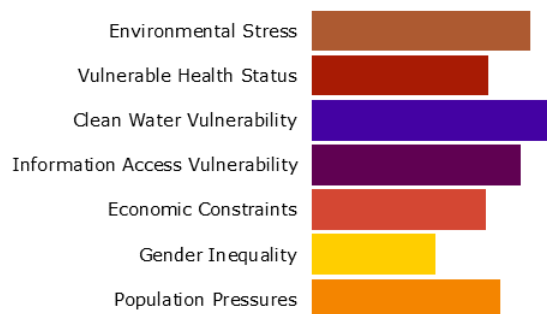


Table 80. Component scores for each vulnerability sub-component

	<b>Environmental Stress</b>	<b>91.4%</b> Province at Drought Risk	<b>64.5%</b> Erosion Risk	<b>58.8</b> Livestock per km <sup>2</sup>		
	<b>Vulnerable Health Status</b>	<b>13.0</b> Infant Mortality Rate	<b>66.6</b> Maternal Mortality Rate	<b>71.2 yrs</b> Average Life Expectancy	<b>0.8%</b> Acute Malnutrition (Children <5)	<b>3.0%</b> Population Disabled
	<b>Clean Water Vulnerability</b>	<b>39.1%</b> Households with Access to Improved Water	<b>19.4%</b> Households with Access to Flush Toilets			
	<b>Information Access Vulnerability</b>	<b>30.2%</b> Illiteracy	<b>5.1 yrs</b> Average Years of Schooling	<b>82.3%</b> Primary School Enrollment	<b>95.7%</b> Households without Internet	<b>46.8%</b> Households without TV <b>44.0%</b> Households without Radio
	<b>Economic Constraints</b>	<b>61.7</b> Economic Dependency Ratio	<b>74.2%</b> Population in Poverty			
	<b>Gender Inequality</b>	<b>50.0%</b> Female Seats in Government	<b>1.06</b> Female to Male Secondary Education Enrollment	<b>0.54</b> Female to Male Labor Ratio		
	<b>Population Pressures</b>	<b>2.39%</b> Average Annual Population Change	<b>3.16%</b> Average Annual Urban Population Change			

<sup>101</sup> **Vulnerability:** The socioeconomic conditions that are associated with the susceptibility to disruptions in a country's normal functions.

## Coping Capacity (CC)

**Coping Capacity<sup>102</sup> Rank: 12 of 17 Departments (Score: 0.421)** Madriz exhibits weaker Coping Capacity in the areas of Economic Capacity, Environmental Capacity, and Infrastructure. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Coping Capacity score.

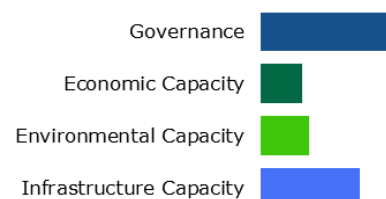


Table 81. Component scores for each coping capacity sub-component

	<b>Economic Capacity</b>	<b>3.8%</b> Households that Receive Remittances	<b>82.4%</b> Employment Rate (Male)	<b>38.1%</b> Employment Rate (Female)	<b>10.2%</b> Population in Highest Welfare Quintile	<b>\$295.1</b> Annual Nominal Global Revenue per Capita
	<b>Governance</b>	<b>94.2%</b> Crime Complaints Cleared	<b>807.2</b> Crime Rate per 100k Persons	<b>90.5%</b> Households without Garbage Collection	<b>48.1%</b> Voter Participation (2016 Election)	
	<b>Environmental Capacity</b>	<b>14.1%</b> Protected or Reforested Land				
	<b>Infrastructure Capacity</b>					
	<b>Health Care Capacity</b>		<b>8.9</b> Hospital Beds per 10,000 Persons	<b>14.7</b> Nurses per 10,000 Persons	<b>9.0</b> Physicians per 10,000 Persons	<b>11.1 km</b> Average Distance to Nearest Hospital
	<b>Communications Capacity</b>		<b>7.6%</b> Households with Access to Fixed Phone Line	<b>60.7%</b> Households with Access to Mobile Phone		
	<b>Transportation Capacity</b>		<b>111.7 km</b> Average Distance to Nearest Port or Airport	<b>0.68 km</b> Total Length of Road per km <sup>2</sup> (area)		

<sup>102</sup> **Coping Capacity:** The systems, means, and abilities of a country to absorb and respond to events that could potentially disrupt normal function.

Lack of Resilience (LR)

Lack of Resilience<sup>103</sup> Rank: 6 of 17 Departments (Score: 0.568)

Madriz’s score and ranking are due to high Vulnerability combined with low Coping Capacity scores.

Table 82. The three thematic areas with the weakest relative scores



Multi-Hazard Risk (MHR)

Multi-Hazard Risk<sup>104</sup> Rank: 14 of 17 Departments (Score: 0.433)

Madriz’s score and ranking are due to very low Multi-Hazard Exposure combined with high Vulnerability and low Coping Capacity scores.

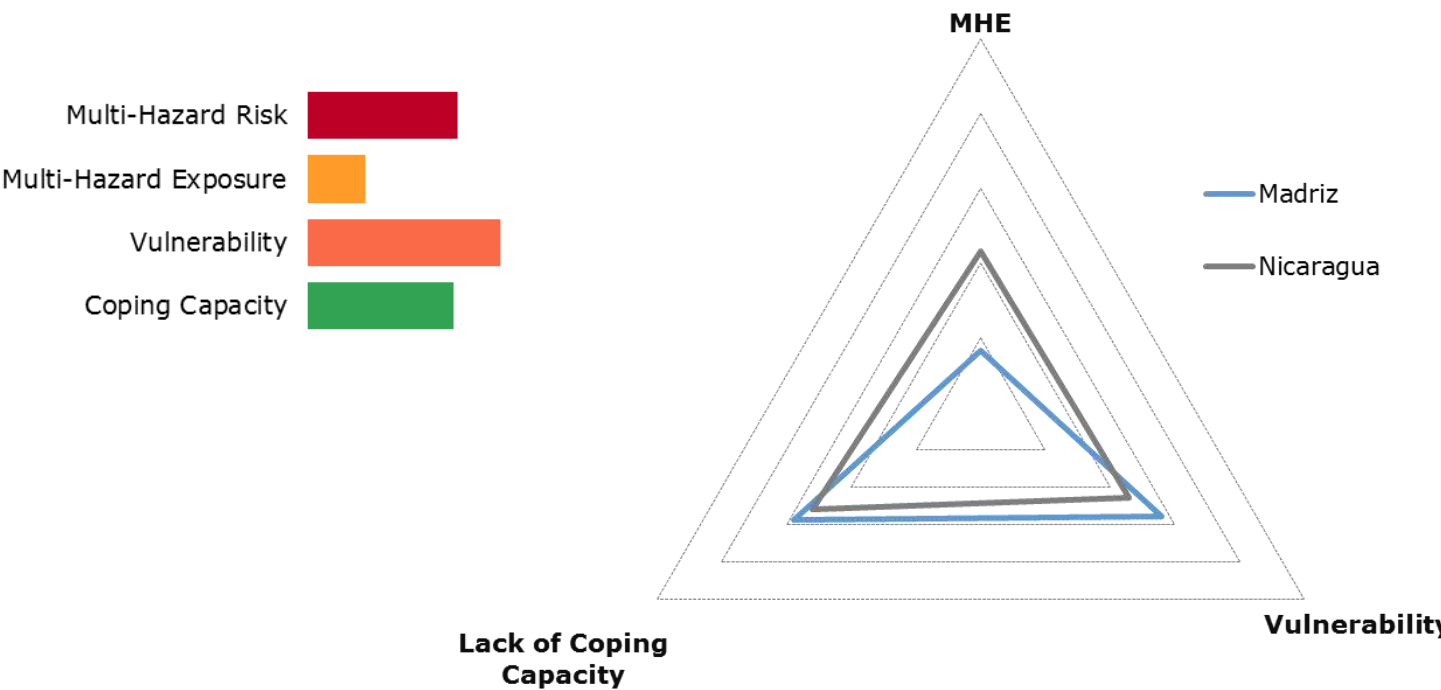


Figure 40. Department Multi-Hazard Risk component scores compared to overall average country scores

<sup>103</sup> **Lack of Resilience:** The susceptibility to impact from the short-term inability to absorb, respond to, and recover from disruptions to a country’s normal function. This index provides a hazard-independent look at current socioeconomic conditions.

<sup>104</sup> **Multi-Hazard Risk:** The likelihood of losses or disruptions to a country’s normal function due to interaction between multi-hazard exposure, socioeconomic vulnerability, and coping capacity.

## Successes



### High health care capacity

Ranked 5 of 17 departments, high health care capacity indicates that the population will have access to healthcare services before, during, and after a disaster.



### High overall governance

Ranked 6 of 17 departments, high governance could facilitate the implementation of disaster management initiatives into departmental and municipal communities.

## Recommendations

01

### Increase economic capacity

Foster small-business development and invest in business education and human capital to raise economic stability and increase employment.

02

### Invest in infrastructure

Limited infrastructure inhibits the capacity to communicate and exchange information, reduces access to health care, and limits the physical distribution of goods and services in Madriz. Health care, transportation, and communication infrastructures require upgrading and investment to increase connectivity and welfare in the department. Focused investments in these areas will increase coping capacity and resilience.

03

### Reduce clean water vulnerability

Invest in public water and sewer infrastructure to ensure equitable access to safe, clean drinking water and sanitation.

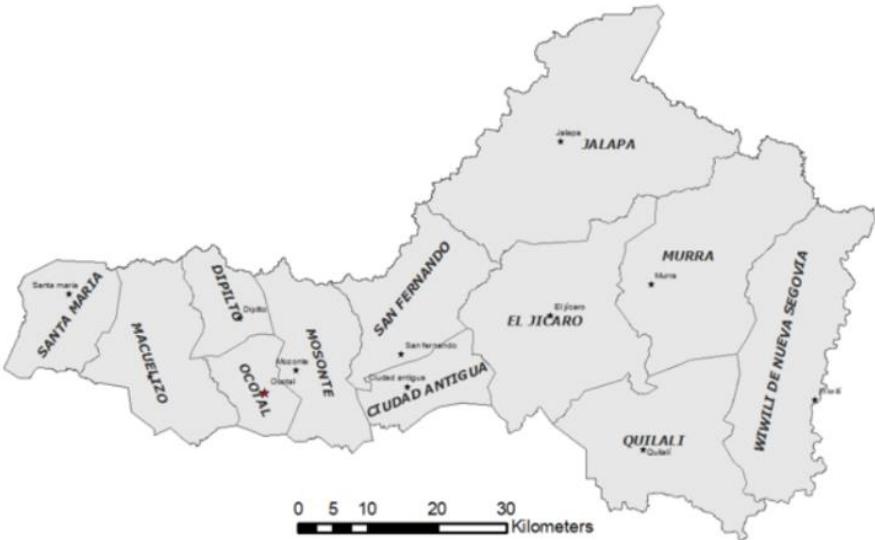
Department: Nueva Segovia



Department Capital: Ocotal  
Area: 3,491 km<sup>2</sup>  
Nueva Segovia is located in northern Nicaragua on the border with Honduras. It is known for its hot springs, coffee plantations, and a thriving handicraft industry.



Municipality	Population
Jalapa	68,099
Murra	18,130
El Jícaro	29,014
San Fernando	11,431
Mozonte	8,424
Dipilto	6,451
Macuelizo	6,812
Santa María	4,901
Ocotal	45,478
Ciudad Antigua	6,389
Quilalí	32,139
Wiwilí de Nueva Segovia	17,792



Multi-Hazard Risk Rank:  
Very Low (15 of 17)

Lack of Resilience Rank:  
Medium (7 of 17)

RVA Component Scores

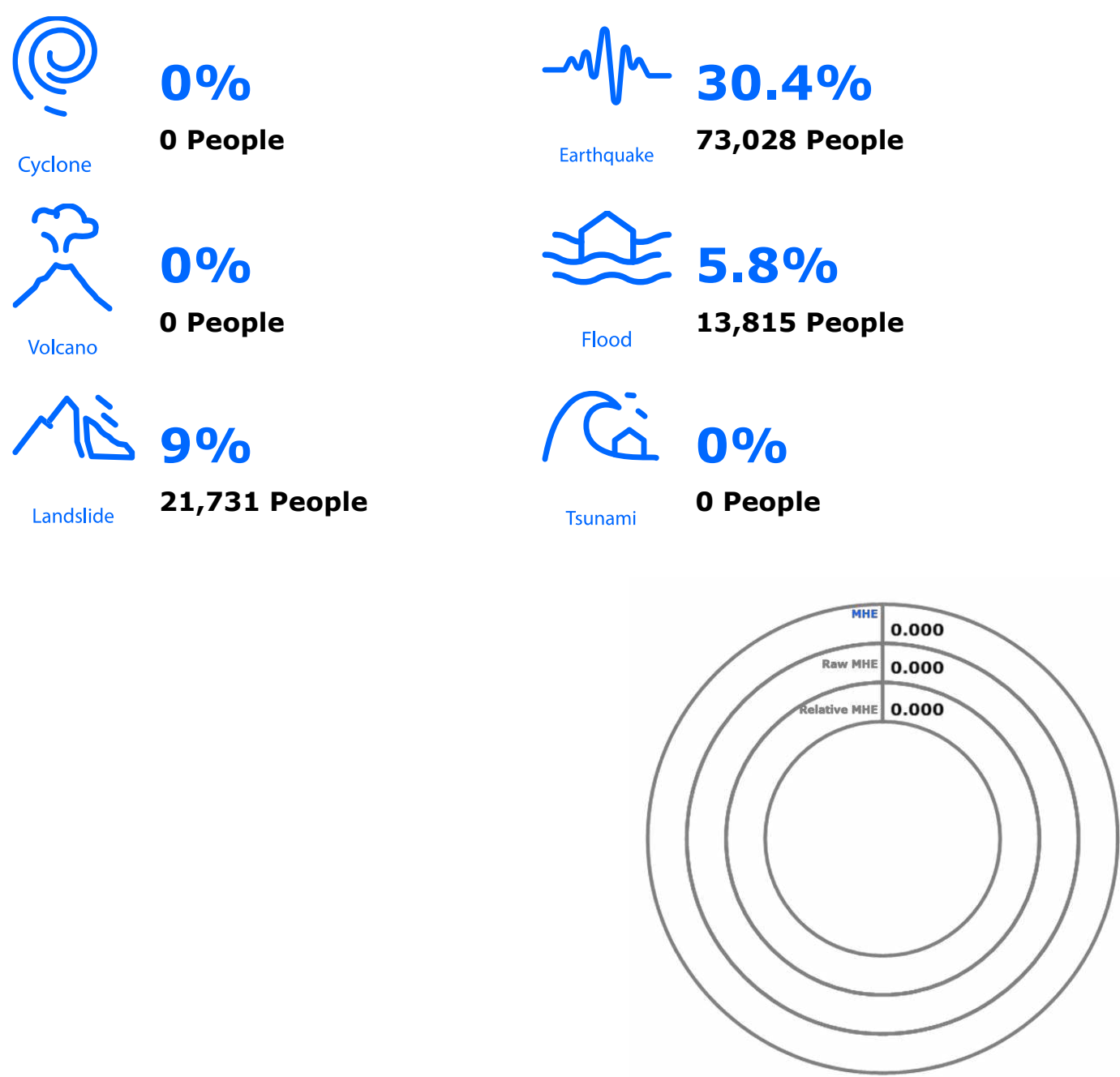
Table 83. Department scores and ranks (compared across departments) for each index

Multi-Hazard Risk		Lack of Resilience		Multi-Hazard Exposure		Vulnerability		Coping Capacity	
Very Low		Medium		Very Low		High		Low	
Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)
0.373	15	0.560	7	0	17	0.513	6	0.393	13

Multi-Hazard Exposure (MHE)

Multi-Hazard Exposure<sup>105</sup> Rank: 17 of 17 Departments (Score: 0.000)

Table 84. Estimated ambient population<sup>106</sup> exposed to each hazard



<sup>105</sup> Multi-Hazard Exposure: Average exposure of the population to hazards.

<sup>106</sup> Ambient Population: 24-hour average estimate of the population in each department. Ambient population typically differs from census population.



## Vulnerability (V)

**Vulnerability<sup>107</sup> Rank: 6 of 17 Departments (Score: 0.513)** Vulnerability in Nueva Segovia is primarily driven by high Information Access Vulnerability, Economic Constraints, and Clean Water Vulnerability. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Vulnerability score.

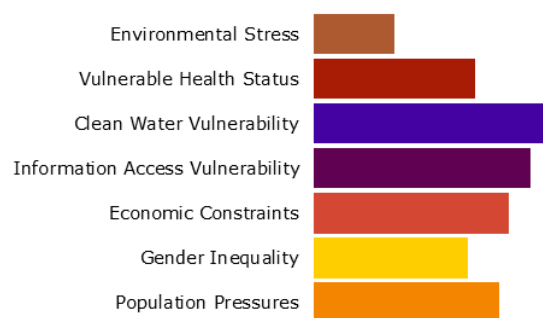


Table 85. Component scores for each vulnerability sub-component

	<b>Environmental Stress</b>	<b>20.2%</b> Province at Drought Risk	<b>36.1%</b> Erosion Risk	<b>59.1</b> Livestock per km <sup>2</sup>			
	<b>Vulnerable Health Status</b>	<b>12.6</b> Infant Mortality Rate	<b>18.6</b> Maternal Mortality Rate	<b>71.2 yrs</b> Average Life Expectancy	<b>2.0%</b> Acute Malnutrition (Children < 5)	<b>2.69%</b> Population Disabled	
	<b>Clean Water Vulnerability</b>	<b>50.0%</b> Households with Access to Improved Water	<b>14.0%</b> Households with Access to Flush Toilets				
	<b>Information Access Vulnerability</b>	<b>29.5%</b> Illiteracy	<b>4.8 yrs</b> Average Years of Schooling	<b>82.7%</b> Primary School Enrollment	<b>97.4%</b> Households without Internet	<b>39.6%</b> Households without TV	<b>45.3%</b> Households without Radio
	<b>Economic Constraints</b>	<b>65.6</b> Economic Dependency Ratio	<b>73.4%</b> Population in Poverty				
	<b>Gender Inequality</b>	<b>41.7%</b> Female Seats in Government	<b>1.05</b> Female to Male Secondary Education Enrollment	<b>0.47</b> Female to Male Labor Ratio			
	<b>Population Pressures</b>	<b>2.16%</b> Average Annual Population Change	<b>3.4%</b> Average Annual Urban Population Change				

<sup>107</sup> **Vulnerability:** The socioeconomic conditions that are associated with the susceptibility to disruptions in a country's normal functions.

## Coping Capacity (CC)

**Coping Capacity<sup>108</sup> Rank: 13 of 17 Departments (Score: 0.393)** Nueva Segovia exhibits weaker Coping Capacity in the areas of Infrastructure, Economic Capacity, and Governance. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Coping Capacity score.

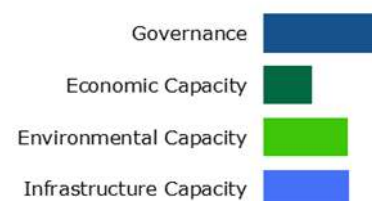


Table 86. Component scores for each coping capacity sub-component

	<b>Economic Capacity</b>	<b>4.5%</b> Households that Receive Remittances	<b>83.6%</b> Employment Rate (Male)	<b>44.7%</b> Employment Rate (Female)	<b>6.3%</b> Population in Highest Welfare Quintile	<b>\$394.9</b> Annual Nominal Global Revenue per Capita
	<b>Governance</b>	<b>90.0%</b> Crime Complaints Cleared	<b>601.2</b> Crime Rate per 100k Persons	<b>84.0%</b> Households without Garbage Collection	<b>44.7%</b> Voter Participation (2016 Election)	
	<b>Environmental Capacity</b>	<b>21.9%</b> Protected or Reforested Land				
	<b>Infrastructure Capacity</b>					
	<b>Health Care Capacity</b>		<b>7.7</b> Hospital Beds per 10,000 Persons	<b>14.1</b> Nurses per 10,000 Persons	<b>7.5</b> Physicians per 10,000 Persons	<b>13.9 km</b> Average Distance to Nearest Hospital
	<b>Communications Capacity</b>		<b>6.9%</b> Households with Access to Fixed Phone Line	<b>65.4%</b> Households with Access to Mobile Phone		
	<b>Transportation Capacity</b>		<b>135.3 km</b> Average Distance to Nearest Port or Airport	<b>0.56 km</b> Total Length of Road per km <sup>2</sup> (area)		

<sup>108</sup> **Coping Capacity:** The systems, means, and abilities of a country to absorb and respond to events that could potentially disrupt normal function.

Lack of Resilience (LR)

Lack of Resilience<sup>109</sup> Rank: 7 of 17 Departments (Score: 0.560)

Nueva Segovia’s score and ranking are due to high Vulnerability combined with low Coping Capacity scores.

Table 87. The three thematic areas with the weakest relative scores



Multi-Hazard Risk (MHR)

Multi-Hazard Risk<sup>110</sup> Rank: 15 of 17 Departments (Score: 0.373)

Nueva Segovia’s score and ranking are due to very low Multi-Hazard Exposure combined with high Vulnerability and low Coping Capacity scores.

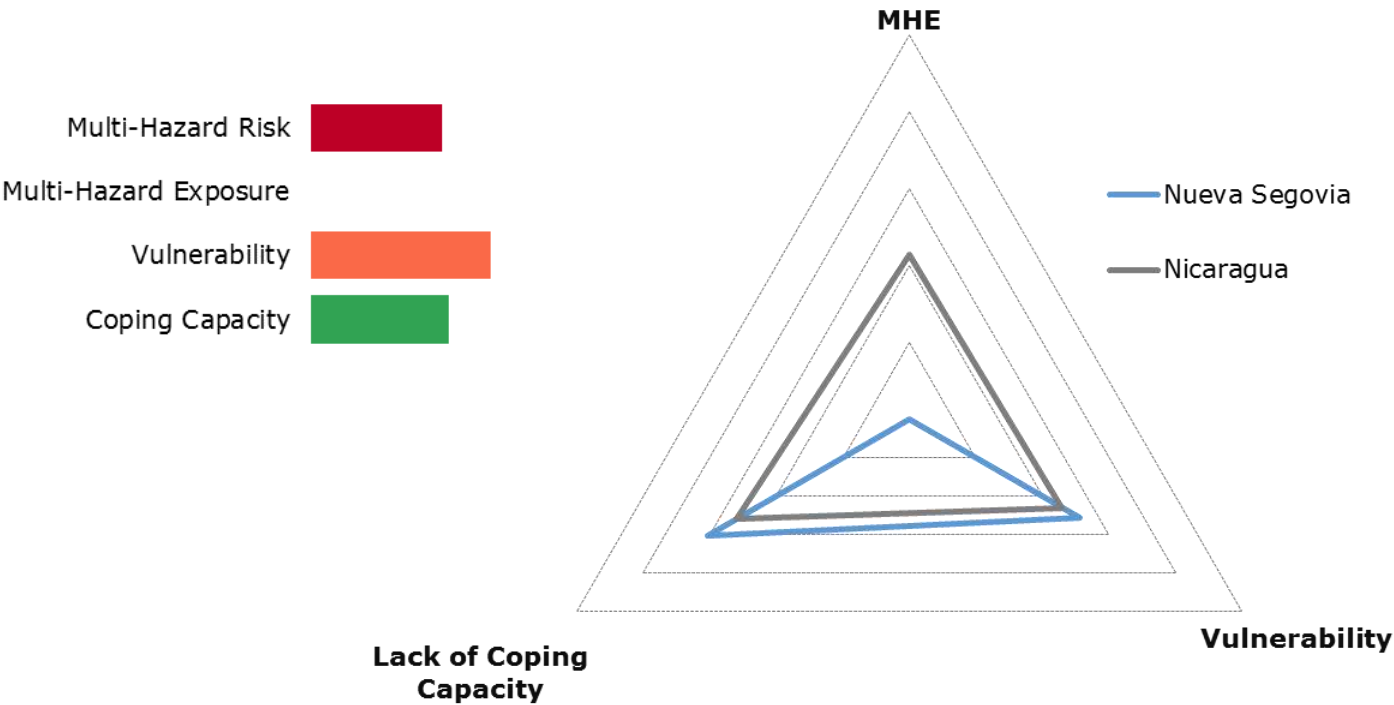


Figure 41. Department Multi-Hazard Risk component scores compared to overall average country scores

<sup>109</sup> **Lack of Resilience:** The susceptibility to impact from the short-term inability to absorb, respond to, and recover from disruptions to a country’s normal function. This index provides a hazard-independent look at current socioeconomic conditions.

<sup>110</sup> **Multi-Hazard Risk:** The likelihood of losses or disruptions to a country’s normal function due to interaction between multi-hazard exposure, socioeconomic vulnerability, and coping capacity.

## Successes



### Low environmental stress

Ranked 14 of 17 departments, low environmental stress indicates that natural resources and agriculture will be more resilient to the effects of a disaster and may recover faster.

## Recommendations

01

### Increase economic capacity

Foster small-business development and invest in business education and human capital to raise economic stability.

02

### Invest in infrastructure

Similar to Madriz, limited infrastructure inhibits the capacity to communicate and exchange information, reduces access to health care, and limits the physical distribution of goods and services in Nueva Segovia. Health-care, transportation and communication infrastructures require upgrading and investment to increase connectivity and welfare in the department. Focused investments in these areas will increase coping capacity and resilience.

03

### Reduce clean water vulnerability

Invest in public water and sewer infrastructure to ensure equitable access to safe, clean drinking water, and sanitation.

## Department: Chontales



Department Capital: Juigalpa

Area: 6,481 km<sup>2</sup>

Chontales is located in central Nicaragua on the shores of Lake Nicaragua. This department is the cattle and dairy region of the country, supplying the majority of Nicaragua's dairy products.



**196,049**

Population  
(2017)



**68.9%**

Population in  
Poverty



**28.1%**

Illiterate  
Population



**73.5 yrs**

Average Life  
Expectancy



**64.4%**

Access to  
Improved Water

Municipality	Population
Comalapa	22,530
San Francisco de Cuapa	10,048
Juigalpa	61,688
La Libertad	14,779
Santo Domingo	14,268
Santo Tomás	19,429

**Multi-Hazard Risk Rank:  
Very Low (16 of 17)**

**Lack of Resilience Rank:  
Medium (9 of 17)**



## RVA Component Scores

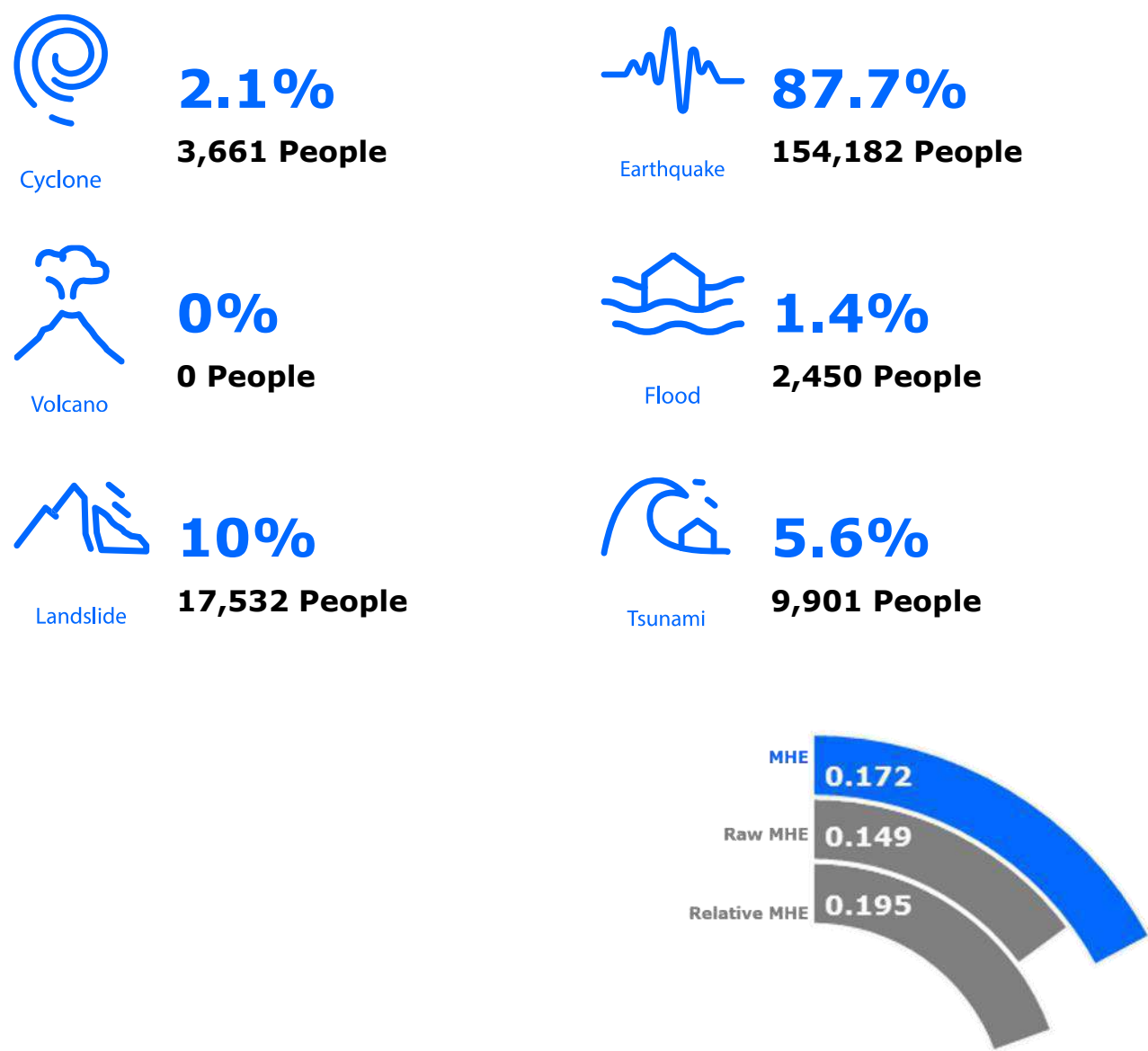
Table 88. Department scores and ranks (compared across departments) for each index

Multi-Hazard Risk		Lack of Resilience		Multi-Hazard Exposure		Vulnerability		Coping Capacity	
Very Low		Medium		Very Low		Medium		Medium	
Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)
0.366	16	0.463	9	0.172	15	0.419	9	0.493	9

Multi-Hazard Exposure (MHE)

Multi-Hazard Exposure<sup>111</sup> Rank: 15 of 17 Departments (Score: 0.172)

Table 89. Estimated ambient population<sup>112</sup> exposed to each hazard



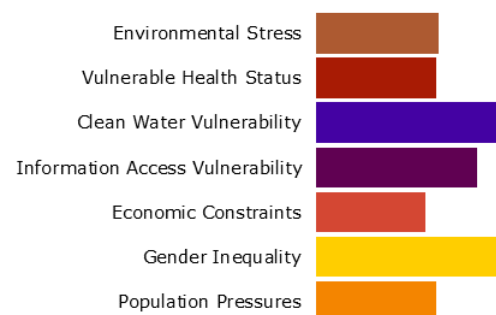
<sup>111</sup> Multi-Hazard Exposure: Average exposure of the population to hazards.








<sup>112</sup> Ambient Population: 24-hour average estimate of the population in each department. Ambient population typically differs from census population.

## Vulnerability (V)

**Vulnerability<sup>113</sup> Rank: 9 of 17 Departments (Score: 0.419)** Vulnerability in Chontales is primarily driven by Gender Inequality, Clean Water Vulnerability, and Information Access Vulnerability. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Vulnerability score.

Table 90. Component scores for each vulnerability sub-component



	<b>Environmental Stress</b>	<b>23.7%</b> Province at Drought Risk	<b>15.8%</b> Erosion Risk	<b>96.4</b> Livestock per km <sup>2</sup>			
	<b>Vulnerable Health Status</b>	<b>16.5</b> Infant Mortality Rate	<b>N/A</b> Maternal Mortality Rate	<b>73.5 yrs</b> Average Life Expectancy	<b>0.5%</b> Acute Malnutrition (Children < 5)	<b>2.4%</b> Population Disabled	
	<b>Clean Water Vulnerability</b>	<b>64.4%</b> Households with Access to Improved Water	<b>23.3%</b> Households with Access to Flush Toilets				
	<b>Information Access Vulnerability</b>	<b>28.1%</b> Illiteracy	<b>5.3 yrs</b> Average Years of Schooling	<b>86.0%</b> Primary School Enrollment	<b>93.3%</b> Households without Internet	<b>30.8%</b> Households without TV	<b>49.1%</b> Households without Radio
	<b>Economic Constraints</b>	<b>54.1</b> Economic Dependency Ratio	<b>68.9%</b> Population in Poverty				
	<b>Gender Inequality</b>	<b>35.0%</b> Female Seats in Government	<b>1.04</b> Female to Male Secondary Education Enrollment	<b>0.49</b> Female to Male Labor Ratio			
	<b>Population Pressures</b>	<b>2.07%</b> Average Annual Population Change	<b>2.44%</b> Average Annual Urban Population Change				

<sup>113</sup> **Vulnerability:** The socioeconomic conditions that are associated with the susceptibility to disruptions in a country's normal functions.

## Coping Capacity (CC)

**Coping Capacity<sup>114</sup> Rank: 9 of 17 Departments (Score: 0.493)** Chontales exhibits weaker Coping Capacity in the area of Environmental Capacity. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Coping Capacity score.

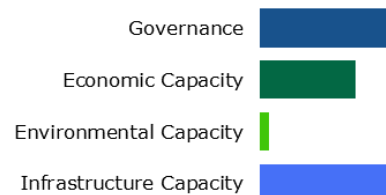


Table 91. Component scores for each coping capacity sub-component

	<b>Economic Capacity</b>	<b>6.3%</b> Households that Receive Remittances	<b>87.0%</b> Employment Rate (Male)	<b>44.7%</b> Employment Rate (Female)	<b>20.9%</b> Population in Highest Welfare Quintile	<b>\$709.5</b> Annual Nominal Global Revenue per Capita
	<b>Governance</b>	<b>87.2%</b> Crime Complaints Cleared	<b>1,447</b> Crime Rate per 100k Persons	<b>54.6%</b> Households without Garbage Collection	<b>95.8%</b> Voter Participation (2016 Election)	
	<b>Environmental Capacity</b>	<b>5.9%</b> Protected or Reforested Land				
	<b>Infrastructure Capacity</b>					
	<b>Health Care Capacity</b>		<b>10.3</b> Hospital Beds per 10,000 Persons	<b>17.8</b> Nurses per 10,000 Persons	<b>9.8</b> Physicians per 10,000 Persons	<b>29.9 km</b> Average Distance to Nearest Hospital
	<b>Communications Capacity</b>		<b>14.8%</b> Households with Access to Fixed Phone Line	<b>82.4%</b> Households with Access to Mobile Phone		
	<b>Transportation Capacity</b>		<b>40.0 km</b> Average Distance to Nearest Port or Airport	<b>0.21 km</b> Total Length of Road per km <sup>2</sup> (area)		

<sup>114</sup> **Coping Capacity:** The systems, means, and abilities of a country to absorb and respond to events that could potentially disrupt normal function.



Lack of Resilience (LR)

Lack of Resilience<sup>115</sup> Rank: 9 of 17 Departments (Score: 0.463)

Chontales’ score and ranking are due to medium Vulnerability combined with medium Coping Capacity scores.

Table 92. The three thematic areas with the weakest relative scores



Multi-Hazard Risk (MHR)

Multi-Hazard Risk<sup>116</sup> Rank: 16 of 17 Departments (Score: 0.366)

Chontales’ score and ranking are due to very low Multi-Hazard Exposure combined with medium Vulnerability and medium Coping Capacity scores.

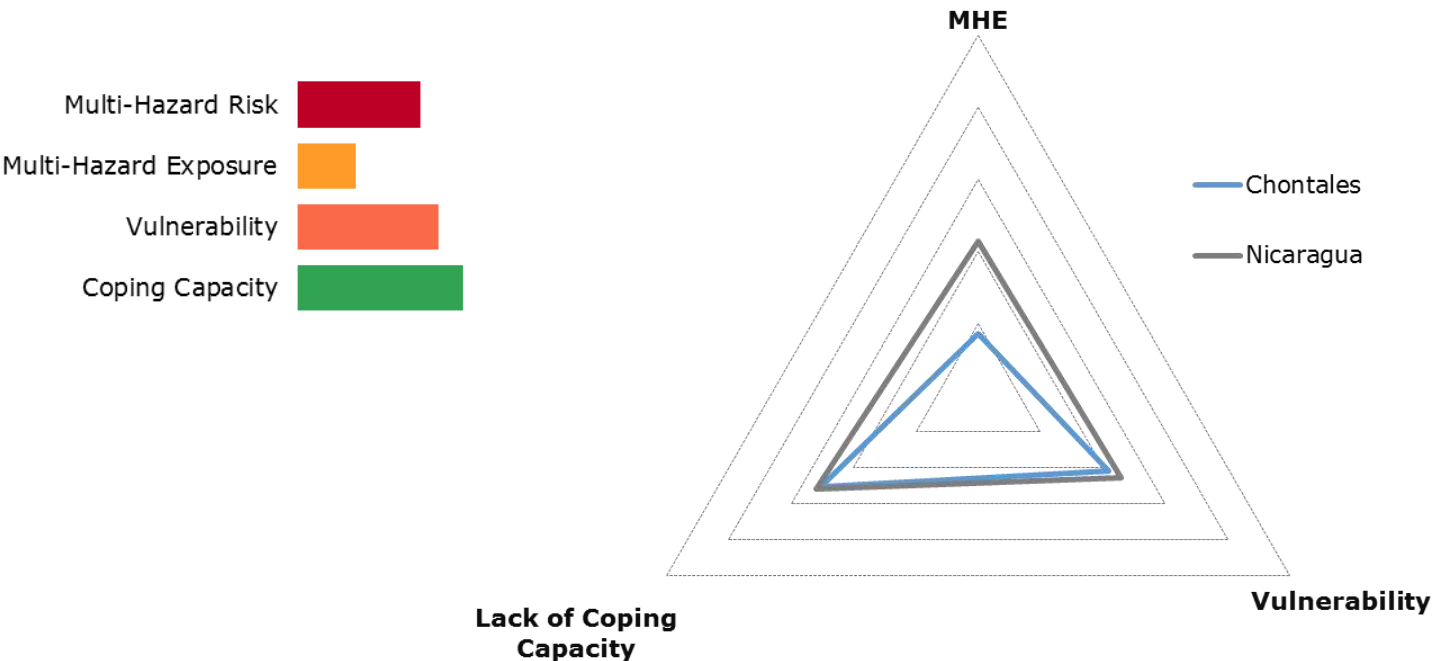


Figure 42. Department Multi-Hazard Risk component scores compared to overall average country scores

<sup>115</sup> **Lack of Resilience:** The susceptibility to impact from the short-term inability to absorb, respond to, and recover from disruptions to a country’s normal function. This index provides a hazard-independent look at current socioeconomic conditions.

<sup>116</sup> **Multi-Hazard Risk:** The likelihood of losses or disruptions to a country’s normal function due to interaction between multi-hazard exposure, socioeconomic vulnerability, and coping capacity.

## Successes



### Very low vulnerable health status

Ranked 16 of 17 departments, low health vulnerability indicates a population that will be more resilient to the negative health impacts associated with major disaster events.

## Recommendations

01

### Promote gender equality

Support equal-educational enrollment at all levels; access to the labor market, wages, and credit; and political representation to reduce vulnerability.

02

### Increase economic capacity

Foster small-business development and invest in business education and human capital to raise economic stability and increase employment.

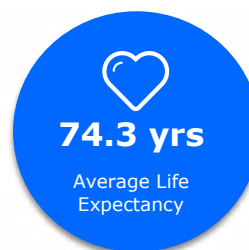
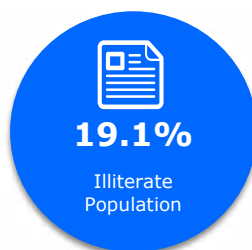
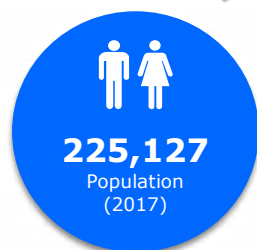
## Department: Estelí



Department Capital: Estelí

Area: 2,230 km<sup>2</sup>

Estelí is a small province located in the northern part of Nicaragua, primarily known for its tobacco industry, nature reserves, and archaeological sites.



Municipality	Population
Pueblo Nuevo	23,768
Condega	30,556
Estelí	125,245
San Juan de Limay	15,350
La Trinidad	22,653
San Nicolás	7,555

**Multi-Hazard Risk Rank:  
Very Low (17 of 17)**

**Lack of Resilience Rank:  
Very Low (15 of 17)**



## RVA Component Scores

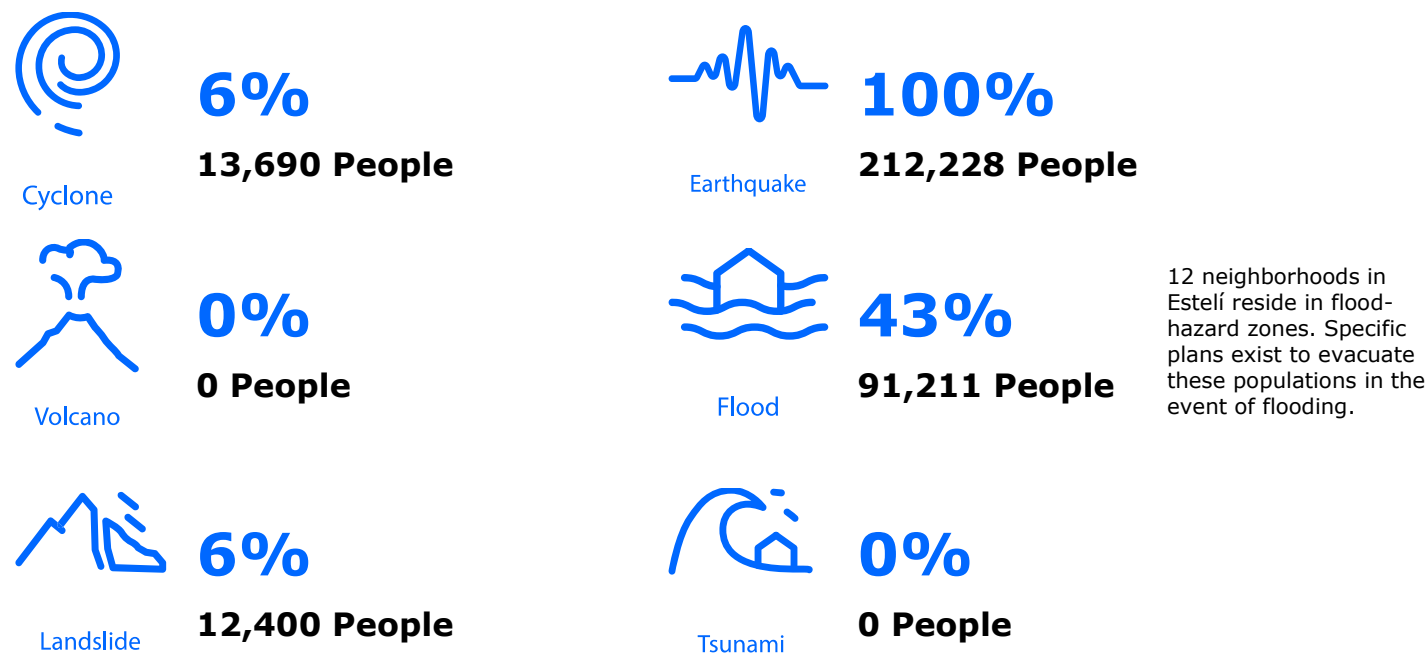
Table 93. Department scores and ranks (compared across departments) for each index

Multi-Hazard Risk		Lack of Resilience		Multi-Hazard Exposure		Vulnerability		Coping Capacity	
Very Low		Very Low		Medium		Very Low		Very High	
Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)	Score	Rank (of 17)
0.331	17	0.334	15	0.325	9	0.303	16	0.636	2

Multi-Hazard Exposure (MHE)

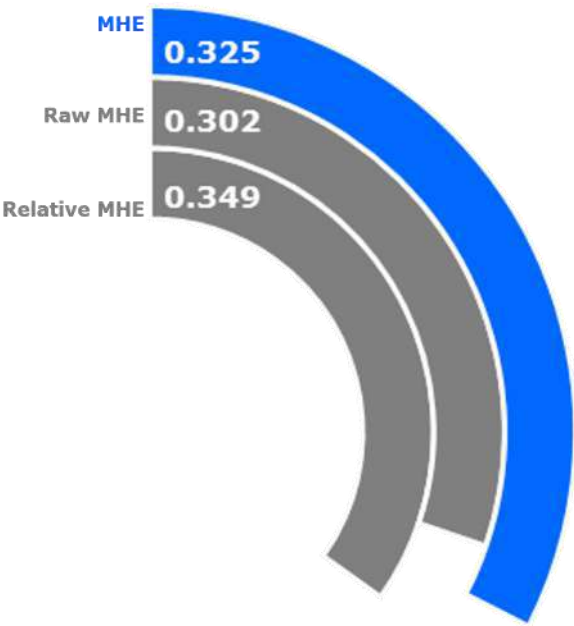
Multi-Hazard Exposure<sup>117</sup> Rank: 9 of 17 Departments (Score: 0.325)

Table 94. Estimated ambient population<sup>118</sup> exposed to each hazard



**Case Study: Department Exercise**

Estelí follows the national guideline of fostering a culture of prevention. Monthly gatherings with representatives from each government sector are conducted to discuss and update preparedness and response plans. In a May 2017 exercise, 77 neighborhoods, 82 communities, all government ministries, and the private sector (tobacco companies, shop owners, gas stations) participated in a municipal-wide exercise to practice response to the specific hazards that impact the region. After-action reports were completed immediately. Concerns included a lack of available resources (equipment and people).



<sup>117</sup> Multi-Hazard Exposure: Average exposure of the population to hazards.  
<sup>118</sup> Ambient Population: 24-hour average estimate of the population in each department. Ambient population typically differs from census population.

## Vulnerability (V)

**Vulnerability<sup>119</sup> Rank: 16 of 17 Departments (Score: 0.303)** Vulnerability in Estelí is primarily driven by Environmental Stress. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Vulnerability score.

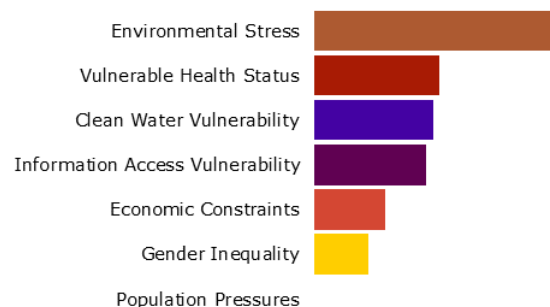


Table 95. Component scores for each vulnerability sub-component

	<b>Environmental Stress</b>	<b>100%</b> Province at Drought Risk	<b>55.8%</b> Erosion Risk	<b>75.5</b> Livestock per km <sup>2</sup>		
	<b>Vulnerable Health Status</b>	<b>11.7</b> Infant Mortality Rate	<b>19.8</b> Maternal Mortality Rate	<b>74.3 yrs</b> Average Life Expectancy	<b>1.5%</b> Acute Malnutrition (Children < 5)	<b>2.6%</b> Population Disabled
	<b>Clean Water Vulnerability</b>	<b>67.5%</b> Households with Access to Improved Water	<b>40.8%</b> Households with Access to Flush Toilets			
	<b>Information Access Vulnerability</b>	<b>19.1%</b> Illiteracy	<b>6.15 yrs</b> Average Years of Schooling	<b>90.5%</b> Primary School Enrollment	<b>93.4%</b> Households without Internet	<b>20.8%</b> Households without TV <b>58.2%</b> Households without Radio
	<b>Economic Constraints</b>	<b>52.5</b> Economic Dependency Ratio	<b>61.2%</b> Population in Poverty			
	<b>Gender Inequality</b>	<b>58.3%</b> Female Seats in Government	<b>1.01</b> Female to Male Secondary Education Enrollment	<b>0.31</b> Female to Male Labor Ratio		
	<b>Population Pressures</b>	<b>1.13%</b> Average Annual Population Change	<b>1.67%</b> Average Annual Urban Population Change			

<sup>119</sup> **Vulnerability:** The socioeconomic conditions that are associated with the susceptibility to disruptions in a country's normal functions.

## Coping Capacity (CC)

**Coping Capacity<sup>120</sup> Rank: 2 of 17 Departments (Score: 0.636)** Estelí exhibits weaker Coping Capacity in the areas of Economic Capacity and Transportation Infrastructure. The bar chart on the right indicates the socioeconomic themes contributing to the department's overall Coping Capacity score.

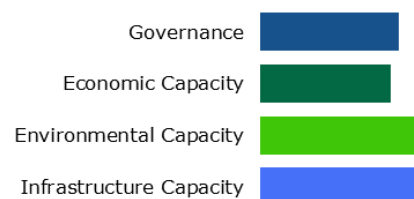









Table 96. Component scores for each coping capacity sub-component

	<b>Economic Capacity</b>	<b>12.2%</b> Households that Receive Remittances	<b>76.7%</b> Employment Rate (Male)	<b>53%</b> Employment Rate (Female)	<b>24.4%</b> Population in Highest Welfare Quintile	<b>\$1,084</b> Annual Nominal Global Revenue per Capita	
	<b>Governance</b>	<b>92.5%</b> Crime Complaints Cleared	<b>1809.7</b> Crime Rate per 100k Persons	<b>53.9%</b> Households without Garbage Collection	<b>66.9%</b> Voter Participation (2016 Election)		
	<b>Environmental Capacity</b>	<b>37.0%</b> Protected or Reforested Land					
	<b>Infrastructure Capacity</b>						
	<b>Health Care Capacity</b>		<b>13.9</b> Hospital Beds per 10,000 Persons	<b>19.4</b> Nurses per 10,000 Persons	<b>12.5</b> Physicians per 10,000 Persons	<b>9.8 km</b> Average Distance to Nearest Hospital	<b>95.1%</b> Children Completed Immunization Schedule
	<b>Communications Capacity</b>		<b>18.2%</b> Households with Access to Fixed Phone Line	<b>78.9%</b> Households with Access to Mobile Phone			
	<b>Transportation Capacity</b>		<b>77.7 km</b> Average Distance to Nearest Port or Airport	<b>0.57 km</b> Total Length of Road per km² (area)			

<sup>120</sup> **Coping Capacity:** The systems, means, and abilities of a country to absorb and respond to events that could potentially disrupt normal function.

Lack of Resilience (LR)

Lack of Resilience<sup>121</sup> Rank: 15 of 17 Departments (Score: 0.334)

Estelí’s score and ranking are a product of very low Vulnerability combined with very high Coping Capacity scores.

Table 97. The three thematic areas with the weakest relative scores



Multi-Hazard Risk (MHR)

Multi-Hazard Risk<sup>122</sup> Rank: 17 of 17 Departments (Score: 0.343)

Estelí’s Multi-Hazard Risk score and ranking are due to medium Multi-Hazard Exposure combined with very low Vulnerability and very high Coping Capacity scores.

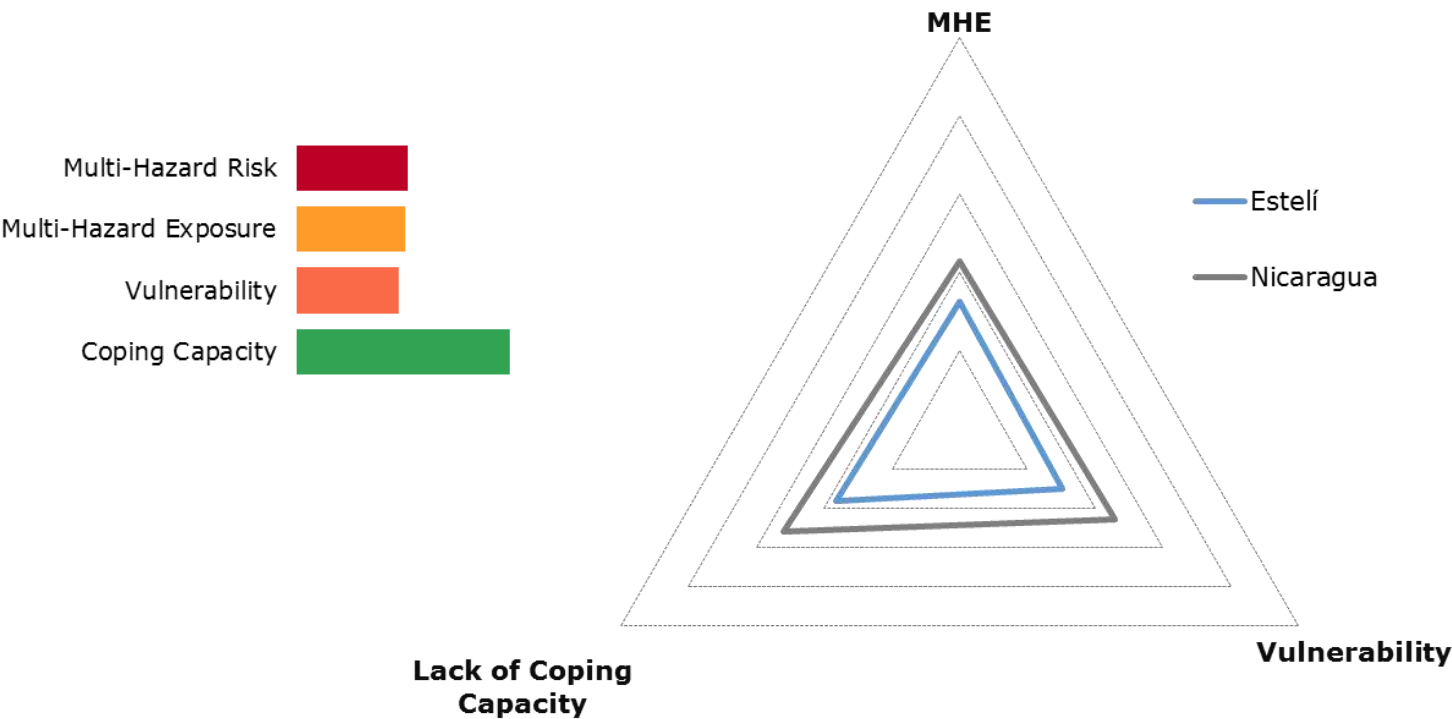


Figure 43. Department Multi-Hazard Risk component scores compared to overall average country scores

<sup>121</sup> **Lack of Resilience:** The susceptibility to impact from the short-term inability to absorb, respond to, and recover from disruptions to a country’s normal function. This index provides a hazard-independent look at current socioeconomic conditions.

<sup>122</sup> **Multi-Hazard Risk:** The likelihood of losses or disruptions to a country’s normal function due to interaction between multi-hazard exposure, socioeconomic vulnerability, and coping capacity.

## Successes



### **Inclusive exercise**

Department level exercises are inclusive of all stakeholders, including SINAPRED staff, private companies, government organizations, NGOs, and the public.



### **Very low overall vulnerability**

Ranked 16 of 17 departments, low overall vulnerability indicates that Guatemala department is less susceptible to the negative impacts of a disaster and will likely recover faster after an event.



### **Highest health care capacity**

Ranked 1 of 17 departments, high health care capacity indicates that the population will have access to healthcare services before, during, and after a disaster.

## Recommendations

**01**

### **Reduce environmental stress**

Invest in drought- and erosion-mitigation projects to reduce environmental stress and degradation.









# Appendices

**National Disaster Preparedness Baseline Assessment**  
Final Report



## Appendix A: RVA Component Index Hierarchies and Thematic Rationale

### Multi-Hazard Exposure

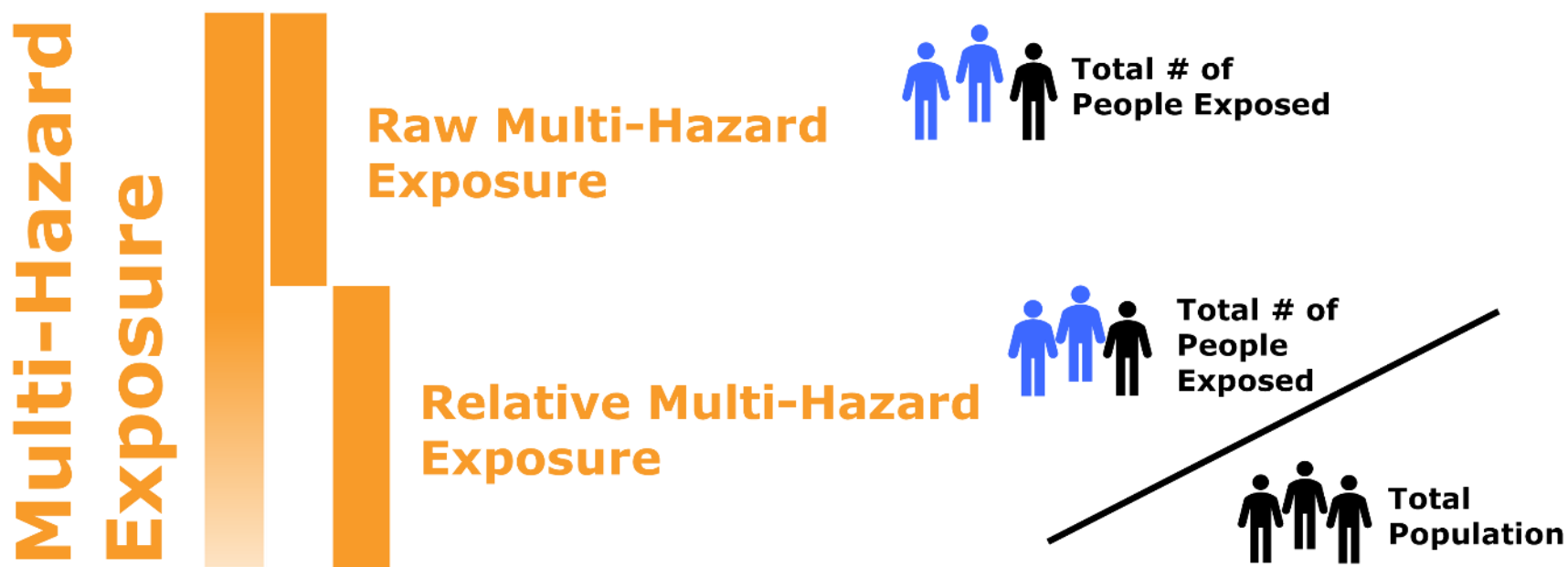


Figure 44. Multi-Hazard Exposure index hierarchy

Table 98. Multi-Hazard Exposure scores and ranks for all indices and subcomponents

Department	MHE Index		Raw MHE		Relative MHE	
	Score	Rank	Score	Rank	Score	Rank
<b>Managua</b>	0.915	1	1.000	1	0.830	3
<b>Granada</b>	0.754	2	0.508	5	1.000	1
<b>Chinandega</b>	0.729	3	0.659	2	0.799	5
<b>Masaya</b>	0.72	4	0.611	4	0.830	2
<b>León</b>	0.71	5	0.639	3	0.781	6
<b>Carazo</b>	0.632	6	0.443	7	0.821	4
<b>Rivas</b>	0.58	7	0.403	8	0.757	7
<b>Matagalpa</b>	0.341	8	0.464	6	0.218	11
<b>Estelí</b>	0.325	9	0.302	11	0.349	9
<b>Rio San Juan</b>	0.316	10	0.194	13	0.438	8
<b>RAAS</b>	0.275	11	0.347	10	0.203	13
<b>RAAN</b>	0.271	12	0.373	9	0.168	15
<b>Boaco</b>	0.199	13	0.166	14	0.233	10
<b>Jinotega</b>	0.19	14	0.283	12	0.098	16
<b>Chontales</b>	0.172	15	0.149	15	0.195	14
<b>Madriz</b>	0.164	16	0.119	16	0.208	12
<b>Nueva Segovia</b>	0.000	17	0.000	17	0.000	17

Table 99. Multi-Hazard Exposure metadata

Multi-Hazard Exposure					
Subcomponent	Indicator	Source(s)	Year	Description	Notes
<b>Raw Exposure</b>	Raw Population Exposure	INETER (Hazards Zones); Muncher/USGS HazPac (Tropical Cyclone Wind); SRTM Elevation; ORNL Landscan (population)	2014 (population)	Cumulative raw count of person units exposed to multiple hazards, including floods, earthquake, landslides, volcanoes, tropical cyclone wind and tsunami	<p>Inland Flood: Areas Susceptible to inland flood based on historic observations and probabilistic modeling.</p> <p>Landslide: Areas susceptible to landslide were estimated using environmental inputs of slope, lithology, precipitation, seismicity, and soil humidity. Susceptibility was classified on a relative scale. Areas of 'very high', and 'high' susceptibility were used to define the hazard zone, per the recommendation of INETER.</p> <p>Tropical Cyclone Wind: Areas exposed to tropical cyclone wind speeds that coincide with the Saffir-Simpson Scale, Category 1 or higher.</p> <p>Volcanoes: Zone includes areas exposed to multiple specific volcanic hazards, including hydromagmatic/Plinian/Strombolian eruptions, lahars, lava flow.</p> <p>Earthquake: Areas with MMI VII and</p>

Multi-Hazard Exposure					
Subcomponent	Indicator	Source(s)	Year	Description	Notes
					<p>above based on 1.0 second spectral acceleration at a 2,475-year return period</p> <p>Tsunami: Coastal Pacific zones include areas with elevation less than or equal to 10 meters. Caribbean/Lake zones based on analysis from SINAPRED</p> <p>Exposed person units = [population exposed to coastal flood hazard] + [population exposed to inland flood hazard] + [population exposed to seismic hazard] + [population exposed to landslide hazard] + [population exposed to tropical cyclone wind hazard]</p>
<b>Relative Exposure</b>	Relative Population Exposure	INETER (Hazards Zones); MunichRe/USGS HazPac (Tropical Cyclone Wind); SRTM Elevation; ORNL Landscan (population)	2014 (population)	Cumulative raw count of person units exposed to multiple hazards, per capita.	[total person units exposed to multiple hazards (see above)] / [estimated total population from Landscan]



## Vulnerability



### Population Pressures



Average Annual Population Change

Average Annual Urban Population Change



### Gender Inequality



Female to Male Labor Ratio

Female to Male Education Enrollment

Female Seats in Government



### Access to Information



Adult Illiteracy Rate

Average Years of Schooling

Primary School Enrollment

Households without Internet, Television, Radio



### Vulnerable Health Status



Infant Mortality Rate

Maternal Mortality Rate

Life Expectancy

Acute Malnutrition

Disability

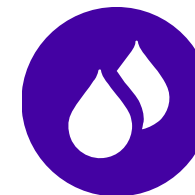


### Economic Constraints



Economic Dependency Ratio

Poverty



### Access to Clean Water



Households with Piped Water

Households with Flush Toilets Access



### Environmental Stress



Erosion

Drought

Livestock Density

Table 100. Vulnerability scores and ranks

Department	Vulnerability Index		Economic Constraints		Info Access Vuln.		Clean Water Vuln.		Vuln. Health Status		Gender Inequality		Population Pressures		Environ. Stress	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
<b>RAAN</b>	0.741	1	1	1	0.757	2	1	1	0.546	5	0.697	3	1	1	0.184	16
<b>Jinotega</b>	0.728	2	0.873	2	0.827	1	0.824	3	0.683	2	0.861	1	0.974	3	0.051	17
<b>RAAS</b>	0.705	3	0.795	3	0.693	4	0.924	2	0.679	3	0.712	2	0.829	4	0.304	13
<b>Río San Juan</b>	0.666	4	0.635	4	0.705	3	0.808	4	0.718	1	0.591	4	0.974	2	0.231	15
<b>Madriz</b>	0.558	5	0.51	8	0.611	6	0.718	5	0.514	6	0.362	9	0.551	6	0.638	4
<b>Nueva Segovia</b>	0.513	6	0.568	5	0.631	5	0.699	6	0.468	9	0.449	7	0.539	7	0.236	14
<b>Matagalpa</b>	0.512	7	0.544	6	0.558	7	0.518	10	0.503	7	0.371	8	0.627	5	0.464	8
<b>Boaco</b>	0.492	8	0.519	7	0.529	8	0.699	7	0.47	8	0.458	6	0.335	11	0.434	9
<b>Chontales</b>	0.419	9	0.318	10	0.47	9	0.526	8	0.352	16	0.555	5	0.352	10	0.359	11
<b>Rivas</b>	0.354	10	0.176	14	0.413	11	0.525	9	0.411	11	0.239	12	0.077	16	0.637	5
<b>Chinandega</b>	0.329	11	0.356	9	0.43	10	0.444	11	0.362	15	0.241	11	0.119	15	0.355	12
<b>Granada</b>	0.324	12	0.263	11	0.301	15	0.281	14	0.408	12	0.111	15	0.468	8	0.432	10
<b>Carazo</b>	0.322	13	0.111	16	0.314	14	0.293	13	0.557	4	0.311	10	0.136	14	0.53	7
<b>León</b>	0.31	14	0.169	15	0.361	12	0.228	15	0.414	10	0.086	16	0.196	13	0.718	3
<b>Masaya</b>	0.307	15	0.184	13	0.27	16	0.218	16	0.212	17	0.074	17	0.408	9	0.782	1
<b>Estelí</b>	0.303	16	0.207	12	0.327	13	0.349	12	0.363	14	0.159	14	0	17	0.719	2
<b>Managua</b>	0.221	17	0	17	0.166	17	0.019	17	0.366	13	0.195	13	0.21	12	0.59	6

Table 101. Vulnerability metadata

<b>Vulnerability</b>					
<b>Subcomponent</b>	<b>Indicator</b>	<b>Source(s)</b>	<b>Year</b>	<b>Description</b>	<b>Notes</b>
<b>Economic Constraints</b>	Economic dependency ratio	INIDE - Anuario Estadístico 2014	2015	Ratio of dependents - people younger than 15 and older than 64 - to the working-age population - those ages 15-64	
	Poverty	INIDE - Censo 2005	2005	The proportion of the population living in poverty	
<b>Access to Information Vulnerability</b>	Adult illiteracy rate	INIDE - Censo 2005	2005	Percentage of the population aged 15 years and older that are illiterate	
	Average years of schooling	INIDE/MINSA - ENDESA 2011/12	2012	Average years of schooling	Individual rates were given for females and males. An average of the two scaled indicators was used for index construction.
	Primary - school enrollment	INIDE/MINSA - ENDESA 2011/12	2012	Net primary-education enrollment	
	Households without internet	INIDE/MINSA - ENDESA 2011/12	2012	Percentage of households that DO NOT have internet-enabled access at home	
	Households without television	INIDE/MINSA - ENDESA 2011/12	2012	Percentage of households that DO NOT have a television	

<b>Vulnerability</b>					
<b>Subcomponent</b>	<b>Indicator</b>	<b>Source(s)</b>	<b>Year</b>	<b>Description</b>	<b>Notes</b>
	Households without radio	INIDE/MINSA - ENDESA 2011/12	2012	Percentage of households that DO NOT have radio	
<b>Access to Clean Water Vulnerability</b>	Households receiving piped water	INIDE/MINSA - ENDESA 2011/12	2012	Percentage of households receiving water piped to yard or dwelling	Does not include wells as we cannot verify if they are protected.
	Households with access to flush toilets	INIDE/MINSA - ENDESA 2011/12	2012	Percentage of households with access to flush toilets	Does not include pit latrines as we cannot verify if they are over a concrete slab.
<b>Vulnerable Health Status</b>	Infant-mortality rate	MINSA	2015	Single-year infant mortality rate per 1,000 live births	
	Maternal-mortality ratio	MINSA	2015	Single-year maternal mortality ratio per 100,000 live births by department	
	Life expectancy	INIDE - Estimaciones y Proyecciones de Población, Nacional, Departamental y Municipal Revisión 2007	2015-2020 (projected)	Life expectancy at birth	Individual rates were given for females and males. An average of the two scaled indicators was used for index construction.
	Acute malnutrition	INIDE/MINSA - ENDESA 2011/12	2012	Rate of acute malnutrition in children < 5	Acute malnutrition is identified when a child's weight is more than 2 SD below the average for their height

<b>Vulnerability</b>					
<b>Subcomponent</b>	<b>Indicator</b>	<b>Source(s)</b>	<b>Year</b>	<b>Description</b>	<b>Notes</b>
	Disability	MINSA (disabled persons); INIDE Anuario Estadístico 2014 (Population)	2016 (disabled persons); 2015 (Total Population)	Percentage of the population that has a disability	
<b>Environmental Stress</b>	Erosion	MAGFOR	2013	Percentage of territory that is within an area of strong, severe, or extreme erosion	Strong: Almost the whole horizon has been lost. Severe: The soil has been eroded to an intricate combination of gullies. Extreme: Refers to a complex of gullies of different depths.
	Drought	INETER	2010	Percentage of department area that is within a zone of "High" or "Medium" threat of drought	Drought areas are based on precipitation data from 1971 to 2010. Levels of drought threat correspond to a range of probability of occurrence: High = More than 34%; Medium = 26-34%; Low = 18-26%. In areas of high drought threat, drought events are expected every 2 or 3 years. In areas of medium drought threat, drought events are expected every 3 or 4 years, with extreme and severe intensity. In areas of low threat, drought events are

<b>Vulnerability</b>					
<b>Subcomponent</b>	<b>Indicator</b>	<b>Source(s)</b>	<b>Year</b>	<b>Description</b>	<b>Notes</b>
					expected every 4 to 7 years and may be moderate to severe intensity (INETER 2010).
	Livestock density	INIDE Agricultural Census 2011	2011	Density of non-avian livestock per square kilometer of farmland area	
<b>Population Pressures</b>	Average annual population change	INIDE	2005 - 2015	Average annual percentage of total population change from 2005 to 2015	
	Average annual urban population change	INIDE	2005 - 2015	Average annual percentage of urban population change from 2005 to 2015	
<b>Gender Inequality</b>	Proportion of female seats in local gov't	SINAPRED	2017	FOR INDEX: Ratio of the proportion of female seats in municipal government to the proportion of females in total population  FOR DISPLAY: Percentage of municipal government seats occupied by women	

<b>Vulnerability</b>					
<b>Subcomponent</b>	<b>Indicator</b>	<b>Source(s)</b>	<b>Year</b>	<b>Description</b>	<b>Notes</b>
	Ratio of female to male secondary-education enrollment	INIDE/MINSA - ENDESA 2011/12	2012	Ratio of female secondary-enrollment rate to male secondary-enrollment rate	
	Female to male labor ratio	INIDE/MINSA - ENDESA 2011/12	2012	Ratio of female employment rate to male employment rate	Within ENDESA, there are variations in both the 'working age' and the period of record for male and female employment. Female employment includes all women aged 15-49 that worked in the previous year. Male employment includes all men aged 15-59 that worked in the previous week.

# Coping Capacity

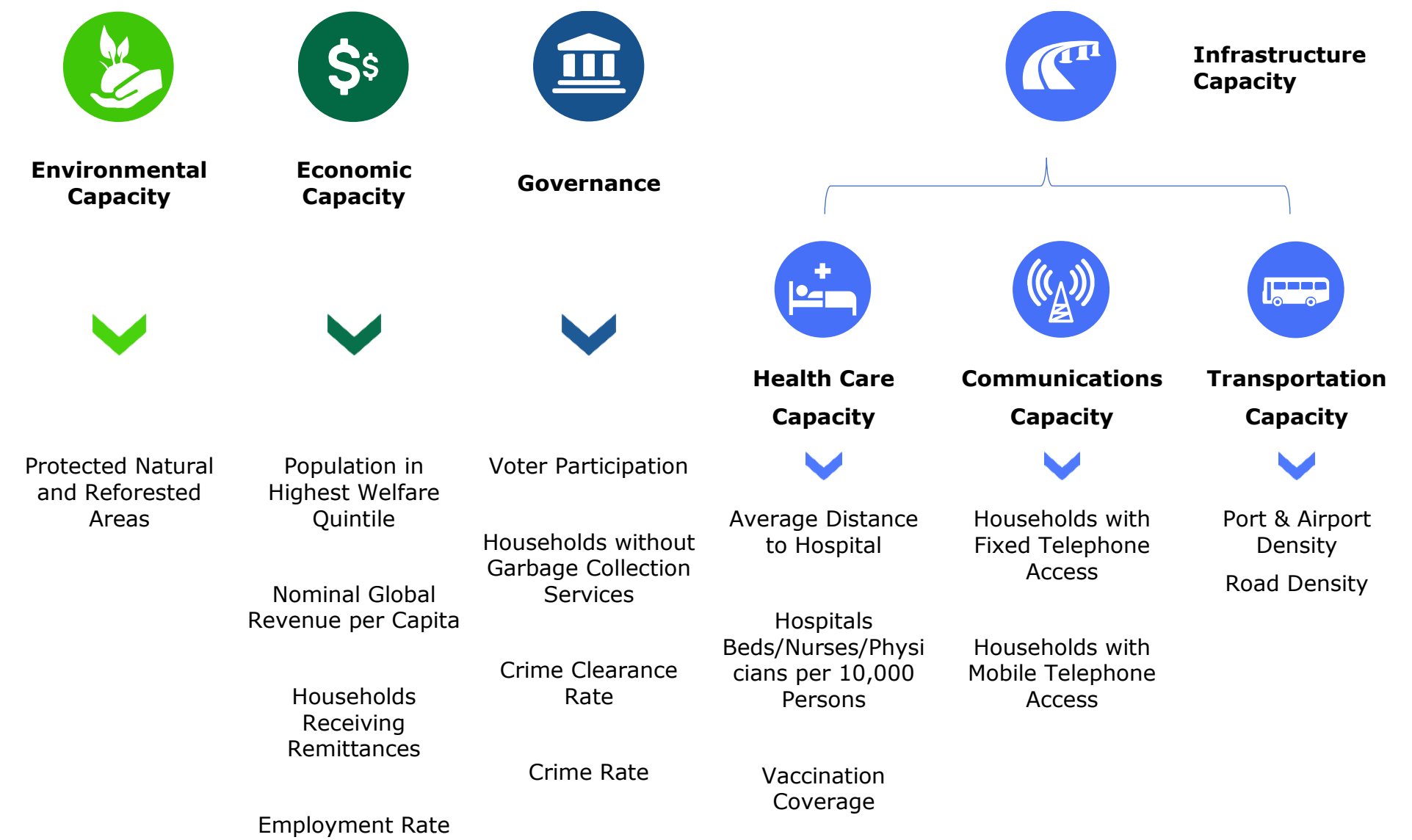




Table 102. Coping Capacity scores and ranks

Department	Coping Capacity Index		Governance		Econ. Capacity		Environ. Capacity		Infrastructure Index		Health Care (Infra.)		Transport (Infra)		Comms (Infra)	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
<b>Granada</b>	0.656	1	0.574	8	0.698	2	0.794	2	0.693	4	0.578	7	0.706	3	0.794	2
<b>Estelí</b>	0.636	2	0.599	5	0.563	7	0.676	4	0.719	3	0.959	1	0.5	8	0.698	3
<b>León</b>	0.616	3	0.708	1	0.592	5	0.21	10	0.644	7	0.655	4	0.614	6	0.663	5
<b>Masaya</b>	0.609	4	0.614	3	0.591	6	0.514	7	0.646	6	0.287	13	0.997	1	0.654	6
<b>Managua</b>	0.592	5	0.494	12	0.838	1	0	17	0.757	2	0.591	6	0.689	5	0.99	1
<b>Chinandega</b>	0.577	6	0.617	2	0.642	3	0.593	6	0.474	9	0.455	10	0.534	7	0.432	10
<b>Carazo</b>	0.546	7	0.508	10	0.533	8	0.069	15	0.764	1	0.866	2	0.826	2	0.599	7
<b>Rivas</b>	0.527	8	0.470	13	0.635	4	0.134	13	0.662	5	0.803	3	0.7	4	0.483	8
<b>Chontales</b>	0.493	9	0.587	7	0.412	9	0.04	16	0.573	8	0.561	8	0.478	9	0.681	4
<b>Río San Juan</b>	0.436	10	0.518	9	0.201	13	0.72	3	0.388	12	0.397	12	0.385	13	0.382	13
<b>Jinotega</b>	0.425	11	0.605	4	0.137	16	1	1	0.184	17	0.217	15	0.334	15	0	17
<b>Madriz</b>	0.421	12	0.588	6	0.18	15	0.208	11	0.431	11	0.607	5	0.416	12	0.269	15
<b>Nueva Segovia</b>	0.393	13	0.507	11	0.211	12	0.366	9	0.37	13	0.536	9	0.256	17	0.317	14
<b>Boaco</b>	0.382	14	0.413	15	0.375	10	0.07	14	0.448	10	0.437	11	0.443	10	0.464	9
<b>Matagalpa</b>	0.369	15	0.433	14	0.347	11	0.188	12	0.359	14	0.217	14	0.436	11	0.425	11
<b>RAAS</b>	0.256	16	0.193	17	0.184	14	0.51	8	0.304	15	0.195	16	0.311	16	0.406	12
<b>RAAN</b>	0.253	17	0.280	16	0.058	17	0.659	5	0.212	16	0.184	17	0.383	14	0.068	16

Table 103. Coping Capacity metadata

<b>Coping Capacity</b>					
<b>Subcomponent</b>	<b>Indicator</b>	<b>Source(s)</b>	<b>Year</b>	<b>Description</b>	<b>Notes</b>
<b>Environmental Capacity</b>	Protected natural area and reforestation areas	MARENA - Sistema Nacional de Areas Protegidas de Nicaragua - 2016; MARENA - Mapa de Reforestacion Nacional - 2016	2016	Percentage of department land area that is a natural protected area or an area of planning reforestation	
<b>Infrastructure - Healthcare</b>	Average distance to hospital	MINSA	2016	Average distance to hospital	Average distance was calculated for populated areas only.  Populated areas were estimated using the 2014 ORNL Landscan population grid, including all areas with population above zero.
	Vaccination coverage rate	INIDE/MINSA - ENDESA 2011/12	2012	Percentage of Children aged 18-59 months that completed the full immunization schedule for polio, BCG, DPT, and MMR in their first 18 months of life	
	Nurses per 10,000 persons	MINSA	2015	Nurses per 10,000 persons	

<b>Coping Capacity</b>					
<b>Subcomponent</b>	<b>Indicator</b>	<b>Source(s)</b>	<b>Year</b>	<b>Description</b>	<b>Notes</b>
	Hospital beds per 10,000 persons	MINSA	2015	Hospital bed complement per 10,000 persons	
	Physicians per 10,000 persons	MINSA	2015	Physicians per 10,000 persons	
<b>Infrastructure - Transportation</b>	Road density	INIDE - Anuario Estadístico 2015	2015	Total length of road (km) per sq. km of territory	
	Average distance to nearest port or airport	MTI (Ports), ICAO (Airports)	2016	Average distance (throughout the department) to the nearest port or airport.	
<b>Infrastructure - Communications</b>	Fixed phone access	INIDE/MINSA - ENDESA 2011/12	2012	Percentage of households that have a fixed phone line	
	Mobile phone access	INIDE/MINSA - ENDESA 2011/12	2012	Percentage of households that have a mobile cellular telephone	
<b>Economic Capacity</b>	% population in highest welfare quintile	INIDE/MINSA - ENDESA 2011/12	2012	Percentage of the population living within the highest national welfare by quintile	Documentation refers to quintiles of "Bienestar/Riqueza" - welfare/wealth
	Nominal global revenue per capita	INIDE - Anuario Estadístico 2015	2015	Annual nominal global revenue per capita	

<b>Coping Capacity</b>					
<b>Subcomponent</b>	<b>Indicator</b>	<b>Source(s)</b>	<b>Year</b>	<b>Description</b>	<b>Notes</b>
	Households receiving remittances	INIDE - Censo 2005	2005	Percentage of households receiving remittances	Municipal data were aggregated to the department Level.
	Employment Rate	INIDE/MINSA - ENDESA 2011/12	2012	Percentage of working-age persons employed	Individual rates were given for females and males. An average of the two scaled indicators was used for index construction.  Within ENDESA, there are variations in both the 'working age' and the period of record for male and female employment. Female employment includes all women aged 15-49 that worked in the previous year. Male employment includes all men aged 15-59 that worked in the previous week.
<b>Governance</b>	Voter Participation	CSE - Presidential Election 2016	2016	Percentage of voter participation during 2016 presidential election	

<b>Coping Capacity</b>					
<b>Subcomponent</b>	<b>Indicator</b>	<b>Source(s)</b>	<b>Year</b>	<b>Description</b>	<b>Notes</b>
	Households without garbage-collection service	PAHO (INIDE - Censo 2005)	2005	Percentage of households that do NOT receive garbage collection services	
	Crime rate	INIDE - Anuario Estadístico 2015	2015	Crime rate per 10,000 persons	
	Crime clearance rate	INIDE - Anuario Estadístico 2015	2015	Percentage of crime complaints cleared by police	



## Appendix B: RVA Index Construction

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

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

$$(\text{Indicator maximum value} + 1) - \text{Observed indicator value}$$

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

$$\frac{(\text{Observed indicator value} - \text{Indicator minimum value})}{(\text{Indicator maximum value} - \text{Indicator minimum value})}$$

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

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

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



## Appendix C: CDM Survey I

### Introduction

As part of CDM data gathering efforts, stakeholder participants completed an initial survey during the NDPBA Kickoff Meeting/Initial Knowledge Exchange held June 22, 2016, in Managua, Nicaragua. Survey questions were designed to provide insight into how participants perceive CDM efforts within their country. Survey I included a total of 25 questions, four of which required short answer responses. Frequency tables of responses to survey questions 1-21 are included for reference.

*Table 104. Organizational affiliation of survey respondents (CDM Survey I)*

<b>Organizational Affiliation of Survey Respondents</b>	<b>Number</b>	<b>Percent (%)</b>
Government Agencies	16	35%
SINAPRED	4	9%
Civil Defense	2	4%
National Police	2	4%
Fire Department	2	4%
Airports	1	2%
University	1	2%
Private Sector	1	2%
Unknown	17	37%

*Table 105. Age of survey respondents (CDM Survey I)*

<b>Age of Survey Respondents (years)</b>	<b>Number</b>	<b>Percent (%)</b>
18-25	1	2%
26-30	3	7%
31-40	11	24%
41-50	8	17%
51-60	14	30%
61-65	3	7%
Over 65	1	2%
Not stated	5	11%

*Table 106. Gender of survey respondents (CDM Survey I)*

<b>Gender of Survey Respondents</b>	<b>Number</b>	<b>Percent (%)</b>
Female	10	22%
Male	30	65%
Not stated	6	13%

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

## Frequency Tables of CDM Survey I Responses

*Table 107. Survey I response - Question 1*

<b>Are you in a position of leadership within your organization?</b>		
	Frequency	Percent
Yes	36	78.3
No	8	17.4
I don't know	0	0
Does not apply	1	2.2
Missing	1	2.2
Total	46	100

*Table 108. Survey I response - Question 2*

<b>Do you feel you have the necessary resources to effectively perform your job requirements?</b>		
	Frequency	Percent
Yes	23	50
No	19	41.3
I don't know	2	4.3
Does not apply	1	2.2
Missing	1	2.2
Total	46	100

*Table 109. Survey I response - Question 3*

<b>In your current position, have you been provided with opportunities for disaster management training?</b>		
	Frequency	Percent
Yes	44	95.7
No	1	2.2
I don't know	1	2.2
Does not apply	0	0
Missing	0	0
Total	46	100

*Table 110. Survey I response - Question 4*

<b>Does your organization require you to complete training on disaster management?</b>		
	Frequency	Percent
Yes	39	84.8
No	5	10.9
I don't know	0	0
Does not apply	2	4.3
Missing	0	0
Total	46	100

Table 111. Survey I response - Question 5

<b>Has disaster management training improved your ability to effectively perform your job duties/requirements?</b>		
	Frequency	Percent
Yes	45	97.8
No	0	0
I don't know	0	0
Does not apply	0	0
Missing	1	2.2
Total	46	100

Table 113. Survey I response - Question 7

<b>Does your organization have a dedicated budget for disaster preparedness?</b>		
	Frequency	Percent
Yes	19	41.3
No	22	47.8
I don't know	1	2.2
Does not apply	1	2.2
Missing	3	6.5
Total	46	100

Table 112. Survey I response - Question 6

<b>Have you experienced any barriers to attending disaster management training?</b>		
	Frequency	Percent
Yes	8	17.4
No	35	76.1
I don't know	1	2.2
Does not apply	0	0
Missing	2	4.3
Total	46	100

Table 114. Survey I response - Question 8

<b>Does your organization have a dedicated budget for disaster response?</b>		
	Frequency	Percent
Yes	19	41.3
No	21	45.7
I don't know	3	6.5
Does not apply	1	2.2
Missing	2	4.3
Total	46	100

Table 115. Survey I response - Question 9

<b>Does your organization have mutual-aid agreements in place?</b>		
	Frequency	Percent
Yes	31	67.4
No	6	13.0
I don't know	4	8.7
Does not apply	0	0
Missing	5	10.9
Total	46	100

Table 116. Survey I response - Question 10

<b>In your opinion, does your organization have sufficient inventory to respond to a large-scale disaster?</b>		
	Frequency	Percent
Yes	8	17.4
No	31	67.4
I don't know	3	6.5
Does not apply	1	2.2
Missing	3	6.5
Total	46	100

Table 117. Survey I response - Question 11

<b>Do you feel that existing disaster risk reduction laws are being adequately implemented at the national level?</b>		
	Frequency	Percent
Yes	40	87.0
No	5	10.9
I don't know	1	2.2
Does not apply	0	0
Missing	0	0
Total	46	100

Table 118. Survey I response - Question 12

<b>Do you feel that existing disaster risk reduction laws are being adequately implemented at the subnational level?</b>		
	Frequency	Percent
Yes	38	82.6
No	4	8.7
I don't know	2	4.3
Does not apply	0	0
Missing	2	4.3
Total	46	100

Table 119. Survey I response - Question 13

<b>In your opinion, do Departments actively support disaster management?</b>		
	Frequency	Percent
Yes	43	93.5
No	0	0
I don't know	0	0
Does not apply	1	2.2
Missing	2	4.3
Total	46	100

Table 120. Survey I response - Question 14

<b>In your opinion, is there adequate local support for disaster risk reduction?</b>		
	Frequency	Percent
Yes	45	97.8
No	1	2.2
I don't know	0	0
Does not apply	0	0
Missing	0	0
Total	46	100

Table 121. Survey I response - Question 15

<b>In your opinion, do Departments currently have the capacity to effectively respond to local disasters?</b>		
	Frequency	Percent
Yes	27	58.7
No	17	37.0
I don't know	2	4.3
Does not apply	0	0
Missing	0	0
Total	46	100

Table 122. Survey I response - Question 16

<b>In your opinion, is there strong support of public-private partnerships in disaster management at the local level?</b>		
	Frequency	Percent
Yes	30	65.2
No	13	28.3
I don't know	3	6.5
Does not apply	0	0
Missing	0	0
Total	46	100

Table 123. Survey I response - Question 17

<b>In your opinion, are non-government organizations (NGOs) actively engaged in disaster preparedness at the local level?</b>		
	Frequency	Percent
Yes	21	45.7
No	19	41.3
I don't know	6	13.0
Does not apply	0	0
Missing	0	0
Total	46	100

Table 124. Survey I response - Question 18

<b>In your opinion, is the National Disaster Fund adequate to support response to a major disaster?</b>		
	Frequency	Percent
Yes	17	37.0
No	18	39.1
I don't know	9	19.6
Does not apply	1	2.2
Missing	1	2.2
Total	46	100

Table 125. Survey I response - Question 19

<b>In your opinion, is the national disaster management budget adequate to respond to a major disaster?</b>		
	Frequency	Percent
Yes	18	39.1
No	19	41.3
I don't know	9	19.6
Does not apply	0	0
Missing	0	0
Total	46	100

Table 126. Survey I response - Question 20

<b>In your opinion, is there sufficient government inventory (supplies) to respond to a large-scale disaster?</b>		
	Frequency	Percent
Yes	10	21.7
No	25	54.3
I don't know	10	21.7
Does not apply	0	0
Missing	1	2.2
Total	46	100

Table 127. Survey I response - Question 21

<b>In your opinion, are non-government organizations (NGOs) effectively supporting national disaster management goals?</b>		
	Frequency	Percent
Yes	14	30.4
No	19	41.3
I don't know	11	23.9
Does not apply	0	0
Missing	2	4.3
Total	46	100

## Participant Definitions of 'Comprehensive Disaster Management'

<b>Respondent</b>	<b>Definition</b>
<b>1</b>	Capabilities that organizations have with support from the State and international organizations.
<b>2</b>	Response capabilities at a local or regional level to disaster situations of any nature.
<b>3</b>	Have the capacity to identify and evaluate potential risks that might arise and the tools to mitigate damages, protect the population, undertake actions to bring things back to normal in an orderly manner, and provide support to those that may require it.
<b>4</b>	Is the capacity to manage an adverse event that presents danger to the population.
<b>5</b>	It is the group of actions, instructions and institutions that coordinate efforts to prevent, respond and mitigate disasters, considering all stages (prevention, mitigation, response, reconstruction).

<b>Respondent</b>	<b>Definition</b>
<b>6</b>	It's the practice of the State destined to preparation, mitigation for an event, follow-up, and accompaniment of affected populations (response and recuperation).
<b>7</b>	Integral management to perform under any emergency situation generated by a natural phenomenon and reduce its impact on the population or region.
<b>8</b>	It is the coordination of all systems including prevention, mitigation, disaster management, providing all the skills, capabilities, and competencies to respond to emergencies.
<b>9</b>	Based on scientific studies on threats, risks, and vulnerability, it is the reduction of risks through knowledge about danger at all levels, having preventive methods at hand and frequent practice.
<b>10</b>	Institutional and personal responsibility to face a threat or risk situation through prevention and resistance to finally overcome a disaster.
<b>11</b>	Develop actions that lead to evaluating, preparing, and identifying needs to support decisions in a timely and efficient manner.
<b>12</b>	It's the response capacity to any event that could have an effect on the population.
<b>13</b>	Joint preparation activities to prevent and mitigate risks in case of disasters (institutions working in a coordinated manner).
<b>14</b>	Work in educating, creating plans, and preventing disasters, communicating and teaching all governmental institutions and population in general on how to generate a culture of resilience.
<b>15</b>	Preparation in the short, medium, and long term.
<b>16</b>	A structure of organizations that is trained to face natural disasters.
<b>17</b>	N/A
<b>18</b>	The capabilities we are developing to transform pre-disaster scenarios into scenarios of sustainable development.



<b>Respondent</b>	<b>Definition</b>
<b>19</b>	The capacity to manage, evaluate, and respond to diverse risk situations and vulnerabilities during disaster situations.
<b>20</b>	Capacity to develop emergency plans. Be prepared for any event we might face. Joint work.
<b>21</b>	Joint efforts to prevent and/or respond to an event that may present a risk to the population.
<b>22</b>	Response capacity to any adverse event using unified strategies from all institutions to provide attention, protection, and rehabilitation of the affected population.
<b>23</b>	Risk management, prevention, and resilience during the multiple threats faced by a community or country.
<b>24</b>	Execute complementary actions, programs, and interventions with all sectors in the territory through a logistical approach.
<b>25</b>	Integral risk management involves possible joint strategies and actions aimed at preparing, responding to, and measuring risks and disasters, as well as the recovery capacity and resilience after an event.
<b>26</b>	Integral disaster management is the immediate response provided during a disaster; it also refers to the follow-up and monitoring of disasters to protect and safeguard people's lives.
<b>27</b>	Processes that integrate all parties during disasters.
<b>28</b>	All processes aimed at transforming dangerous conditions into safe conditions. Launching programs and projects geared towards protecting the population from natural disasters.
<b>29</b>	Capacity to identify risks in order to reduce them.
<b>30</b>	Disaster management authorities take measures and prepare for a disaster. We should all carry out drills for any type of event.
<b>31</b>	Organizational efforts and response to a disaster for the population.

<b>Respondent</b>	<b>Definition</b>
<b>32</b>	Understand the danger at hand that could impact a community and reduce it to benefit communities or families.
<b>33</b>	Preparation, prevention, and mitigation actions that are carried out to provide response to any natural disaster in the country.
<b>34</b>	Capacity to lead, organize, plan, monitor, and evaluate logistically the risks and threats present in nature.
<b>35</b>	Actions carried out for prevention purposes.
<b>36</b>	Preparing the population to face a disaster and mitigating its effects. Avoid the existence of risks.
<b>37</b>	The capacity a country has to transform disaster risk scenarios through prevention and mitigation actions. Integral disaster management is classified as corrective management, reactive management, and prospective management.
<b>38</b>	It is the group of actions, plans, programs, and projects aimed at reducing disaster risks and their impact on assets and people.
<b>39</b>	Large group of institutions responsible for managing processes aimed at reducing risks to reduce the impact of disasters.
<b>40</b>	The capacity to efficiently manage a disaster.
<b>41</b>	The way in which we will face an emergency situation.
<b>42</b>	Integral disaster management to prevent, mitigate, and reduce disasters.
<b>43</b>	It is an approach based on transversal areas of every institutional action.
<b>44</b>	The term is inconsistent since all management processes need to be integral. This last word is redundant. Management = define-policies+plans+implement actions+surveillance+continuous improvement.

## Appendix D: CDM Survey II

### Introduction

As part of CDM data gathering efforts, stakeholder participants completed a second survey during the NDPBA Knowledge Exchange II held November 29, 2016, in Managua. Survey II was designed to assess the presence of comprehensive disaster-management plans, specific components of disaster-management plans, and the drilling and exercising of plans within organizations at both the national and subnational level. Survey II included a total of 32 questions, five of which required short answer responses. Frequency tables of responses to survey questions 1-29 are included for reference.

*Table 128. Organizational affiliation of survey respondents (CDM Survey II)*

<b>Organizational Affiliation of Survey Respondents</b>	<b>Number</b>	<b>Percent (%)</b>
Central Government	37	64%
Local Government	1	2%
NGOs	2	3%
UN	0	0%
Universities	0	0%
Not stated	18	31%

*Table 129. Age of survey respondents (CDM Survey II)*

<b>Age of Survey Respondents (years)</b>	<b>Number</b>	<b>Percent (%)</b>
18-25	3	5%
26-30	4	7%
31-40	16	28%
41-50	10	17%
51-60	11	19%
61-65	1	2%
Over 65	1	2%
Not stated	12	21%

*Table 130. Gender of survey respondents (CDM Survey II)*

<b>Gender of Survey Respondents</b>	<b>Number</b>	<b>Percent (%)</b>
Female	10	17%
Male	36	62%
Not stated	12	21%

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

## Frequency Tables of CDM Survey II Responses

*Table 131. Survey II response - Question 1*

<b>Does your organization have a comprehensive disaster management plan?</b>		
	Frequency	Percent
Yes	52	89.7
No	3	5.2
I don't know	2	3.4
Does not apply	0	0
Missing	1	1.7
Total	58	100

*Table 132. Survey II response - Question 2*

<b>Does your organization have a disaster response plan?</b>		
	Frequency	Percent
Yes	58	100
No	0	0
I don't know	0	0
Does not apply	0	0
Missing	0	0
Total	58	100

*Table 133. Survey II response - Question 3*

<b>Does your organization have a disaster preparedness plan?</b>		
	Frequency	Percent
Yes	54	93.1
No	3	5.2
I don't know	0	0
Does not apply	0	0
Missing	1	1.7
Total	58	100

*Table 134. Survey II response - Question 4*

<b>Does your organization have a disaster mitigation plan?</b>		
	Frequency	Percent
Yes	44	75.9
No	10	17.2
I don't know	3	5.2
Does not apply	1	1.7
Missing	0	0
Total	58	100

Table 135. Survey II response - Question 5

<b>Does your organization have a recovery plan?</b>		
	Frequency	Percent
Yes	38	65.5
No	11	19.0
I don't know	7	12.1
Does not apply	1	1.7
Missing	1	1.7
Total	58	100

Table 136. Survey II response - Question 6

<b>Did you participate in the drafting of any of the disaster plans?</b>		
	Frequency	Percent
Yes	46	79.3
No	10	17.2
I don't know	0	0
Does not apply	0	0
Missing	2	3.4
Total	58	100

Table 137. Survey II response - Question 7

<b>Do you have a copy of the disaster management plan(s)?</b>		
	Frequency	Percent
Yes	47	81.0
No	10	17.2
I don't know	0	0
Does not apply	0	0
Missing	1	1.7
Total	58	100

Table 138. Survey II response - Question 8

<b>Does your disaster management plan include information on all hazard types (example: earthquakes, landslide, tsunami, extreme cold, floods, etc.)?</b>		
	Frequency	Percent
Yes	46	79.3
No	7	12.1
I don't know	3	5.2
Does not apply	0	0
Missing	2	3.4
Total	58	100

Table 139. Survey II response - Question 9

<b>Has your plan been shared with other agencies or organizations active in disaster management?</b>		
	Frequency	Percent
Yes	38	65.5
No	12	20.7
I don't know	5	8.6
Does not apply	2	3.4
Missing	1	1.7
Total	58	100

Table 140. Survey II response - Question 10A

<b>Are your organization's disaster plans updated regularly?</b>		
	Frequency	Percent
Yes	51	87.9
No	3	5.2
I don't know	2	3.4
Does not apply	0	0
Missing	2	3.4
Total	58	100

Table 141. Survey II response - Question 10B

<b>Are your organization's disaster plans tested, drilled or exercised regularly?</b>		
	Frequency	Percent
Yes	56	96.6
No	1	1.7
I don't know	0	0
Does not apply	0	0
Missing	1	1.7
Total	58	100

Table 142. Survey II response - Question 11

<b>Do your disaster plans address public outreach?</b>		
	Frequency	Percent
Yes	41	70.7
No	11	19.0
I don't know	2	3.4
Does not apply	3	5.2
Missing	1	1.7
Total	58	100

Table 143. Survey II response - Question 12

<b>Do your disaster plans address early warning?</b>		
	Frequency	Percent
Yes	47	81.0
No	8	13.8
I don't know	1	1.7
Does not apply	0	0
Missing	2	3.4
Total	58	100

Table 144. Survey II response - Question 13

<b>Do your disaster plans address evacuation?</b>		
	Frequency	Percent
Yes	53	91.4
No	1	1.7
I don't know	1	1.7
Does not apply	1	1.7
Missing	2	3.4
Total	58	100

Table 145. Survey II response - Question 14

<b>Do your disaster plans address logistics management (the movement of personnel and resources during times of disasters)?</b>		
	Frequency	Percent
Yes	41	70.7
No	9	15.5
I don't know	1	1.7
Does not apply	4	6.9
Missing	3	5.2
Total	58	100

Table 146. Survey II response - Question 15

<b>Do your disaster plans address shelter operations?</b>		
	Frequency	Percent
Yes	18	31.0
No	27	46.6
I don't know	3	5.2
Does not apply	8	13.8
Missing	2	3.4
Total	58	100

Table 147. Survey II response - Question 16

<b>Do your disaster plans address when and how to activate the Emergency Operation Center?</b>		
	Frequency	Percent
Yes	41	70.7
No	11	19.0
I don't know	0	0
Does not apply	4	6.9
Missing	2	3.4
Total	58	100

Table 149. Survey II response - Question 18

<b>Do your disaster plans address transportation during times of disasters?</b>		
	Frequency	Percent
Yes	35	60.3
No	15	25.9
I don't know	0	0
Does not apply	6	10.3
Missing	2	3.4
Total	58	100

Table 148. Survey II response - Question 17

<b>Does your organization have a separate standard operating procedure (SOP) for how to activate the Emergency Operation Center?</b>		
	Frequency	Percent
Yes	32	55.2
No	13	22.4
I don't know	3	5.2
Does not apply	6	10.3
Missing	4	6.9
Total	58	100

Table 150. Survey II response - Question 19

<b>Do your disaster management plans address emergency communications during times of disaster?</b>		
	Frequency	Percent
Yes	38	65.5
No	12	20.7
I don't know	0	0
Does not apply	6	10.3
Missing	2	3.4
Total	58	100



Table 151. Survey II response - Question 20

<b>Do your disaster plans address public works and engineering?</b>		
	Frequency	Percent
Yes	16	27.6
No	28	48.3
I don't know	2	3.4
Does not apply	9	15.5
Missing	3	5.2
Total	58	100

Table 153. Survey II response - Question 22

<b>Do your plans address search and rescue?</b>		
	Frequency	Percent
Yes	27	46.6
No	24	41.4
I don't know	1	1.7
Does not apply	5	8.6
Missing	1	1.7
Total	58	100

Table 152. Survey II response - Question 21

<b>Do your disaster plans address public health and medical services?</b>		
	Frequency	Percent
Yes	12	20.7
No	32	55.2
I don't know	1	1.7
Does not apply	9	15.5
Missing	4	6.9
Total	58	100

Table 154. Survey II response - Question 23

<b>Do your plans address oil and hazardous materials response (chemical, biological, radiological, etc.)?</b>		
	Frequency	Percent
Yes	17	29.3
No	31	53.4
I don't know	2	3.4
Does not apply	7	12.1
Missing	1	1.7
Total	58	100

*Table 155. Survey II response - Question 24*

<b>Do your plans address agriculture and natural resources?</b>		
	Frequency	Percent
Yes	15	25.9
No	30	51.7
I don't know	1	1.7
Does not apply	10	17.2
Missing	2	3.4
Total	58	100

*Table 156. Survey II response - Question 25*

<b>Do your plans address public safety and security?</b>		
	Frequency	Percent
Yes	23	39.7
No	25	43.1
I don't know	2	3.4
Does not apply	7	12.1
Missing	1	1.7
Total	58	100

*Table 157. Survey II response - Question 26*

<b>Do your plans address long-term community recovery?</b>		
	Frequency	Percent
Yes	17	29.3
No	28	48.3
I don't know	1	1.7
Does not apply	9	15.5
Missing	3	5.2
Total	58	100

*Table 158. Survey II response - Question 27*

<b>Does your organization have strong disaster management leadership?</b>		
	Frequency	Percent
Yes	41	70.7
No	9	15.5
I don't know	4	6.9
Does not apply	1	1.7
Missing	3	5.2
Total	58	100

Table 159. Survey II response - Question 28

Do you think your organization has an effective disaster management program?		
	Frequency	Percent
Yes	41	70.7
No	8	13.8
I don't know	3	5.2
Does not apply	1	1.7
Missing	5	8.6
Total	58	100

Table 160. Survey II response - Question 29

How often are your SOPs reviewed and updated?		
	Frequency	Percent
Annual	50	86.2
Every 2 years	3	5.2
Every 5+ years	0	0
Not updated	2	3.4
Missing	3	5.2
Total	58	100

## Participant Definitions of 'Effective Disaster Management'

Respondent	Definition
<b>1</b>	Actions that allow to reduce the damage caused by the occurrence of a disaster.
<b>2</b>	It is the comprehensive management that allows to contribute to the strengthening of the response in an event of a disaster.
<b>3</b>	Act immediately; taking into account the actual needs during a disaster and valuating those that require urgent attention.
<b>4</b>	Management, organization and mitigation in face of an emergency in an organized manner.
<b>5</b>	Good organization, efficiency, and effectiveness at every moment.
<b>6</b>	Management containing all the integrated elements, organization, material, and human resources.
<b>7</b>	As having a structure capable of providing response in face of any disaster that occurs, as well as everyone working in research, risk appraisal, preparation activities.

<b>Respondent</b>	<b>Definition</b>
<b>8</b>	First avoid the loss of lives. The organizational level that allows executing the plans scheduled for each moment.
<b>9</b>	A plan containing protection axes to safeguard lives and accompany the families of the affected areas.
<b>10</b>	These are the joint coordinated actions carried out in a timely manner leading to reduce or avoid a disaster.
<b>11</b>	Joint and individual actions that help us reduce the risks and vulnerability.
<b>12</b>	It is an adequate planning to confront a natural or man-made extreme event by defining the objectives and criteria for prevention and risk management through the organization of national, departmental, municipal, and local structures.
<b>13</b>	Be prepared for all type of events (multiple threats).
<b>14</b>	It is the one that allows to reduce human losses to the minimum.
<b>15</b>	Actions foreseen to be carried out in a multiple threat event with positive results in the safeguarding of the lives of the population.
<b>16</b>	Management that complies with the fundamental goal of insuring in a reasonable manner the protection of lives, infrastructure, economy, basic services, production means, among others; Implementing a methodological framework, response strategies, national involvement, and investment in resources.
<b>17</b>	The functional management of an effective response when a disaster occurs.
<b>18</b>	It is the capacity to plan, care, and mitigate in face of a situation that is harmful to the population.
<b>19</b>	An effective disaster management is one where there is an excellent organization for the prevention and mitigation of disasters, when the team is prepared and trained to face any event that might occur and reduce or avoid the loss of all lives.
<b>20</b>	A management that boosts capabilities and resources and clearly defines roles and coordination.

<b>Respondent</b>	<b>Definition</b>
<b>21</b>	Set of legal measures and standards that allow to have clear and timely responses.
<b>22</b>	Is in charge of preventing any disaster, with simulations as is being done by the government.
<b>23</b>	With permanent, efficient, legal presence and financial support.
<b>24</b>	It is the policy of state, the organization from the state to the community and family and persons in charge of prevention and response in the event of an emergency or disaster.
<b>25</b>	Planning for an effective prevention, agility in response, and recovery capacity.
<b>26</b>	To be aware about what is happening and have a plan.
<b>27</b>	I define it as the preparation, as what to do in the event of a disaster.
<b>28</b>	When my colleagues are made aware and participate in the activities.
<b>29</b>	The single disaster management plan has to have the following four essential elements: readiness, response, mitigation, and recovery.
<b>30</b>	It means to be ready in face of any event of nature to save lives among our population and be successful if a disaster strikes to minimize the number of casualties.
<b>31</b>	When people are able to safeguard their lives and be at the front of an emergency.
<b>32</b>	It is when the organization prepares readiness plans to face any natural phenomena, keeping in mind that the main goal in every disaster management is to save lives.
<b>33</b>	For example, training our human resources for them to learn about the vulnerability of our environment through concrete actions to prevent, mitigate, face, and respond.

<b>Respondent</b>	<b>Definition</b>
<b>34</b>	Have experience prior to an event that might cause an emergency or disaster, and that can allow us to provide a holistic response.
<b>35</b>	As a very good planning and readiness to face any threat and minimize the risk of life loss.
<b>36</b>	Immediate response actions to mitigate disasters and help the populations affected after the event.
<b>37</b>	Humanitarian protection management, prevention, citizen participation.
<b>38</b>	It is a management that satisfies people's expectations, by managing processes adequately from prior communication, evacuation, emergency management and recovery after the disaster.
<b>39</b>	The organization of a country in charge of confronting natural disasters and man-made disasters, to minimize or neutralize their harmful effects among the population.
<b>40</b>	Plan according to resources available to be prepared in face of any emergency and provide immediate response.
<b>41</b>	It is when all components are considered (training, education, prevention, monitoring, care).
<b>42</b>	It is the way in which the central government, local government, organizations, and the community organize, plan for any emerging event.
<b>43</b>	As the response we must provide to prevent, mitigate, and respond to our family and community or personally in face of a natural phenomenon.
<b>44</b>	Comprehensive actions that are needed by the most vulnerable population.
<b>45</b>	Hard work in prevention.
<b>46</b>	Preparation, follow up to serve the institutions in charge of preserving human lives.

<b>Respondent</b>	<b>Definition</b>
<b>47</b>	Capacity building and an effective and timely quality response.
<b>48</b>	Management, planning, direction, and control of all activities to mitigate the effects of the threats.
<b>49</b>	Fast, safe, and responsible care.





# Appendix E: CDM Survey III

## Introduction

As part of comprehensive disaster management (CDM) data gathering efforts, stakeholder participants completed a third survey during the NDPBA Knowledge Exchange II held November 29, 2017, in Managua. Survey III explored aspects of disaster-response activities within the country, including resources and capacity building, damage and needs assessments, staffing, roles and responsibilities during disaster-response operations, budget allocations, early-warning system usage, the existence of mutual-aid agreements, response partnerships and collaboration, and the operationalization of Emergency Operations Centers. Survey III included 21 questions, six of which required short answer responses. Frequency tables of responses to survey questions 1-15 are included for reference.

Table 161. Organizational affiliation of survey respondents (CDM Survey III)

Organizational Affiliation of Survey Respondents	Number	Percent (%)
Central Government	26	49%
Local Government	1	2%
NGOs	1	2%
UN	0	0%
Universities	0	0%
Not stated	25	47%

Table 162. Age of survey respondents (CDM Survey III)

Age of Survey Respondents (years)	Number	Percent (%)
18-25	4	8%
26-30	2	4%
31-40	11	21%
41-50	14	26%
51-60	11	21%
61-65	2	4%
Over 65	0	0%
Not stated	9	17%

Table 163. Gender of survey respondents (CDM Survey II)

<b>Gender of Survey Respondents</b>	<b>Number</b>	<b>Percent (%)</b>
Female	10	19%
Male	35	66%
Not stated	8	15%

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

## Frequency Tables of CDM Survey III Responses

Table 164. Survey III response - Question 1

<b>Is your organization active in disaster response?</b>		
	Frequency	Percent
Yes	41	77%
No	8	15%
I don't know	1	2%
Does not apply	2	4%
Missing	1	2%
Total	53	100

Table 165. Survey III response - Question 2

<b>In your opinion, was the national response to the last major disaster effective?</b>		
	Frequency	Percent
Yes	50	94%
No	1	2%
I don't know	1	2%
Does not apply	1	2%
Missing	0	0%
Total	53	100

Table 166. Survey III response - Question 3

<b>Do you feel that disaster alert/warning messages were issued effectively during the last disaster?</b>		
	Frequency	Percent
Yes	49	92%
No	1	2%
I don't know	2	4%
Does not apply	1	2%
Missing	0	0%
Total	53	100

Table 167. Survey III response - Question 4

<b>In your opinion, was the mobilization of resources and response personnel effective during the last disaster?</b>		
	Frequency	Percent
Yes	38	72%
No	6	11%
I don't know	5	9%
Does not apply	2	4%
Missing	2	4%
Total	53	100

Table 168. Survey III response - Question 5

<b>Does your organization have pre-established agreements for support during times of disaster (i.e. mutual aid agreements)?</b>		
	Frequency	Percent
Yes	38	72%
No	6	11%
I don't know	5	9%
Does not apply	2	4%
Missing	2	4%
Total	53	100

Table 169. Survey III response - Question 6

<b>Is your organization responsible for post-disaster damage and needs assessments?</b>		
	Frequency	Percent
Yes	26	49%
No	15	28%
I don't know	3	6%
Does not apply	7	13%
Missing	2	4%
Total	53	100

Table 170. Survey III response - Question 7A

<b>Were post-disaster damage and needs assessments conducted following the last major disaster?</b>		
	Frequency	Percent
Yes	39	74%
No	5	9%
I don't know	4	8%
Does not apply	5	9%
Missing	0	0%
Total	53	100

Table 171. Survey III response - Question 7B

<b>If yes, were they done accurately?</b>		
	Frequency	Percent
Yes	29	55%
No	2	4%
I don't know	4	8%
Does not apply	4	8%
Missing	14	26%
Total	53	100

Table 172. Survey III response - Question 8A

<b>Does your organization maintain an Emergency Operations Center?</b>		
	Frequency	Percent
Yes	37	70%
No	10	19%
I don't know	1	2%
Does not apply	2	4%
Missing	3	6%
Total	53	100

Table 173. Survey III response - Question 7B

<b>If yes, does the Emergency Operations Center have adequate resources to perform its responsibilities effectively?</b>		
	Frequency	Percent
Yes	21	40%
No	12	23%
I don't know	6	11%
Does not apply	3	6%
Missing	11	21%
Total	53	100

Table 174. Survey III response - Question 9

<b>In your opinion, does your organization have adequate staffing to conduct disaster response?</b>		
	Frequency	Percent
Yes	33	62%
No	11	21%
I don't know	1	2%
Does not apply	6	11%
Missing	2	4%
Total	53	100

Table 175. Survey III response - Question 10

<b>Does your organization have a training program to help develop and build capacity in disaster management staff members?</b>		
	Frequency	Percent
Yes	33	62%
No	16	30%
I don't know	3	6%
Does not apply	1	2%
Missing	0	0%
Total	53	100

Table 176. Survey III response - Question 11

<b>In your opinion, are disaster response tasks clearly defined?</b>		
	Frequency	Percent
Yes	43	81%
No	6	11%
I don't know	2	4%
Does not apply	1	2%
Missing	1	2%
Total	53	100

Table 177. Survey III response - Question 12

<b>In your opinion, is there overlap between organizations active in disaster response in Nicaragua?</b>		
	Frequency	Percent
Yes	20	38%
No	10	19%
I don't know	11	21%
Does not apply	3	6%
Missing	9	17%
Total	53	100

Table 178. Survey III response - Question 13

<b>Does your organization engage with the military to support disaster response?</b>		
	Frequency	Percent
Yes	36	68%
No	10	19%
I don't know	1	2%
Does not apply	1	2%
Missing	5	9%
Total	53	100

Table 179. Survey III response - Question 14

<b>Does your organization engage with the private sector to support disaster response?</b>		
	Frequency	Percent
Yes	26	49%
No	14	26%
I don't know	1	2%
Does not apply	4	8%
Missing	8	15%
Total	53	100

Table 180. Survey III response - Question 15A

<b>Does your organization have a budget allocated for disaster response?</b>		
	Frequency	Percent
Yes	17	32%
No	18	34%
I don't know	10	19%
Does not apply	3	6%
Missing	5	9%
Total	53	100

Table 181. Survey III response - Question 15B

<b>If yes, was the budget adequate for the last disaster response your organization conducted?</b>		
	Frequency	Percent
Yes	15	28%
No	5	9%
I don't know	5	9%
Does not apply	6	11%
Missing	22	42%
Total	53	100

## Participant Definitions of 'Effective Disaster Response'

<b>Respondent</b>	<b>Definition</b>
<b>1</b>	As the option to solve the need of one or a group of persons whose lives are threatened in face of the occurrence of a natural or man-made disaster.
<b>2</b>	Prior organization and preparation at all levels, decision making, and measures undertaken when an event occurs (after monitoring) damage assessment and response of the impacted population.
<b>3</b>	First to assess damages, equity, inclusion, and efficiency.
<b>4</b>	Appropriate management responding to the special features of each scenario, and based on equity, inclusion, and resilience capacity.
<b>5</b>	It is the set of actions that leads to guarantee a better response, safeguarding the life of the population.
<b>6</b>	Provide the necessary response on a timely manner.
<b>7</b>	Give immediate assistance to family members and undertake all the measures necessary.
<b>8</b>	N/A
<b>9</b>	N/A
<b>10</b>	Proceed under the protocol and take care of the emergency with diligence.
<b>11</b>	Immediate presence with trained staff, and an organization with the appropriate support and government leadership.
<b>12</b>	N/A
<b>13</b>	Organization, training at every institutional and community level.

<b>Respondent</b>	<b>Definition</b>
<b>14</b>	A good organization to mitigate in all areas.
<b>15</b>	The one that minimizes damages and human and material damages and losses in a disaster.
<b>16</b>	It means to put into practice all response plans at every level through drills and simulations.
<b>17</b>	Create the necessary basic conditions to return the population to the conditions they enjoyed before the disaster.
<b>18</b>	N/A
<b>19</b>	It is the way we are prepared and trained with all the knowledge, to face any disaster situation.
<b>20</b>	As the immediate action previously planned to take care, confront and mitigate a disaster event in a timely and positive manner in case of potential vulnerabilities
<b>21</b>	Actions to rapidly respond to the victims and do our protection work.
<b>22</b>	When everyone responds to an emergency in the best way.
<b>23</b>	It is an action taken in an organized manner, based on the fact that the means exist, as well as the inputs, tools necessary to provide a timely response.
<b>24</b>	In principle to safeguard human lives and pets.
<b>25</b>	The one that produces the effect desired to control each threat and this prepares us to respond to any natural or man-made disaster.
<b>26</b>	It is the way in which lives are saved in the event of a natural disaster.
<b>27</b>	That all institutions accountable that are part of SINAPRED respond in time at the moment that an event occurs.
<b>28</b>	N/A



<b>Respondent</b>	<b>Definition</b>
<b>29</b>	As a measure implemented to save lives.
<b>30</b>	Respond with all resources available and necessary to contribute to the welfare of victims.
<b>31</b>	N/A
<b>32</b>	N/A
<b>33</b>	All the structures that participate during an alert and after the disaster.
<b>34</b>	It is the capability to respond effectively to provide immediate short and medium term measures.
<b>35</b>	Immediate response during disasters with the full participation and support of groups and human resources.
<b>36</b>	Timely recovery capacity, and resilience of communities.
<b>37</b>	N/A
<b>38</b>	Includes the preparedness and organization before an event occurs.
<b>39</b>	Organizing and planning the first response to save lives.
<b>40</b>	Set of activities that meet to respond to a natural event.
<b>41</b>	N/A
<b>42</b>	That all the goals set were achieved at the end of the exercise.
<b>43</b>	Speed, responsibility, and solidarity.
<b>44</b>	Planning for preparedness, agility, and effectiveness during recovery.
<b>45</b>	When the prevention system is well organized. When the purpose is to safeguard the lives of families.

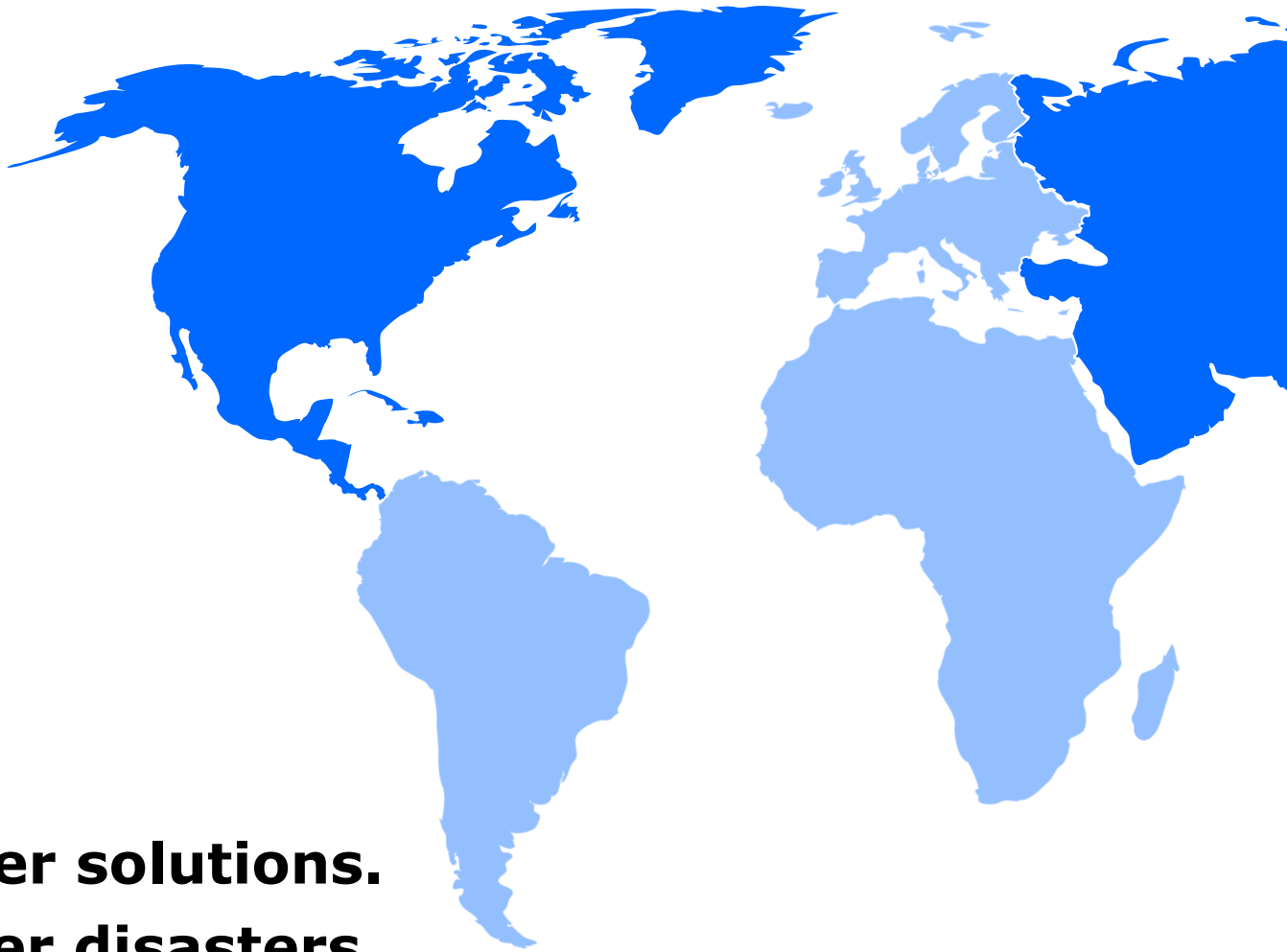
<b>Respondent</b>	<b>Definition</b>
<b>46</b>	It is the preparation and knowledge to respond to a threat before, during, and after an event.
<b>47</b>	Comprehensive, in other words, local, departmental, and national levels in every field.
<b>48</b>	An efficient response including a good organization where the tasks of each person are defined and also for each structure.
<b>49</b>	One that has been efficient where we have achieved our goal, such as to safeguard human lives and protect as much as possible during an event. The impact is less thanks to prior organization.
<b>50</b>	Regarding our institution, it is timely information, early alert, and complete and correct assessment of the event.
<b>51</b>	The speed with which the government undertakes the role as the leader to mitigate the consequences of a natural or man-made disaster.
<b>52</b>	The capacity to assist and guide the population struck by the natural event, be able to assess, help with recovery, food, infrastructure, etc.
<b>53</b>	When we can get the data on the same day about victims affected by the disaster.











**Better solutions.  
Fewer disasters.**

# **Safer World.**



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