ADAPTATION FUND

AFB/PPRC.36/Inf.6
15 September 2025

Adaptation Fund Board
Project and Programme Review Committee
Thirty-sixth Meeting
Bonn, Germany, 7-8 October 2025

PROPOSAL FOR BELIZE

ADAPTATION FUND BOARD SECRETARIAT TECHNICAL REVIEW OF PROJECT/PROGRAMME PROPOSAL

PROJECT/PROGRAMME CATEGORY: Regular-sized Project Concept

Country/Region: Belize
Project Title: Strengthening Disaster Preparedness, Early Warning Systems, and Climate Resilient Housing
Thematic Focal Area: Disaster Risk Reduction or Urban Development
Implementing Entity: Protected Area Conservation Trust (PACT)
Executing Entities: Protected Area Conservation Trust (PACT)
AF Project ID:
IE Project ID: **Requested Financing from Adaptation Fund (US Dollars):** USD24,948,700
Reviewer and contact person: Mahamat Assouyouti **Co-reviewer(s):** Timileyin Tobi Oyebade
IE Contact Person:

Technical Summary	The project "Strengthening Disaster Preparedness, Early Warning Systems, and Climate Resilient Housing" aims to strengthen national disaster preparedness and response capacities, improving hurricane monitoring and early warning systems, and promoting climate-resilient housing and infrastructure through an innovative financing mechanism. This will be done through the three components below: Component 1: Enhance the Capacity of Belize's National Emergency Management Organization (USD 2,000,000); Component 2: Support to the National Meteorological Service for Enhanced Hurricane Monitoring and Tracking (USD 2,000,000); Component 3: Climate-Resilient Housing and Critical Infrastructure through Innovative Finance for Vulnerable Communities in Belize (USD 17,500,000). Component 4: Monitoring and Evaluation (USD 1,000,000). Requested financing overview: Project/Programme Execution Cost: USD 368,700 Total Project/Programme Cost: USD 24,948,700 Implementing Fee: USD 2,080,000

	Financing Requested: USD 24,948,700 The proposal includes a request for a project formulation grant of USD 150,000. However, the PFG request is not included in the CN package. The initial technical review raises several issues, such as the need for strengthening the adaptation rationale of the various components, the identification of potential risks and impacts of the project, the lack of information about potential overlapping projects, the absence of initial gender assessment and the project's cost-effectiveness, as is discussed in the number of Clarification Requests (CRs) and Corrective Action Requests (CARs) raised in the review.
Date:	September 2, 2025

Review Criteria	**Questions**	**First Technical Review Comments September 2, 2025**
Country Eligibility	1. Is the country party to the Kyoto Protocol, and/or the Paris Agreement?	**Yes.**
	2. Is the country a developing country particularly vulnerable to the adverse effects of climate change?	**Yes.** In Belize, climate change has intensified hydro-meteorological hazards, increasing both the immediate and medium-term vulnerability of the population. These changes are accompanied by significant inter- and intra-annual climate variability. As a result, the country is experiencing more frequent and intense meteorological droughts, floods, storms, and hurricanes which exacerbate the country's vulnerability to climate change and limits its development.
Project Eligibility	1. Has the designated government authority for the Adaptation Fund endorsed the project/programme?	**Yes.** As per the Endorsement letter dated August 5th, 2025. However, please see address the following: **CAR1**: Please complete the IE certification at IV section B.
	2. Does the length of the proposal amount to no more than Fifty pages for the project/programme concept, including its annexes?	**No** The concept note exceeds 50 pages including its annexes. **CAR2**: Please reduce the total pages within the required 50 pages
	3. Does the project / programme support concrete adaptation actions to assist the	**Yes.** **However additional information is required.**

	country in addressing adaptive capacity to the adverse effects of climate change and build in climate resilience?	The concept note provides overall information about the components and activities aiming at addressing the vulnerability of homes and households to more frequent and severe climate hazards. However, there are few elements to be addressed: **CR1**: Beyond the overall description of the vulnerability and challenges caused by natural hazard on Belize housing sector, there is little information of how the proposed new resilient housing will address the impacts of climate hazards including increasing rain, sea rise, hurricane and others. Please explain how the newly proposed infrastructures will address the adaptative capacity of people, in particular if there are any specific building standards (national or international) or technology that help strengthen the infrastructure and prevent negative impacts. **CR2:** Although the CN states that "as of September 2024, approximately 89,874 people across 20,562 households were living in multidimensional poverty, representing over 22.1% of the population", it is not clear how the proposed activities under component 3 and in particular the investment of 1,000 homes will address the overall vulnerability of populations exceeding the number of homes to be built or rehabilitated. Please clarify how the proposed investment will build resilience in transformative and long-term manner. **CR3**: While the CN states that "While this project will examine the vulnerability of the housing stock throughout the entire country, special emphasis will be given to those residing in high-risk, coastal communities", there is no clear approach to implement the project to avoid creating inequity and exacerbate the vulnerability among population taking onto account existing social dimension. Please clarify the project approach to target vulnerable communities without creating additional social issues. Please elaborate how the beneficiaries will be selected taking onto account existing vulnerability factors.

		CAR3: Beyond the number of 1,000 houses to be built or rehabilitated, the CN doesn't provide an indicative number of beneficiaries. Please indicate the estimated number of beneficiaries (direct and indirect) which will be supported. **CAR4**: Despite the fact that project focuses on climate-resilient housing, the CN does not specify a clear definitions and standard of the proposed "Climate-Resilient Housing and Infrastructure". Please explain and comment in the CN how the proposed "climate resilient housing" will build resilience in the context of Belize? **CAR5**: Please elaborate on the new standards to be established taking onto account the climate change model for Belize and reference to the national disaster preparedness baseline assessment (Annex 2). **CR4:** Kindly provide more details for each project activity, for example: clarify stakeholders to be involved), and which specific actions will be taken to ensure successful implementation of proposed climate resilient housing, and the locations (even tentative) where the constructions (housing and public buildings) will be done if already known at this stage. **CR5:** Under Component 1, Output 1.3 "Critical infrastructure for hurricane response and recovery retrofitted to with flood protection, solar power, and water purification systems to ensure reliable hurricane response and recovery operations", please clarify what is meant by critical infrastructures and list them if already known. If not, please consider USP approach in line with AF OPG guidelines. **CR6**: Under Component 1, Output 1.4 "Local disaster preparedness and response capacity is enhanced through strengthened data analysis, network administration, and disaster mitigation planning and policies" and component 2, Output 2.2 "Enhanced capacities in hurricane modelling and forecasting tools", there seem to be potential to strengthen the proposed approach for new "resilience housing" for

		long term sustainability and resilient of the infrastructures. Please clarify how the activities mentioned above will contribute to build a new "resilient housing" beyond the hard infrastructure component of the housing. **CAR6:** Under Component 2, the output 3.1 "Legal, financial, and institutional frameworks to ensure sustainable management and governance of the revolving fund for climate-resilient housing and infrastructure established" seems to be executed by a third-party entity named "Development Finance Corporation". However, the CN states on its cover note that PACT will execute the entire project. Please clarify the execution approach under the revolving fund and revise the CN accordingly. **CAR7**: Under Component 3, Output 3.2 "At least 1000 homes in vulnerable communities are retrofitted, upgraded, or relocated to climate-resilient standards", although the CN mentions that "The selection and implementation process will be guided by a thorough Environmental and Social Risk Screening to ensure that interventions minimize negative impacts and promote sustainability", please provide at this stage some indicative selection criteria which can be further developed during FP stage. **CR7**: Under Component 4, mostly all funds are allocated to monitoring and evaluation and there is no other outputs and activities aiming at support concrete adaptation actions to assist the country in addressing adaptive capacity to the adverse effects of climate change and build in climate resilience. Please note that as per AF OPG and new evaluation policy, evaluation costs are included in the project implementation fees. Please revise the component 4 and including activities and outputs in accordance with AF OPG. **CAR8:** As required by AF, please add explicitly the alignment with the Adaptation Fund Results Framework in Part II section B.

	4. Does the project / programme provide economic, social and environmental benefits, particularly to vulnerable communities, including gender considerations, while avoiding or mitigating negative impacts, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	**. Unsure.** The concept note briefly outlines some project's economic, social, and environmental benefits; however, the explanation is too general and with no estimated benefits. The document does not provide information on the expected total number of beneficiaries of the project and the specific vulnerable groups targeted. The concept note does not include an Initial Gender Assessment. **CR8:** Please include in the economic benefits section, how many people will benefit in each community and what is the dollar-value of the economic benefit to them for each of the target communities. It would also be useful to present overall figures for economic and social benefits. **CR9**: Please strengthen the social, and environmental benefits with specific and quantifiable data where possible. **CAR9:** Please include an initial gender assessment which is required at the concept note stage. **CAR10:** Kindly provide specific information on the expected beneficiaries, disaggregated by gender and age, where possible. Also, whether marginalized and vulnerable groups and indigenous communities have been identified in the project area and if so, to specify how the project benefits those groups. **CR10:** As raised in CR3, kindly explain how the project will ensure the equitable distribution of benefits.
	5. Is the project / programme cost effective?	**Unsure.** The concept note provides a broad explanation of the project cost-effectiveness including a comparative table on pages 44-48 (BAU vs proposed interventions). However, the document lacks details on cost-effectiveness approach with alternative options and measures beyond the BAU scenario. For now, it is not possible to demonstrate the cost-effectiveness of the selected measures.

		CAR11: Kindly provide a sound justification for the cost-effectiveness of the project and selected measures, including scope, approach, alternative options to the proposed measures, and estimates of the evaluation where possible. Please consider update the table in pages 44-48 to include tentative cost figures for benchmark and alternative solutions of the proposed infrastructures and solutions.
	6. Is the project / programme consistent with national or sub-national sustainable development strategies, national or sub-national development plans, poverty reduction strategies, national communications and adaptation programs of action and other relevant instruments?	**Yes.** **But further information is needed.** The project identifies relevant adaptation-related plans and strategies for Belize as well as sectoral country's policy and strategies including losses and damages. However, the document lacks reference to SDGs and other development indicators. **CAR12:** Kindly provide specific linkage about how the project supports the implementation of the SDGs.
	7. Does the project / programme meet the relevant national technical standards, where applicable, in compliance with the Environmental and Social Policy of the Fund?	**Yes.** **But further clarification is needed.** The concept identifies several national regulations relevant to the project as described in Section D and E, Part II, including the Environmental Protection Act Chapter 328 of the Substantive Laws of Belize Revised Edition 2020, Belize Building Act Chapter 131 and the National Land Use Policy for Belize (2025-2035). **CAR13**: However, considering the newly proposed "resilience housing and infrastructure", please clarify and elaborate in the CN if the existing standards are sufficient or a need for new approach and standards for climate-proofed infrastructure.
	8. Is there duplication of project / programme with other funding sources?	**Yes.** **However additional information is required.** Although relevant information is described to the minimum extent in Section F, Part II, all potentially overlapping projects are not clearly identified in the concept note.

		CR11: Kindly conduct more analysis and include a comprehensive list of projects that are or have been implemented in Belize and the selected area. Please consider using a table format to demonstrate the complementarity and non-duplication if any.
	9. Does the project / programme have a learning and knowledge management component to capture and feedback lessons?	**Yes. However, amendment is required.** Although the information provided on section G, Part II describes the project learning and knowledge approach, there is no dedicated component or activity in the project funding table associated with KM. **CAR14**: Please strengthen the project KM part beyond the section G. Please consider revising the project component 4 and including the knowledge and dissemination-related activities which are currently spread among the 3 other components.
	10. Has a consultative process taken place, and has it involved all key stakeholders, and vulnerable groups, including gender considerations in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	**Unsure.** The CN indicates that initial consultations were conducted through focus groups and one-on-one interviews. The consultative process has included local authorities, government entities, and communities. However, there is no annex or mention of the persons who have been consulted nor the locations. **CAR15:** Kindly indicate whether any physical consultation has taken place and include the list of stakeholders in Annex, including if possible one or two images. **CAR16**: Considering the important role of vulnerable groups including women and youth, kindly explain how these groups been involved during consultation workshops.
	11. Is the requested financing justified on the basis of full cost of adaptation reasoning?	**Unsure.** The concept note provides general arguments for the funding of the project and its impact on Belize and selected areas. However, the demonstration of how the project will address solely its adaptation objective is not fully clear with the resources provided is not clear. **CR12:** Please present information to indicate how this project will meet its objectives solely with the resources of the adaptation fund.

		CR13: Kindly clarify whether the project requires co-financing or not. If co-financing is being considered, please clearly indicate how the project with the AF resources only, will be able to effectively meet its objectives. **CAR17**: Considering that most of the proposed activities under component 2 (infrastructures) are to be designed or identified (standards for resilient housing), kindly confirm if this project will be implemented through an approach of unidentified sub-project (USP). **CR14**: Given that the project will establish a "revolving housing finance facility, which will provide low-interest loans to working poor households", please clarify how the AF funding will meet its full cost of adaptation reasoning with a grant-based instrument. Please clarify how the low-interest loans return will be aligned with AF requirements for full cost of adaptation reasoning.
	12. Is the project / program aligned with AF's results framework?	**Yes, however amendment is required.** Although the CN includes information under section A, Part III on the results framework, the document doesn't not fully demonstrate the project alignment with AF's results framework. **CAR18**: Please add at least one Project objective indicators to the project results framework, allowing the project to track progress towards the achievement of the project objective. This may be one or several core impact indicators. **CAR19**: Several indicators of the project results framework are measured using "number or % of communities" as a unit. In line with the methodologies for reporting on indicators, all data should be reported in terms of number of people or another unit that can be easily tracked. Please review and revise all relevant indicators and associated targets in the project results framework to ensure consistency with AF guidelines, specifically ensuring that all data are

		expressed in number of people. Remove any reference to households where applicable. Please be guided by the template available at • Results Framework Alignment Table (Amended in March 2019) (77 kB, DOC) **CAR209**: Please ensure a consistent use of "Number" or "#" throughout the project results framework.
	13. Has the sustainability of the project/programme outcomes been taken into account when designing the project?	**Yes.** **However additional information is required.** The project seeks to sustain its benefits mainly through a key sustainability mechanism with the establishment of a revolving housing finance facility. It is not clear how the involvement of national and local stakeholders will be done to fostering community ownership, and building capacity for end users. **CR15:** Kindly identify the sustainability approach and mechanism beyond the revolving fund. Please explain how the adaptation benefits will be sustained after this project ends and explain if this can be replicated and/or scale up. **CAR21**: considering that the proposed resilient housing will be newly introduced to Belize, please identify the O&M mechanism and implementation modality to ensure project sustainability.
	14. Does the project / programme provide an overview of environmental and social impacts / risks identified, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	**Yes.** **However, further information is required.** The concept note does not state the project classification (A, B or C) from the screening. The proposal has not identified all potential risks and impacts but rather provides some general information about some of the environmental and social principles from the checklist. For the concept note, the ESP overview should start by identifying potential risks, even if the project aims not to affect issues related to the principles.

		CAR22: Please kindly state the project classification from the screening in Section K, Part II. **CAR23:** Please review Table in page 68 and assess all the principles that may apply to the project, and state and describe all potential impacts and risks in particular regarding the unidentified subprojects if any (resilient housing and public infrastructures). Please refrain from using "n/a" as the project has to be screened against all principles. Please note that ESPs 1, 4 and 6 will always require further assessment. **CAR24**: Please include an initial gender assessment. **CR16**: Please confirm if the project includes USP in particular for activities involving construction (housing and public infrastructures) and refer to AF policy of USP for compliance.
Resource Availability	1. Is the requested project / programme funding within the cap of the country?	**Yes.** **But further clarification is needed** **CAR25:** Please attach the request for PFG of $150,000 as announced in the CN document. **CAR26:** The funding requested on the cover of the proposal is US$25M, which does not correspond with the amount in the project financing and components section. Please correct and align all figures throughout the document.
	2. Is the Implementing Entity Management Fee at or below 8.5 per cent of the total project/programme budget before the fee?	**Yes.** However, amendment is required in regard to overall project financing breakdown. EE cost seem to be wrong. **CAR27:** Ref to CAR28 below For further clarification on the costs and fees please refer to More information, please visit: https://www.adaptation-fund.org/generic/costs-and-fees/.

	3. Are the Project/Programme Execution Costs at or below 9.5 per cent of the total project/programme budget (including the fee)?	**No.** **CAR28**: Since PACT is acting as both IE and EE, please only 1.5% of the EC costs can be allocated to PACT. The cover page only lists PACT as the EE however; the endorsement letter indicates that Both PACT and DFC will execute the project. 1. Please update the cover page to reflect this or provide an updated endorsement letter. 2. Please note that justification for the IE to serve as the EE is required and should be provided with the re-submission.
Eligibility of IE	1. Is the project/programme submitted through an eligible Implementing Entity that has been accredited by the Board?	**Yes.** PACT accreditation is active until April 2030
Implementation Arrangements	1. Is there adequate arrangement for project / programme management, in compliance with the Gender Policy of the Fund?	n/a at concept stage
	2. Are there measures for financial and project/programme risk management?	n/a at concept stage
	3. Are there measures in place for the management of for environmental and social risks, in line with the Environmental and Social Policy and Gender Policy of the Fund?	n/a at concept stage
	4. Is a budget on the Implementing Entity Management Fee use included?	n/a at concept stage
	5. Is an explanation and a breakdown of the execution costs included?	n/a at concept stage
	6. Is a detailed budget including budget notes included?	n/a at concept stage
	7. Are arrangements for monitoring and evaluation clearly defined, including budgeted M&E plans and sex-disaggregated data, targets and	n/a at concept stage

	indicators, in compliance with the Gender Policy of the Fund?	
	8. Does the M&E Framework include a break-down of how implementing entity IE fees will be utilized in the supervision of the M&E function?	n/a at concept stage
	9. Does the project/programme's results framework align with the AF's results framework? Does it include at least one core outcome indicator from the Fund's results framework?	n/a at concept stage
	10. Is a disbursement schedule with time-bound milestones included?	n/a at concept stage

ADAPTATION FUND

CONCEPT NOTE PROPOSAL FOR SINGLE COUNTRY

PART I: PROJECT/PROGRAMME INFORMATION

Title of Project/Programme: Strengthening Disaster Preparedness, Early Warning Systems, and Climate Resilient Housing

Country: Belize

Thematic Focal Area:

Type of Implementing Entity: National Implementing Entity

Implementing Entity: Protected Area Conservation Trust (PACT)

Executing Entities: Protected Area Conservation Trust (PACT)

Amount of Financing Requested: $25,000,000 (in U.S Dollars Equivalent)

Project Formulation Grant Request (available to NIEs only): Yes ☒ No ☐

Amount of Requested financing for PFG: $150,000 (in U.S Dollars Equivalent)

Letter of Endorsement (LOE) signed: Yes ☒ No ☐

NOTE: LOEs should be signed by the Designated Authority (DA). The signatory DA must be on file with the Adaptation Fund. To find the DA currently on file check this page: https://www.adaptation-fund.org/apply-funding/designated-authorities

Stage of Submission:

☐ This concept has been submitted before

☒ This is the first submission ever of the concept proposal

In case of a resubmission, please indicate the last submission date: Click or tap to enter a date.

Please note that concept note documents should not exceed 50 pages, including annexes.

Project/Programme Background and Context:

Provide brief information on the problem the proposed project/programme is aiming to solve. Outline the economic social, development and environmental context in which the project would operate.

Geographic and socio-economic context

1. Belize is a small (22,966 sq km or 8,867 sq mi), developing country located on the Caribbean coast of Central America. It shares borders with Mexico to the north, Guatemala to the west and south, and the Caribbean Sea to the east (Figure 1). The mainland makes up 95% of the territory and 5% is represented by more than 1,060 small islands or Cayes. The country's coastal and marine environment is an exceptional natural system, comprising a 386-kilometer (240 mi) coastline; more than 1,060 small sand and mangrove islands known as cays; a 300-kilometer (190 mi) barrier reef; and three of the four offshore atolls in the Western Hemisphere—Lighthouse Reef, Turneffe Atoll, and Glover's Reef. As the largest reef complex in the Atlantic-Caribbean region and the second-largest reef system globally, the Belize Barrier Reef Reserve System (BBRRS) is recognized for its unique diversity of reef types within a single area. It was designated a UNESCO World Heritage Site in 1996 (UNESCO 2025)

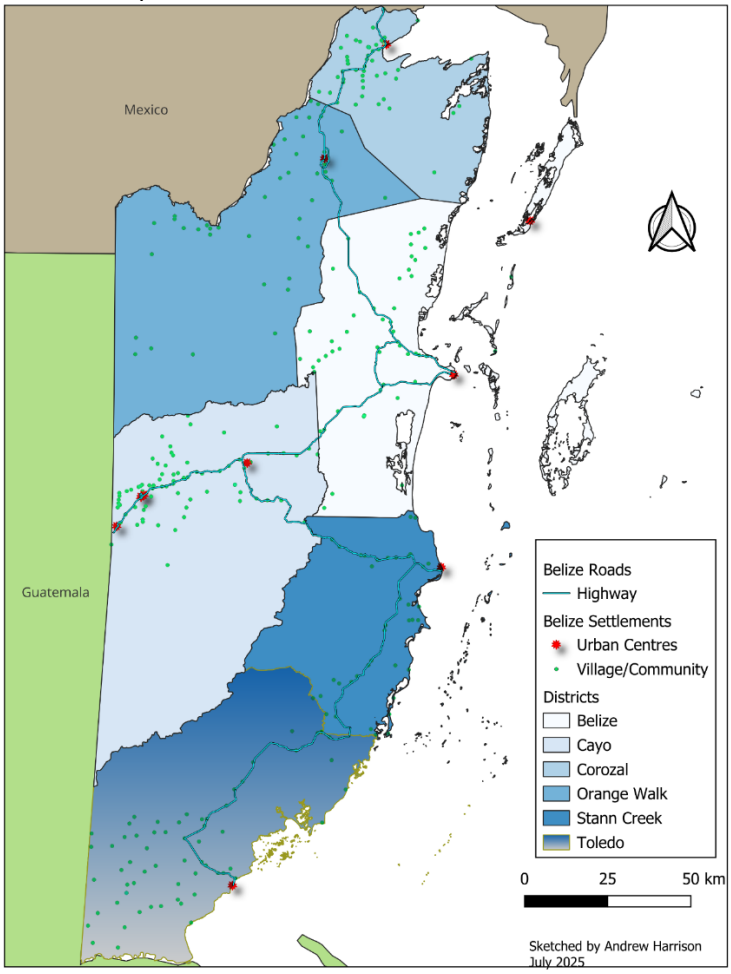


Figure 1: Map of Belize showing Administrative Districts and Urban Centers
Source: GOB 2025

2. The mainland consists of two primary physiographic regions. The Maya Mountains and their associated basins and plateaus dominate the southwestern region, rising to just over 1,100 meters. In contrast, the northern lowlands and southern coastal plain are relatively flat and drained by eighteen major rivers and numerous perennial streams. The coastal terrain is characterized by mangrove forests, lagoons, and estuaries, transitioning inland into tropical pine savannah and broadleaf forests. The highlands remain sparsely populated, whereas the more fertile lowlands have supported extensive agriculture and human settlement (CZMIA 2025).

Climate

3. Belize experiences only two main seasons: a wet (rainy) season and a dry season. The wet season spans from June to November and coincides with the Atlantic hurricane season. Around 60% of the country's annual rainfall occurs during this period. Rainfall is highest in southern Belize, where the tropical climate brings up to 3,800 mm (150 inches) of rain annually. As you move north, precipitation gradually decreases, with the more subtropical regions averaging around 1,500 mm (60 inches) per year. Between November and February, a transitional period marked by declining rainfall occurs. During this time, cold fronts pass through the country, ushering in the dry season, which lasts until April. Average maximum temperatures across Belize are around 85°F (29.5°C), with minimum temperatures in the low 70s°F (about 20°C). Inland areas experience greater temperature variation, while coastal regions remain cooler due to sea breezes. In mountainous regions, temperatures drop by about 5°F (-15°C) for every 1,000 feet of elevation. Humidity remains high throughout the year, averaging around 80%, but tends to be lower during the dry season. Due to its location along the Caribbean Sea, part of the Atlantic Basin, Belize is particularly vulnerable to tropical cyclones (NCCO 2022).

Human Settlements

Belize has six administrative districts with approximately 225 settlements, which include 9 urban centres, 190 villages, and about 26 communities or settlements. The urban centres consist of two cities, Belize City, the commercial capital, and Belmopan, the administrative capital, as well as seven municipal towns: San Pedro, Corozal Town, Orange Walk Town, San Ignacio and Santa Elena, Benque Viejo del Carmen, Dangriga, and Punta Gorda. Five of these urban centres, Belize City, Corozal Town, Dangriga, Punta Gorda, and San Pedro, are coastal settlements, while the other four, Belmopan, San Ignacio and Santa Elena, Benque Viejo del Carmen, and Orange Walk Town, are inland but located along rivers on flood plains. Additionally, more than 30 villages and communities or settlements are also located on or very near the coast. Belize's population has been growing rapidly (SIB 2022).

Table 1: The six administrative districts of Belize

Administrative Districts	Descriptions
Corozal	Corozal is the northernmost district of Belize, bordered to the north by the Rio Hondo River, which separates it from the Mexican state of Quintana Roo and forms the country's northern international boundary. The district features a long, low-lying coastline, along which many of its key settlements are located. Chief among them is Corozal Town, situated on Corozal Bay. As the district's

	primary urban centre, Corozal Town hosts most administrative offices, business services, and amenities. Corozal District comprises 27 villages, 9 of which are located on or near the coast. Several of these villages are adjacent to Corozal Town and are increasingly accommodating peri-urban growth and development.
Orange Walk District	The Orange Walk District is located in the northern region of Belize, bordering Mexico to the north and Guatemala to the west. It is a landlocked district with no coastline. Orange Walk Town, situated on the western banks of the New River, serves as the administrative and commercial center of the district. The district comprises 24 officially recognized villages. Among them, Trial Farm is the largest—both in the district and one of the largest in the country. Located directly north of Orange Walk Town, Trial Farm is experiencing peri-urban expansion due to its proximity to urban amenities. Other major villages in the district include Shipyard, Guinea Grass, and San Jose.
Belize District	The Belize District, located in the central-eastern region of the country, includes several populated offshore islands. It is home to two major urban centres. Belize City, the former capital, is the oldest, largest, most populous, and economically most significant urban centre in the country. Positioned on a low-lying peninsula near the midpoint of Belize's coastline, the city is interlaced with the Haulover Creek, streams, man-made canals, and mangrove wetlands. As a port city and Belize's primate city, Belize City has a population roughly three times larger than that of the second-largest urban centre. San Pedro, the second key urban centre in the district, is located on Ambergris Caye. Originally situated at the southern tip of the island, its municipal boundary was expanded in April 2025 to cover 34,378.43 acres—encompassing most of the island Statutory Instrument No. 59 of 2025: Town Boundaries Order, 2025. San Pedro is one of the fastest-growing municipalities in the country and serves as the hub of Belize's tourism industry. The Belize District includes 34 villages, two of which, Caye Caulker and St. George's Caye, are located on offshore islands. Caye Caulker has experienced significant growth due to its appeal as a coastal and marine tourism destination. St. George's Caye holds historical importance as the site of the country's first settlement and former capital. Five other villages in the district are situated on or near the coast. Among them are Ladyville, the largest village in the country, and Lord's Bank, also among the largest. Located just a few miles outside Belize City, these villages are absorbing much of the peri-urban expansion. This

	trend is driven by a lack of developable land within the city and by socio-economic factors such as crime, which are prompting residents to relocate while remaining close to jobs, recreation, and other urban amenities.
Cayo District	The Cayo District is the largest district in Belize, situated in the western region of the country and bordering Guatemala's Petén Department. It is landlocked, with no coastline. Three of Belize's key urban centres are located within the district. Belmopan, the national capital, is strategically positioned near the centre of the country, in the northeastern part of Cayo District. It lies south of the Belize River, nestled between Roaring Creek to the west and Mount Pleasant Creek to the east. Established and master-planned in 1970, Belmopan was built in response to the severe destruction caused by Hurricane Hattie in 1961, which devastated Belize City. As the administrative heart of Belize, Belmopan hosts the National Assembly building, the Office of the Prime Minister, most government headquarters, numerous embassies, and the main campus of the University of Belize. Since its incorporation as a city in 2000, Belmopan has experienced significant growth, becoming the country's second most populous urban centre. San Ignacio and Santa Elena are twin towns located near the western edge of the district. The Macal River runs between them, with San Ignacio on the west bank and Santa Elena on the east. To the north, San Ignacio is bordered by the Mopan River, and the confluence of the Macal and Mopan Rivers forms the Belize River, which borders Santa Elena to the north. Despite their inland location, these twin towns are often severely impacted by flooding due to heavy rainfall from tropical systems. Together, they form the hub of Belize's inland tourism industry, serving as the gateway to major archaeological sites, natural reserves, parks, and national monuments within the district. Benque Viejo del Carmen is the westernmost urban centre in both the Cayo District and Belize. This border town sits along the southern edge of the Mopan River and provides access to Belize's main terrestrial border crossing with Guatemala. Within the district, there are 34 villages, many of which are located along the east-west corridor of the George Price Highway between Belmopan and the twin towns of San Ignacio and Santa Elena.
Stann Creek District	The Stann Creek District is located in the southern region of Belize and features an extensive coastline along with several offshore islands, although none of these islands are inhabited. Dangriga, the district's capital and largest

	town in southern Belize, is situated on the coast at the mouth of the Stann Creek River. It serves as the financial and commercial centre of the district, offering a wide range of services including banking, shopping, administrative offices, and medical care, most notably through the Southern Regional Hospital, which also serves the Toledo District. Dangriga is also an important hub for education in the region. The district is home to 23 villages, approximately 10 of which are located on or near the coast. Independence is the largest village, with its growth closely tied to the Big Creek port and its proximity to the Placencia Peninsula. The Placencia Peninsula itself is a major focal point for coastal tourism in Stann Creek, hosting two key villages: Placencia at the southern tip and Seine Bight just north of it. Another notable coastal community is Hopkins village, which is experiencing significant growth and development pressures due to the expanding coastal tourism industry.
Toledo District	The Toledo District is the southernmost district in Belize, bordered by Guatemala to the west and south, and the Caribbean Sea to the east. Punta Gorda, located along the southeastern coast of the district, remains a vital commercial hub despite the 2022 Housing and Population Census revealing it is no longer the most populous settlement in Toledo. The town continues to attract thousands of residents from rural areas throughout the district who come daily for business and trade. Toledo is home to 48 villages, six of which are coastal. Notably, 41 of these villages are indigenous Maya communities that hold communal land rights. Bella Vista, situated along the Southern Highway near the border with Stann Creek District, is now the largest village in Toledo, with a population that has surpassed that of Punta Gorda.

Source: (SIB 2022), (Elections and Boundaries Department 2025)

Population Trends and Patterns

4. Belize's population has been growing rapidly. Over the last 60 years, there has been a fourfold increase in the population with growth rates ranging between 2.5 – 3.8% per annum in the 1980s, 1990's and early 2000's. According to the 2022 Housing and Population Census, the population of Belize is 397,483: growing by 23.3% since the last census in 2010 (SIB 2022). This represents a population growth rate of 1.9% per annum between 2010 and 2022. The figures indicate that the population growth rate per annum has decreased during this most recent intercensal period.

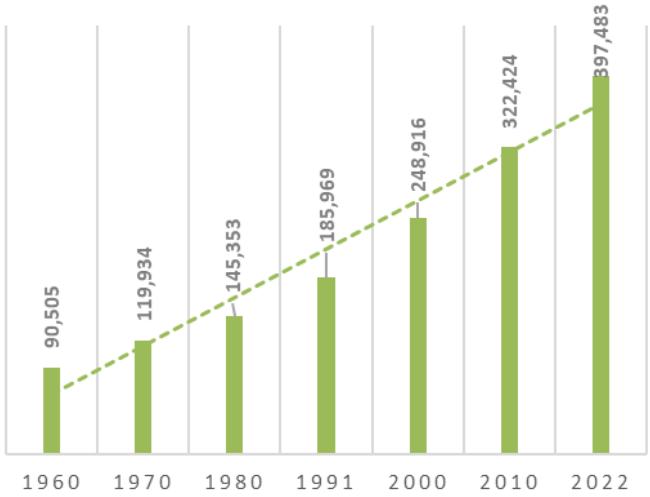


Figure 2: Population Growth in Belize 1960-2022
Source: (SIB 2022)

5. Data from (SIB) 2022 also shows that over half of Belize's population (53.5%) is concentrated in the central region, particularly in the Belize and Cayo districts, which account for 28.6% and 24.9% of the total population, respectively. The northern districts—Orange Walk (13.6%) and Corozal (11.4%)—together make up 25% of the population, while the southern districts account for 21.5%, with Stann Creek comprising 12.1% and Toledo 9.3%, the lowest of all districts. Notably, the fastest-growing district between 2010 and 2022 was Stann Creek, which experienced a 35% increase in population. Cayo followed closely with 32% growth, and Toledo saw a 27% rise. In contrast, growth was more modest in the Belize District (19%), Orange Walk (18%), and Corozal (10%). These population trends highlight a growing and uneven demand for housing across the country, particularly in rapidly expanding districts like Stann Creek and Cayo. This underscores the urgent need for climate-resilient housing solutions, especially in areas vulnerable to climate impacts such as coastal flooding, and hurricanes. As population pressures increase, sustainable urban planning and resilient infrastructure will be essential to ensure safe, secure, and adaptive living conditions for current and future residents.

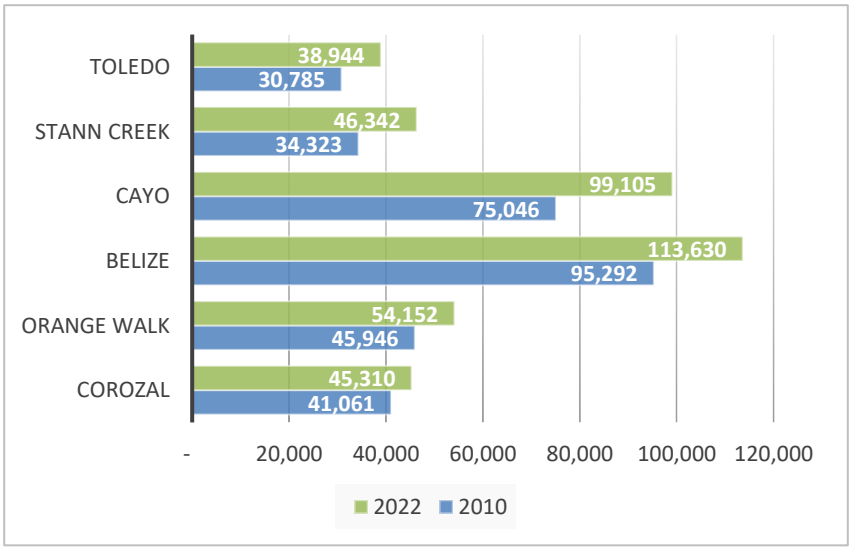


Figure 3: Population Growth by District 2010 and 2022
Source: (SIB 2022)

Household and Housing Characteristics

6. According to the SIB (2022), Belize's population grew by 23.3% during the intercensal period; however, the number of households increased by an even greater margin—rising by 39%, from 79,658 in 2010 to 110,719 in 2022. This significant growth in households is largely attributed to a decline in average household size, which dropped from 4.0 persons in 2010 to 3.6 in 2022. The Toledo District had the highest average household size at 4.0, while the Belize District had the lowest at 3.2. The most notable growth was seen in smaller households: those with 2–3 persons increased by 6.6%, and single-person households rose slightly by 0.3%. In contrast, households with 4–6 persons declined by 1.7%, and those with 7 or more persons decreased by 5.2%. Nationally, the percentage of overcrowded households declined by 6.3%, from 14.3% in 2010 to 8% in 2022. Despite this progress, the Toledo District still had the highest rate of overcrowding at 22%, although this marked a 15.2% decrease since 2010.
7. These shifts in household structure have direct implications for vulnerability to storms and hurricanes. Smaller households, especially single-person and elderly-headed ones, may face greater challenges in storm preparedness, evacuation, and recovery due to limited support networks. On the other hand, overcrowded households, particularly in rural and economically disadvantaged areas like Toledo, are more likely to reside in substandard housing that is less resilient to extreme weather events. The data also highlights a demographic shift in household leadership: while the majority of households (66.5%) are still headed by men, this represents a 5.8% decrease since 2010. Female-headed households now account for 33.5% of all households, an increase of the same magnitude. This change is noteworthy, as female-headed households, especially those led by single mothers, may also face unique socioeconomic vulnerabilities in the face of natural disasters. This is further highlighted by UNWOMEN (2022) Policy Brief “Gender Inequality of Climate Change and Disaster Risk in Belize”, which explains that following hurricanes and storms, although all suffer from property damages, women suffer the most due to their limited access to resources for hazard-proofing their properties.

Conditions and Quality of Housing

8. The findings of the 2022 Housing and Population Census underscore the urgent need for investments in more resilient housing, especially in the face of increasing threats from storms and hurricanes. While over half (53.9%) of homes in Belize are constructed with concrete walls, 30.3% are still built with wood and another 7.8% with highly vulnerable materials such as sheet metal, plywood, and traditional materials like sticks and palmetto. Roofing materials present even greater concern: a staggering 82.9% of homes rely on sheet metal or zinc roofing, which is particularly susceptible to wind damage during hurricanes, while only 12.7% have more resilient concrete roofs. The census also revealed that 30.5% of the housing stock requires minor repairs, 8.4% need moderate repairs, and 7.0% major repairs highlighting the fragility of much of the current stock. Alarmingly, even relatively new homes built between 2010 and 2019 account for 27% of those needing repairs, with 6% of homes built as recently as 2020–2022 also showing signs of structural issues (SIB 2022). This raises serious concerns about the quality of construction and the enforcement of building standards.
9. Furthermore, the data show that homes most in need of repair are predominantly concrete (46.7%) and wooden (34.3%), which could point to poor design or execution, not just material choice. In Belize City, where the housing stock is significantly older than in other parts of the country, vulnerability to severe weather events is even more pronounced. These statistics collectively point to an urgent need for targeted investment in upgrading and reinforcing existing homes, improving construction standards for new builds, and promoting

the use of more durable materials, particularly in vulnerable areas. With the increasing frequency and severity of hurricanes, enhancing the resilience of Belize's housing sector is not just a matter of infrastructure, it is a matter of national safety and long-term economic stability.

Impacts of Climate Variability and Change

10. In Belize, climate change has intensified hydro-meteorological hazards, increasing both the immediate and medium-term vulnerability of the population. These changes are accompanied by significant inter- and intra-annual climate variability. As a result, the country is experiencing more frequent and intense meteorological droughts, floods, storms, and hurricanes. These climate-related hazards continue to impact low-lying coastal plains and densely populated urban areas, causing widespread damage to property, loss of lives, and serious disruptions to livelihoods (NCCO 2021). For the purposes of this project, the sections below describe the climate variables that are either associated with or influenced by the development of storms and hurricanes.

Factors that contribute to Hurricane Development.

11. Analyzing the frequency and intensity of hurricanes is essential to understanding how climate change trends are influencing storm behavior over time. The formation and intensification of hurricanes rely on four primary ingredients: warm ocean waters (at least 26.5°C), a pre-existing weather disturbance such as a tropical wave, low vertical wind shear, and active thunderstorm development.
12. Hurricanes are categorized using the Saffir–Simpson Hurricane Wind Scale with 1 (least severe, exceeding 74 mph winds) to 5 (most severe, exceeding 157 mph winds) rating based on the hurricane's maximum sustained wind speed (Taylor 2010). (NOAA) 2025 considers Category 3 hurricanes (111 mph to 129 mph) or higher to be major hurricanes because of their potential for catastrophic wind damage and significant loss of life due to the strength of their winds. These powerful systems redistribute heat from the tropics to higher latitudes, playing a key role in regulating the Earth's energy balance. Their formation typically begins with a tropical wave—an area of low pressure moving through a warm, moisture-rich atmosphere—usually during the Atlantic hurricane season from June to November. As warm, moist air rises over heated ocean waters, it cools and condenses to form water droplets. This process releases latent heat, which intensifies cloud and thunderstorm development. Continued rising of warm air can lead to a closed, rotating low-level circulation—eventually forming a tropical cyclone or hurricane (Méndez-Tejeda 2023).

Analysis of Frequency and Intensity of Hurricanes for Belize.

13. Figure 4 illustrates Belize's maximum and average air temperatures from 1971 to 2025 based on data provided by the National Meteorological Service (NMS) of Belize to the Caribbean Institute of Meteorology and Hydrology (CIMH) for two locations, the Airport (central coastal) and Central Farm (central inland) stations.

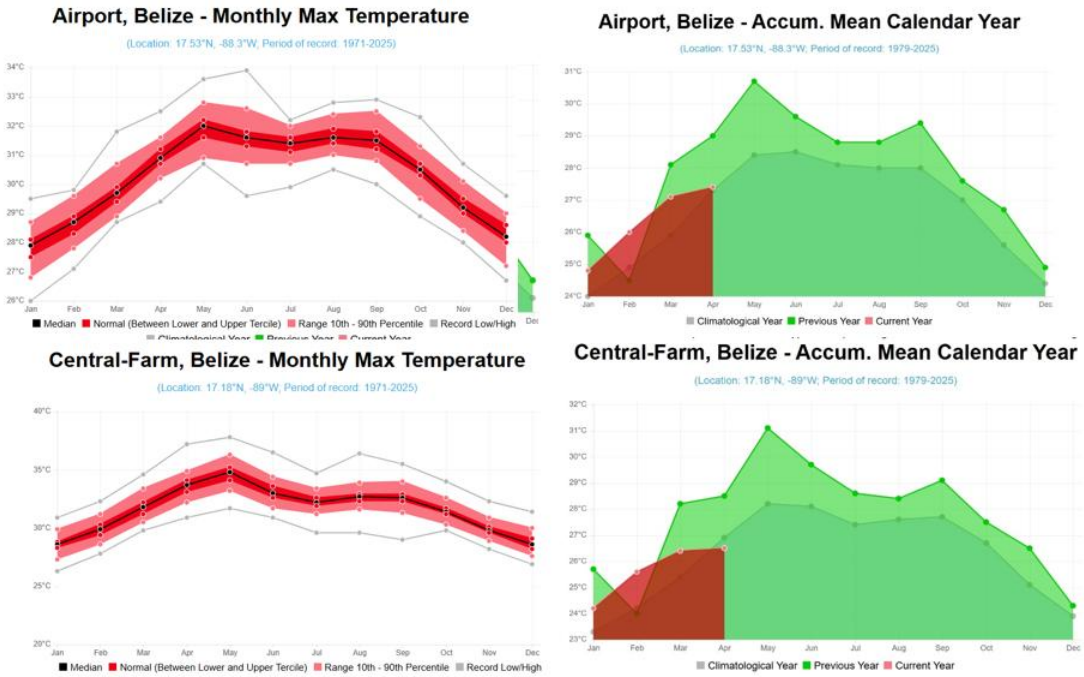


Figure 4: Belize Monthly Max and Mean Temperature (January to December) for 1971-2025
Source: (CIMH 2025)

14. Since the early 1900s, Belize has experienced rising air temperatures alongside increasing carbon dioxide emissions. In 2024, the globally averaged near-surface temperature was 1.55 °C ± 0.13 °C above the 1850–1900 average, which is commonly used to represent pre-industrial conditions. Notably, 2024 was the warmest year on record in the 175-year history of observed surface temperature data. According to (WMO) 2024, each year from 2015 to 2024 ranks among the ten warmest on record.
15. Belize has not been exempted from these global trends. As illustrated in Figure 1, 2024 was also the warmest year on record for the country, with a national average temperature anomaly of 0.8 °C. Temperature records show that 2024 mean temperatures exceeded the climatological average for the 1991–2020 reference period. At the airport station, the record high occurred in June with a maximum of 34 °C, while at Central Farm, the highest temperature recorded was 38 °C in May. The interannual temperature range at these two locations typically falls between 26 °C and 38 °C, highlighting the extent of warming in 2024.

Tropical Cyclones in the North Atlantic Ocean Basin

16. Data from 1860 showed that the North Atlantic Ocean Basin has been highly active in tropical cyclone development, with a total of 1,988 systems recorded in the region. As illustrated in Figure 5, there is a noticeable increasing trend in tropical cyclone activity after 1950 compared to earlier decades. Of the 1,988 systems, the most recent was Tropical Storm Sara, which made landfall in Belize in November 2024. Prior to the 1950s, the highest number of storms recorded in a single year was 20. In contrast, the maximum number of systems observed in one year—31—occurred in 1961, 2000, and again in 2020. Notably, only one tropical cyclone developed in the entire basin in 1914, highlighting the variability in storm activity over time (NOAA 2025).

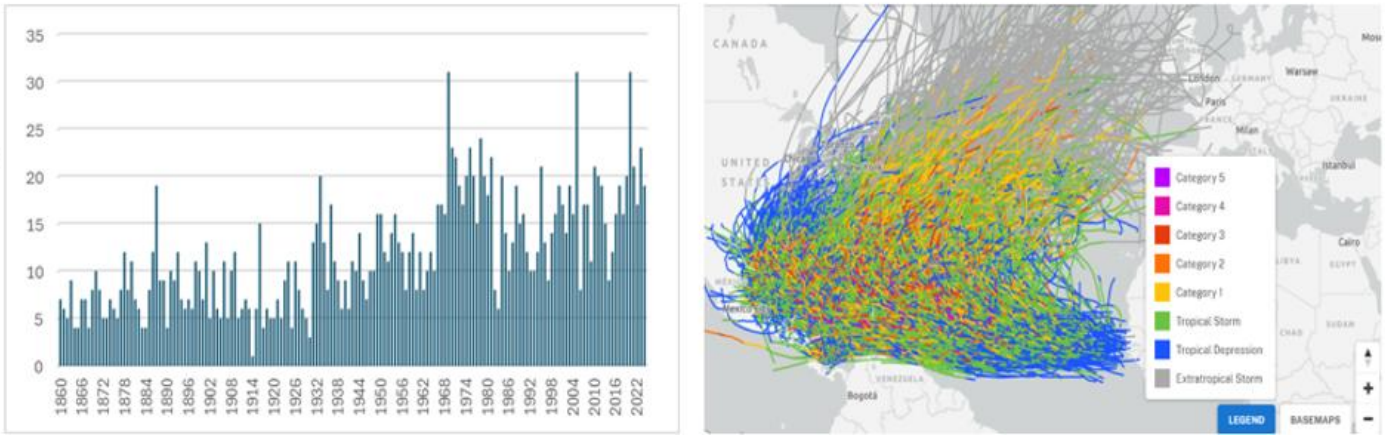


Figure 5: Number of Tropical Cyclones in the North Atlantic Ocean Basin (1860-2022)
Source: (NOAA 2025)

17. Hurricane Intensity and development is also dependent on the accumulated cyclone energy (ACE) index created by William Gray and associates at Colorado State University (Niño 2021). It considers the number, duration, and strength of all tropical storms and hurricanes in ocean basin during the year. Figure 5 depicts the ACE index for the North Atlantic Ocean, and it is used to compare the overall activity of tropical cyclones utilizing tropical storms and hurricanes only and classify the hurricane season as either extremely active, above-normal, near-normal, and below-normal.

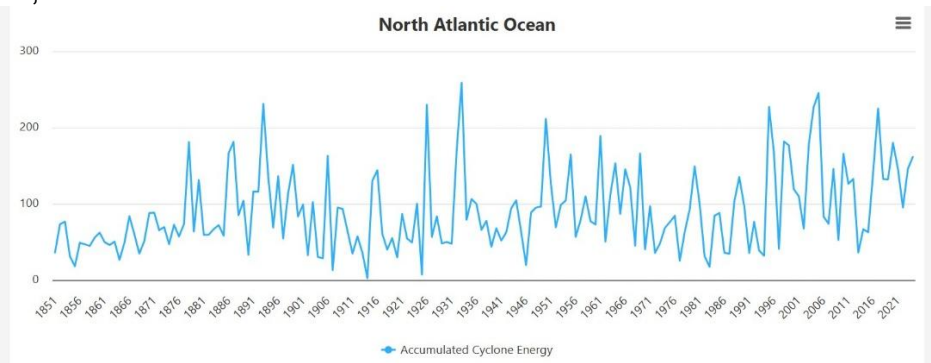


Figure 6: Trends in the ACE Index for the North Atlantic Ocean Basin since 1850.
Source: (NOAA 2025)

18. As shown in Figure 6, the Accumulated Cyclone Energy (ACE) index for the North Atlantic Basin reveals a recurring pattern of heightened activity, with notable spikes in the years 1893, 1926, 1933, and 1950, and again in more recent years such as 1995, 2004, 2005, and 2017. These peaks reflect periods of intensified tropical cyclone activity. While the ACE index demonstrates variability across the past two centuries, there has been no consistent long-term increase in total hurricane activity, even in the face of rising global temperatures during the 20th and 21st centuries. This underscores the complex relationship between climate variability and tropical cyclone dynamics.
19. Climate variability—driven by factors such as the Atlantic Multidecadal Oscillation (AMO), El Niño-Southern Oscillation (ENSO), and other ocean-atmosphere interactions—plays a key role in modulating storm frequency and intensity (Chen 2025). The unpredictability introduced by these natural climate patterns, especially when layered over the long-term warming trend, presents a significant risk for countries like Belize. The irregular yet potentially extreme nature of tropical cyclone activity increases challenges in disaster preparedness and resource planning, heightening the vulnerability of coastal communities.

Hurricanes Making landfall in Belize

20. Figure 7 illustrates trends in the frequency (number of aggregate and major hurricanes) of landfalling hurricanes in Belize since 1850.

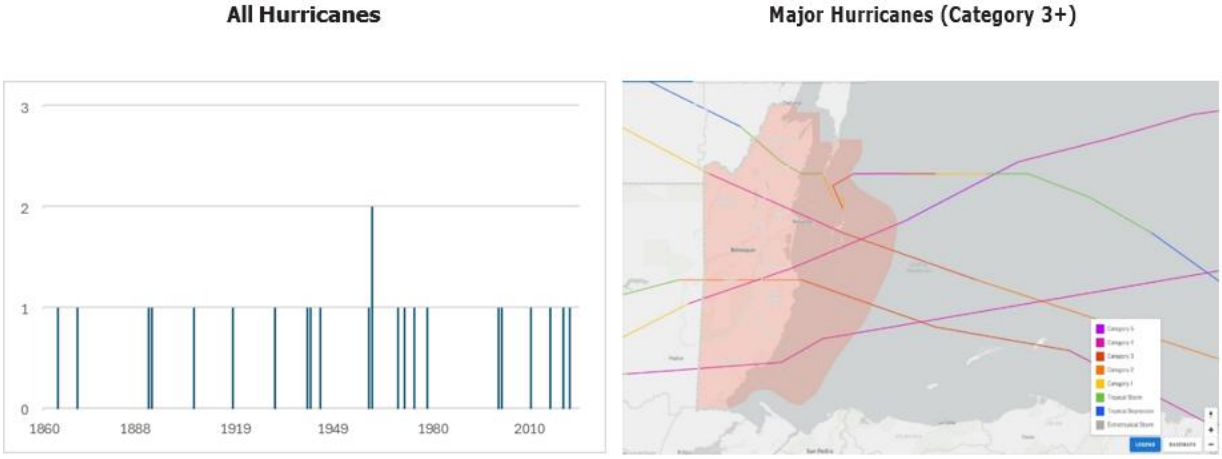


Figure 7: Hurricanes Making Landfall in Belize.
Source: (NOAA 2025)

21. Table 2 illustrates trends in the intensity (presented in terms of central pressure and maximum wind speed) of landfalling major hurricanes in Belize since 1850.

Table 2: the intensity (presented in terms of central pressure and maximum wind speed) of landfalling major hurricanes in Belize since 1850

STORM NAME	DATE RANGE	MAX WIND SPEED	MIN PRESSURE	MAX CATEGORY
IRIS 2001	Oct 04, 2001 to Oct 09, 2001	125	948	H4
KEITH 2000	Sep 28, 2000 to Oct 06, 2000	120	939	H4
GRETA 1978	Sep 13, 1978 to Sep 20, 1978	115	947	H4
HATTIE 1961	Oct 26, 1961 to Nov 01, 1961	145	914	H5
UNNAMED 1931	Sep 06, 1931 to Sep 13, 1931	115	-1	H4

Source: (NOAA 2025)

22. Prior to the 20th century, Belize experienced an average of one hurricane per decade, typically balanced between Category 1 and Category 2 storms. Notably, there were no recorded hurricanes exceeding Category 3 intensity (111–129 mph), indicating that major hurricanes were exceptionally rare during this period. This historical pattern suggests a relatively low frequency and intensity of landfalling tropical cyclones in the region during the pre-industrial era.
23. Figure 7 illustrates that, throughout the 20th century, there is no clear overall trend in the frequency of landfalling hurricanes in Belize, even as global temperatures began to rise. Certain decades saw no landfalling hurricanes. On average, hurricanes made landfall only once per year, with the notable exception of 1961, when both Hurricane Anna (Category 2) and the devastating Hurricane Hattie (Category 5) struck the country in July and October, respectively.
24. However, since the 1950s, the number of hurricanes making landfall in Belize has slightly increased. From 1850 to 1949, only 10 hurricanes made landfall, compared to 13 between

1950 and 2024. A total of five major hurricanes (Category 3 or higher) have historically made landfall, with two of them—Keith (2000) and Iris (2001)—occurring in close succession after the turn of the century.

25. While major hurricanes remain relatively infrequent in Belize, the risk is increasing. According to (IPCC) 2023, the global proportion of major hurricanes (Category 3–5) has increased over the past four decades. Additionally, climate change has contributed to stronger rainfall associated with tropical cyclones and has negatively impacted economic growth, infrastructure, and livelihoods, particularly in vulnerable coastal regions. In Belize, this raises concerns about the resilience of infrastructure, especially given outdated building codes, limited risk transfer mechanisms, and high exposure in coastal zones.
26. Tropical storms, rather than hurricanes, have historically posed the most frequent threat to Belize. Since 1890, a total of 33 tropical storms has made landfall, as shown in Figure 8. Of these, 16 occurred before 1950 and 17 afterward (NOAA 2025). Although the overall number is similar, the past two decades have seen a notable increase in the frequency of landfalling tropical storms, along with a shorter return period. In five separate years, Belize was impacted by two tropical storms in the same season. This pattern mirrors broader trends in the North Atlantic Basin, where tropical storm activity has increased significantly since the 1950s. Most systems maintained tropical storm strength upon landfall, though some weakened rapidly to tropical depressions.

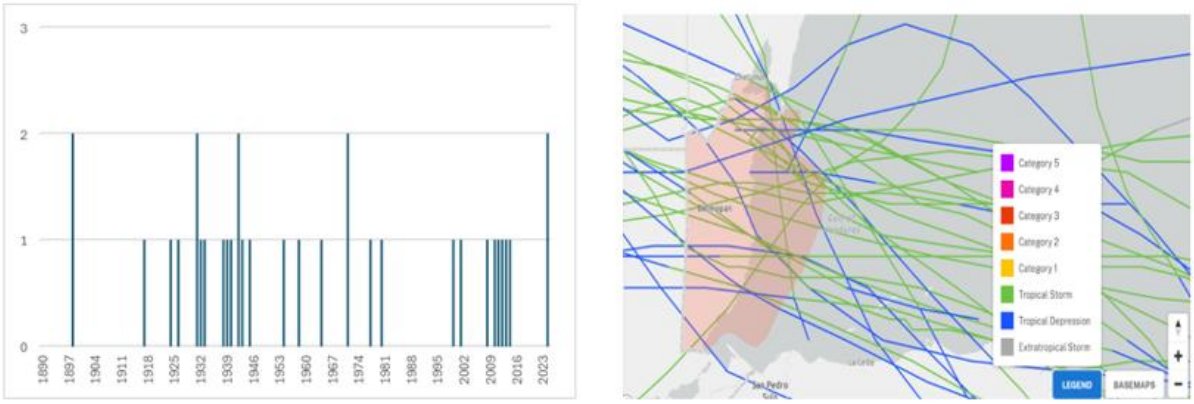


Figure 8: Tropical Storms Making Landfall Belize
Source: (NOAA 2025).

27. Given that tropical cyclones remain the most impactful climate hazard for Belize, their interaction with factors such as poor infrastructure, outdated regulations, and socio-economic vulnerability increases the potential for catastrophic outcomes. While there is still scientific uncertainty regarding how global warming will influence hurricane frequency and intensity worldwide, it is highly likely that the occurrence of major hurricanes (Category 3 or higher) will increase, intensifying the risks for small coastal nations like Belize.
28. In Belize, the impacts of changing storm behavior are of growing concern. Climate change is driving rising sea surface temperatures and shifting atmospheric conditions, contributing to the increased frequency, intensity, and unpredictability of tropical storms and hurricanes. This creates escalating risks to life, property, and infrastructure, especially in vulnerable coastal communities and low-lying urban centers.

Financial Impact of Losses and Damages

29. As described above, the housing sector along Belize's coastal belt is a mix of formal and informal structures, many built with lightweight materials and lacking proper engineering to

withstand hurricane-force winds and flooding. Belize City, the country's most densely populated urban area, is especially vulnerable due to its low elevation and concentration of residents. Hurricane Lisa, which made landfall near Belize City in 2022 as a Category 1 storm, demonstrated the sector's vulnerability. Despite its relatively moderate strength, Lisa caused widespread destruction through storm surge, strong winds, and flooding. According to the (UNDP 2023) Post Disaster Needs Assessment, the housing sector alone sustained BZ$54.4 million in direct damage and an additional BZ$3.5 million in related losses. Belize City accounted for 76% of the damage, with a further 21% occurring in Belize Rural areas. The hurricane affected over 4,483 households and displaced nearly 15,000 people. Belize's vulnerability to storms is long-standing and well-documented. Over the past 15 years, the country has been repeatedly impacted by high-intensity weather events:

- Hurricane Earl (2016): Made landfall as a Category 1 hurricane, damaging over 2,000 homes and causing economic losses exceeding BZ$100 million. Belize City and the Belize River Valley were among the most affected areas.
- Tropical Depression 16 (2008): Caused catastrophic flooding in southern Belize, damaging more than 1,500 homes and displacing thousands, particularly in the Toledo and Stann Creek districts. The Policy Brief on the gendered impacts of climate change posited that Women suffer the most from events such as these, due to poor housing and insufficient resources to build forward better (Fruttero 2024).
- Cumulative Impact: According to NOAA and IFRC data, Belize has suffered storm-related damage nearly every year since 2008, with repeated impacts on housing, infrastructure, and livelihoods.

Financial Loss and damage associated with storms and hurricanes will be elaborated during the development of the full funding proposal.

30. The vulnerability of homes and households is particularly critical. As climate-related hazards become more frequent and severe, residential structures are increasingly exposed to high winds, intense rainfall, and storm surge. These impacts not only damage or destroy homes, but also deepen existing social and economic vulnerabilities, leaving families displaced, traumatized, and without access to basic services. Housing loss disrupts livelihoods, education, and social cohesion, while damage to surrounding infrastructure such as roads, schools, and health facilities further limits emergency response capacity, healthcare, and access to food and water, often compounding the devastation. Despite increasing risks, many households in Belize are compelled to build in high-risk areas due to the scarcity and high cost of safe, developable land. As of September 2024, approximately 89,874 people across 20,562 households were living in multidimensional poverty, representing over 22.1% of the population (Figure 9) (SIB 2024). Consequently, a large number of homes are self-built using substandard materials and often do not comply with building codes.

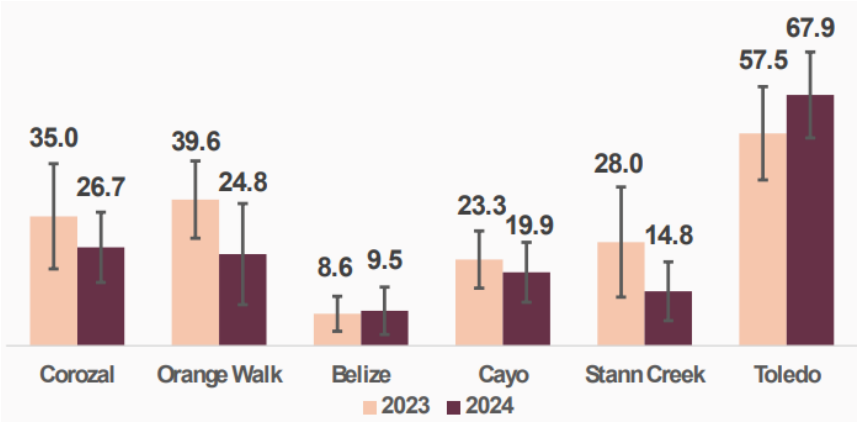


Figure 9: Incidence of Multidimensional Poverty by District, September 2023 and 2024
Source: (SIB, Multidimensional Poverty Study 2024)

31. Adding to the challenge is the lack of access to affordable finance for resilient housing. The high upfront cost of climate-resilient construction, combined with limited access to credit, insurance, or subsidized financing options, makes it extremely difficult for vulnerable families to invest in safer homes. As a result, many remain trapped in a cycle of risk and recovery, unable to rebuild adequately after each event, with repeated shocks further eroding their coping capacity and delaying long-term recovery. To break this cycle, reducing disaster risk must prioritize resilient housing, inclusive land-use planning, and community-based preparedness. Future development must integrate climate change projections and ecosystem considerations, ensuring that construction and infrastructure decisions are (SIB 2024)informed by environmental risk. While this project will examine the vulnerability of the housing stock throughout the entire country, special emphasis will be given to those residing in high-risk, coastal communities. At the same time, expanding access to affordable, gender inclusive finance and technical support is essential to enable low-income households to build safe, durable homes that can withstand future climate shocks. Without these targeted efforts, the risks to homes, livelihoods, and national development will only continue to grow.

Climate Change Projections

32. Understanding the evolving dynamics of storm systems under climate change is crucial for enhancing national preparedness, reinforcing infrastructure resilience. As the climate continues to warm, the frequency, intensity, and behavior of storms and hurricanes are projected to change, posing heightened risks to vulnerable regions. The sections below present an analysis of downscaled climate model projections for Belize, with a focus on key climate variables that influence storm formation and hurricane severity: rainfall patterns, sea level rise, sea surface temperatures, air surface temperatures, and hurricane activity. This analysis provides critical insights into how future climatic shifts may shape the risk landscape for extreme weather events in Belize.
33. The Government of Belize, through the National Climate Change Office, supported the development of a Climate Change Model as part of its efforts to inform the development of the National Climate Change Policy and Master Plan in 2021. This strategic initiative aimed to strengthen the country's capacity to anticipate and respond to the long-term impacts of climate change. This section outlines the results from Model developed for Belize, covering a 100-year projection period from 2021 to 2121. Climate projections were generated for the base year (2021) and at future intervals of 25, 50, 75, and 100 years—namely 2046, 2071, 2096, and 2121. Also, since its Fourth Assessment Report (AR4), the IPCC introduced four Representative Concentration Pathways (RCPs), which project how GHG concentrations

may evolve due to human influence through to the year 2100. The four RCPs—RCP2.6, RCP4.5, RCP6.0, and RCP8.5—are named according to their estimated radiative forcing values (in watts per square meter) by 2100, relative to pre-industrial levels. RCP2.6 represents the most ambitious mitigation scenario, while RCP8.5 reflects the most extreme emissions trajectory. These RCPs were used as the foundation for the climate projections presented here, allowing for analysis of Belize's future climate under a range of internationally recognized emissions pathways (NCCO 2021).

Climate Model Outputs:

Rainfall

34. The annual rainfall trend prediction was derived using a regression analysis between the year and the predicted urban surface values. These values were extracted by modeling the urban surface on a per-pixel basis. A pixel size of 6 × 6 km was chosen, as it provided the strongest correlation between urbanization and rainfall patterns. To model rainfall in non-urban areas, a grid of 21 × 21 km was used. This larger grid size produced correlation results comparable to those from the 6 × 6 km model, while being large enough to minimize the influence of urbanization. Within this grid, data between nearby locations were interpolated using a scalar field gradient, ensuring smooth transitions between measured values.
35. Seasonal rainfall differences were incorporated into the CCM (Climate Change Model) by analyzing variations between wet and dry seasons. A threshold of 100 mm/month was used to define the seasonal boundary, following research on the narrowing gap between wet and dry season precipitation and its effects on vegetation productivity. For Belize, the wet season was defined as June through November, and the dry season as December through May. To assess changes over time, annual rainfall anomalies were calculated by summing values across all sampled locations (Table 2). These anomalies serve as indicators for evaluating future seasonal shifts due to climate change.

Key Findings include:

• Overall Decline in Rainfall: A general decrease in mean annual rainfall is expected across Belize, with a slight increase projected near the mountainous southern regions.
• Expansion of Dry Zones: Dry areas are predicted to expand, while rainfall will increasingly concentrate in mountainous regions.
• Urbanization Impact: Increased urban development will lead to decreased rainfall, as forested areas—critical for water vapor retention and cloud formation—are replaced by urban and agricultural land, reducing the likelihood of precipitation.
• Dry Season Stability: Rainfall quantities and frequency during the dry season are not expected to change significantly.
• Wet Season Intensity: While the number of rainy days in the wet season will decline, rainfall events will become more intense, resulting in a higher frequency of torrential downpours.

Table 2: Rainfall Predictions Over the Next Century in Belize (mm)

Time frame	Value	Current (2021)	25 Years	50 Years	75 Years	100 Years
Wet Season	Max	290.2	269.8	249.4	229.1	219.9
	Min	49.3	16.1	0.0	0.0	0.0
Dry Season	Max	167.6	156.9	153.4	153.6	153.8
	Min	0.0	0.0	0.0	0.0	0.0
Annual Total	Mean	107.4	89.9	74.7	61.8	50.5

Source: (NCCO 2021)

36. The projected changes in rainfall patterns across Belize over the next century have significant implications for flood risk, particularly in relation to storms and hurricanes. Although overall annual rainfall is expected to decline, the concentration of rainfall in mountainous regions, combined with more intense precipitation events during the wet season, raises concerns about localized flooding. The increased intensity of rainstorms means that when storms and hurricanes do occur, they are more likely to produce sudden, heavy downpours that can overwhelm drainage systems and riverbanks, leading to flash floods and landslides, especially in vulnerable mountainous and urbanized areas. Furthermore, the expansion of dry zones may reduce soil moisture retention, making these areas more susceptible to rapid runoff during intense storms, exacerbating flood risks downstream. Urban expansion, which reduces forest cover, further compounds the problem by diminishing the natural capacity of landscapes to absorb and regulate water flow, increasing surface runoff and flood potential. Although the frequency of rainy days in the wet season may decrease, the higher intensity of rainfall events implies that flood risks during storms and hurricanes could increase, demanding improved flood management strategies and resilient infrastructure to protect communities across Belize.

Sea Level Rise

37. To observe the sea level rise affecting Belize, the nearest points to the coastline had to be studied. The metadata used was defined by a grid, marked with minimum and maximum latitude and longitude. This allowed the determination of whether the grid intersected with land, and the measurements were saved accordingly. A total of five points along the coastline had been identified where daily measurements were recorded from 1993 to 2020.

Key Findings include:

• The actual mean sea level (MSL) increase rate observed—3.7 mm/year—has been found to fit perfectly with the observations and predictions of the IPCC, aligning closely with Scenario RCP2.6.
• The physical model concluded that the rise in sea level had recently accelerated, consistent with the IPCC's high-confidence suggestions.
• Around the year 2080, the RCP models could be clearly distinguished, and beyond that point, the sea level rise under the worst-case scenarios was projected to increase much more rapidly than under other RCP models.

38. The sea level rise in Belize had been modeled according to the RCP2.6, RCP4.5, and RCP6.0 scenarios, with results over the next 100 years shown in the table 3.

Table 3: Sea Level Rise Predictions over the next Century in Belize

Model	Current (2021)	25 Years	50 Years	75 Years	100 Years
RCP2.6	Set level 0	+ 9.13 cm	+16.40 cm	+ 25.70 cm	+ 35.00 cm
RCP4.5	Set level 0	+ 9.14 cm	+ 20.40 cm	+ 45.10 cm	+ 91.30 cm
RCP6.0	Set level 0	+ 9.14 cm	+ 21.50 cm	+ 49.50 cm	+ 103.90 cm

Source: (NCCO 2021)

39. The observed mean sea level rise of 3.7 mm per year, which closely aligns with the IPCC projections under Scenario RCP2.6, indicates a steady upward shift in baseline sea levels along the Belizean coast. This rise means that during hurricanes and tropical storms, the starting water level for storm surges will be higher than before. As a result, even storms of moderate strength could cause more extensive coastal flooding, putting communities and infrastructure at greater risk.
40. Furthermore, the recent acceleration in sea level rise identified by the physical model and supported by IPCC assessments with high confidence suggests that this threat is intensifying. As sea levels rise faster, storm surges during hurricanes will become more severe, leading to increased flooding, stronger wave action, and more significant erosion of natural coastal defenses such as mangroves and coral reefs. These changes can exacerbate the damage caused by storms, making coastal areas more vulnerable.
41. Looking ahead to around 2080, the differences between the RCP scenarios become more distinct. The worst-case scenarios predict a much more rapid rise in sea levels, which could significantly amplify the destructive potential of hurricanes and tropical storms. Under these conditions, coastal flooding and damage could become much more frequent and severe, making it essential for Belize to implement stronger adaptation measures. This includes reinforcing coastal defenses, improving evacuation infrastructure, and adopting land-use policies that reduce vulnerability to storm impacts.

Sea Surface Temperature

42. The C3S Sea Surface Temperature dataset provides daily data from 1982 to 2020, encompassing 1,270 data points that extend from the coastline to the longitude 87.216442°W, corresponding to a spatial resolution of 4x4 km grids. Sea surface temperature predictions were performed on a point-by-point basis. Initially, a polynomial model capturing the monthly variations was developed as an additive composition, which plots the number of data points deviating from the mean trend each month. This model effectively reproduces the monthly temperature patterns (see Figure 15), illustrating the annual upward trend in sea surface temperature.

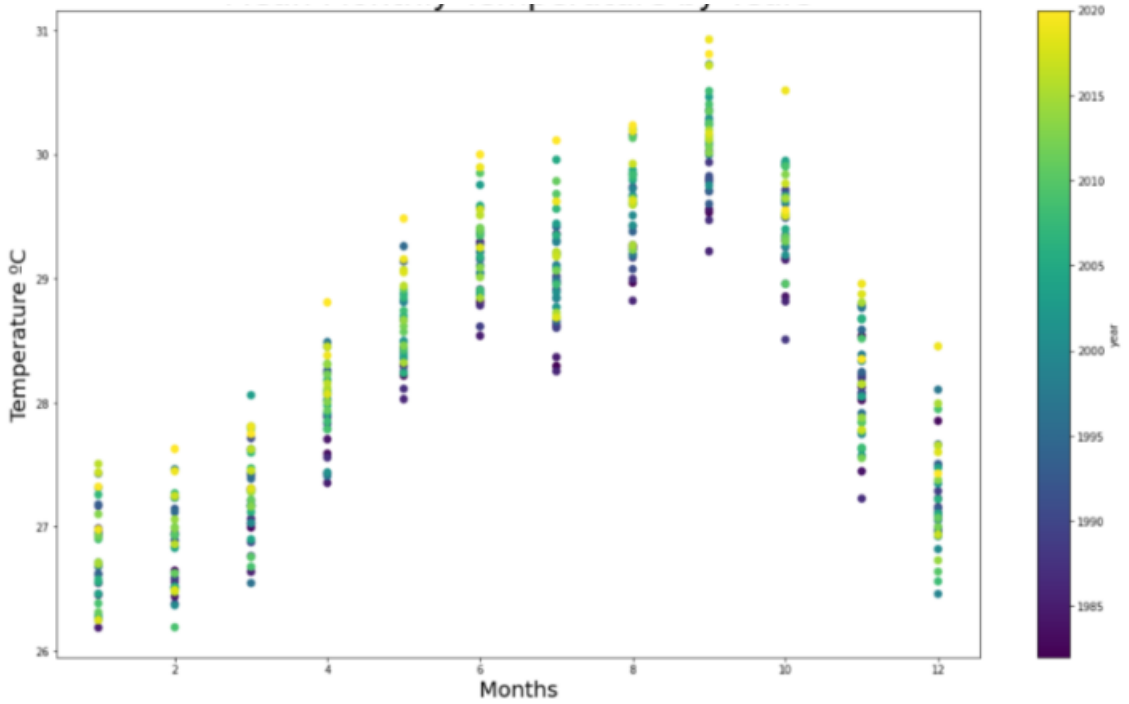


Figure 10: Value of the Sea Surface Temperature per month and year (1982 to 2020).
Source: (NCCO 2021)

43. Table 4 presents the projected sea surface temperatures for coastal regions surrounding Belize over the next 100 years. It details the spatial distribution of mean sea surface temperatures for each quarter at 25-, 50-, 75-, and 100-year intervals.

Table 4: projected sea surface temperatures for coastal regions surrounding Belize

Current (2021)	25 Years	50 Years	75 Years	100 Years
28.19°C	28.67°C	29.20°C	29.58°C	30.06°C

Source: (NCCO 2021)

Key Findings include:

- The mean sea surface temperature is projected to increase by 1ºC within the first 50 years, followed by an additional 0.7ºC rise over the next 50 years. Notably, maximum temperature peaks are expected to persist for longer durations than currently observed.
- Temperature increases will be more pronounced offshore, primarily due to Ekman transport.
- Chetumal Bay will experience the highest temperatures, remaining approximately 2ºC warmer than surrounding waters for periods exceeding four months.
- Significant seasonal variability in the rate of temperature increases and decrease is expected. The underlying causes of these seasonal fluctuations are currently under investigation.

44. The projected rise in sea surface temperatures poses significant implications for the intensity and behavior of storms and hurricanes in the region. An increase of 1ºC in the first 50 years, followed by an additional 0.7ºC in the subsequent 50 years, will likely provide more energy to tropical cyclones, increasing their frequency, strength, and duration. Of

particular concern is the persistence of high temperature peaks, which could extend the hurricane season and prolong the conditions necessary for storm formation. Warming is expected to be more pronounced offshore, especially due to Ekman transport, which may contribute to rapid storm intensification before landfall—leaving less time for communities to respond. Chetumal Bay is projected to become a regional hotspot, remaining up to 2ºC warmer than surrounding waters for extended periods. This localized warming could amplify storm surge risks and extreme rainfall events in adjacent coastal areas. Additionally, the seasonally variable rate of temperature increase adds uncertainty to forecasting, complicating efforts to predict storm behavior and increasing the need for adaptive, responsive disaster preparedness strategies.

Surface Air Temperature

45. The mean surface air temperature in Belize is projected to rise over the next 100 years. Under an optimistic scenario (RCP 2.6), the maximum temperature could increase up to 2°C, while the mean temperature may rise by approximately 0.7°C. Regardless of the scenario, extreme temperature events—both unusually high and low—are expected to become more frequent, even as the mean temperature increases.
46. In terms of extremes, under a pessimistic scenario (RCP 4.5), temperature anomalies could reach ±8°C from the mean within the next century. Under the more optimistic RCP 2.6 scenario, the variation is expected to be ±6°C (Table 5). As a result, Belize will likely experience more frequent and intense heatwaves and cold spells, with extreme hot and cold months becoming increasingly common.

Key Findings Include:

• Temperature Rise Expected: Belize's mean surface air temperature will increase over the next 100 years, with up to 0.7°C rise in mean and 2°C in maximum temperatures under the optimistic RCP 2.6 scenario.
• More Extreme Events: Extreme heat and cold events will become more frequent and intense under all climate scenarios.
• Greater Temperature Variability: Temperature extremes could vary by ±6°C (RCP 2.6) to ±8°C (RCP 4.5) from the mean, leading to more recurring heatwaves and cold spells.
• Uneven Geographic Impact: Temperature changes will be uneven across Belize, with cooler southern mountains and hotter conditions shifting depending on the scenario; differences between models will become clear by 2080.

47. These temperature changes will not be evenly distributed across the country. Spatial variations will depend on the emissions scenario considered. Under the optimistic RCP 2.6 model, the southern mountainous regions will remain the coolest areas, while the northwestern part of northern Belize will experience the most intense heat. In contrast, under the pessimistic RCP 4.5 model, the highest temperatures will shift toward the southern and coastal areas. The divergence between these two climate projections will become more evident by around 2080.

Table 5: Mean Air Surface Temperature Projection in Belize

Model	Parameter	Current (2021)	25 Years	50 Years	75 Years	100 Years
RCP2.6	Max	24.68°C	25.16°C	25.16°C	25.83°C	26.42°C
	Min	19.96°C	19.96°C	19.96°C	19.96°C	19.96°C
	Mean	22.92°C	23.17°C	23.20°C	23.40°C	23.61°C
RCP 4.5	Max	24.68°C	25.23°C	26.11°C	29.00°C	32.65°C
	Min	20.15°C	20.15°C	20.15°C	17.71°C	14.11°C
	Mean	22.93°C	23.23°C	23.32°C	23.60°C	23.92°C

Source: (NCCO 2021)

48. Rising surface air temperatures in Belize—projected to increase by up to 2°C in maximum values and 0.7°C in mean values under the optimistic RCP 2.6 scenario—have serious implications for storm and hurricane activity. Warmer air leads to warmer ocean surface temperatures, which fuel tropical storms and hurricanes. As a result, Belize is expected to face more intense and possibly more frequent hurricanes, even under lower-emission scenarios, putting homes and communities at greater risk.
49. The projected increase in extreme temperature events—ranging from ±6°C under RCP 2.6 to ±8°C under RCP 4.5—can further destabilize atmospheric conditions. These fluctuations increase the likelihood of sudden, severe storms. Stronger winds, heavier rainfall, and storm surges can damage or destroy homes, particularly in low-lying coastal and flood-prone areas. Informal settlements and poorly constructed buildings are especially vulnerable, increasing the risk of displacement and long-term economic hardship for affected households.
50. In addition, more frequent heatwaves and cold spells will stress household infrastructure and daily life. High temperatures can degrade roofing materials, strain energy systems (due to increased cooling needs), and compromise indoor comfort and safety—especially for vulnerable populations such as the elderly, young children, and those with pre-existing health conditions. Cold spells, though less common, can also catch households unprepared, leading to discomfort and health risks in poorly insulated homes. The uneven distribution of warming across Belize—hotter conditions in the north and along the coast, cooler zones in southern mountainous areas—may also shift the geographic concentration of storm impacts. Coastal and lowland communities, already at higher risk of hurricanes, may face greater destruction and displacement. By 2080, the differences between climate models will become more pronounced, further highlighting the need for climate-resilient housing, improved building codes, and targeted support for at-risk households.

Inland Flooding

51. Predictions of inland flooding in Belize were based on rainfall, sea surface temperature, and air surface temperature data. The primary assumption is that inland flooding results mainly from heavy rainfall and extreme storms causing rivers to overflow. The model developed for Belize (CCM model) does not consider urban flooding from poor drainage systems due to the complexity of factors involved; it focuses solely on flooding caused by river overflow. Belize's districts are divided into three zones (A, B, and C) based on geoclimatic conditions affecting flood risk (Table 6):
    - Zone A (Cayo, Stann Creek, Toledo): Located on the slopes of the Mayan Mountains, the rainiest region in Belize. This zone experiences high flash flood risk due to heavy rainfall accumulation on steep slopes and proximity to rivers like the Macal and Rio Grande. While some rainfall is absorbed by the soil, extreme rainfall events and river

overflows pose a significant flood risk.

- Zone B (Belize District): Characterized by many rivers, including the Belize River and its large tributaries (Macal and Mopan Rivers) that originate from Zone A. During rainy seasons, these rivers carry excess water from Zone A, increasing flooding risk. The low elevation and medium rainfall levels, combined with heavy tropical storms and hurricanes, further contribute to flooding in this zone.
- Zone C (Orange Walk, Corozal): The driest region with only three major rivers (Hondo, Booths, and New River), resulting in lower risk from rainfall or river overflow. However, this zone is highly vulnerable to flooding triggered by hurricanes and extreme weather events.

Table 6: Flood Risk in Belize by Zone and Flood Type

Zone	Districts	River Overflow		Hurricanes		Rainfall	
		Risk	Trend	Risk	Trend	Risk	Trend
Zone A	❖ Cayo ❖ Stann Creek ❖ Toledo	High	↗	Low	→	Medium	↗
Zone B	❖ Belize	High	↗	High	↗	High	↗
Zone C	❖ Orange Walk ❖ Corozal	Low	↘	High	↗	Low	↘

Source: (NCCO 2021)

Belize is expected to face stronger and more frequent hurricanes and storms over the next century due to rising air and sea surface temperatures, especially in northern regions. Although overall rainfall may decrease, intense rain events combined with hurricanes will increase flooding risks, particularly in Belize District and southern areas with major rivers. Warmer ocean waters will fuel storm intensity and reduce weakening when storms reach land. Additionally, rising sea levels will exacerbate coastal flooding and saltwater intrusion, further threatening vulnerable communities. This highlights the urgent need for investment in critical infrastructure, such as resilient homes and community-based shelters, to better protect people and livelihoods in a changing climate.

Hurricanes

52. The increase in global air temperature is expected to influence storm and hurricane formation in two main ways. First, it may reduce the strength of atmospheric convection due to a smaller temperature difference between the Earth's surface and the upper atmosphere. Second, it can lead to a decrease in the density of the troposphere. Both effects suggest that the overall formation of hurricanes may remain stable or even decline slightly. However, when focusing on the most intense storms—specifically Category 4 and 5 hurricanes—climate models indicate a different trend. Once global warming reaches +2ºC, a threshold aligned with IPCC projections and specific forecasts for Belize, the intensity of these storms is expected to increase by approximately 13%. This projected increase is largely due to higher atmospheric moisture from increased temperatures and reduced ocean salinity, which further enhances humidity. On the other hand, warming of the ocean's surface tends

to occur in layers, meaning the deeper water remains cooler, potentially limiting the energy available to fuel hurricanes. Yet, in the case of Belize, the presence of the Mesoamerican Barrier Reef—about 80 kilometers offshore—creates a shallower ocean profile that reduces the effects of temperature stratification. This allows hurricanes approaching the coastline to continue drawing energy from the warm surface waters, potentially sustaining or even increasing their intensity as they near land.

53. The information provided below will describe how the behavior of hurricanes or tropical storms are expected to change as they approach the coasts of Belize. It is noteworthy that hurricanes tend to develop a northward component in their movement. This trend is evident in the consistently positive difference between the initial and final latitudes of storm tracks. Such a pattern could have important implications for how hurricanes may behave in the future, especially in the context of a changing climate. The trajectory of cyclonic-anticyclonic systems impacting Belize can be classified into three general patterns, each with distinct implications for different regions of the country (Figure 11):

- Type 1 – Affecting Zone A:

54. In this scenario, the Mayan Mountains act as a barrier separating the cyclonic and anticyclonic systems. This separation allows the cyclone to make landfall with a degree of intensity due to the conservation of angular momentum. As one of the adjacent anticyclonic systems moves away, the cyclone's core expands, drawing in more energy. However, shortly after making landfall, the storm's intensity diminishes due to the lack of oceanic energy input. Because the anticyclonic systems are separated, this path does not usually produce significant rainfall. Additionally, Zone A maintains relatively high baseline rainfall levels, which means the land can absorb storm precipitation more effectively, reducing the risk of flooding. The probability of this path occurring depends on the likelihood of the storm having a sufficiently strong southerly component. Based on historical data, the probability of this type of trajectory is estimated at a maximum of 12%. At present, there are no climate projections that suggest an increase in the frequency of this type of hurricane path.

- Type 2 – Affecting Zones A and B:

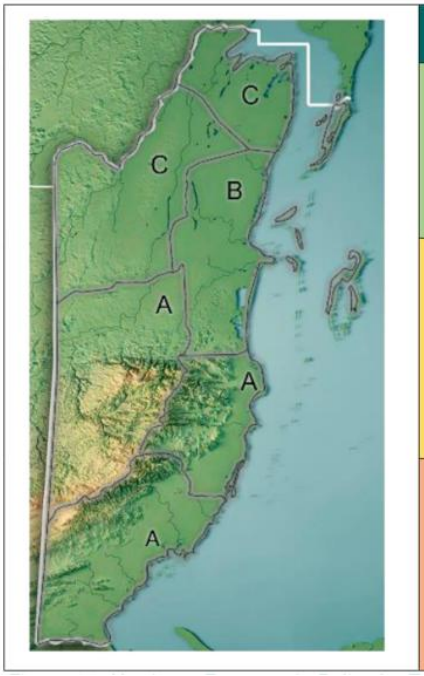
55. When the alignment of anticyclonic centers runs parallel or perpendicular to the coastline, the Mayan Mountains compress the system, initially slowing its progress and causing it to release a large volume of precipitation. Climate projections indicate that rising land surface temperatures and decreasing rainfall could intensify the impact of this path. Reduced rainfall would lead to drier, less permeable soils, which would take longer to absorb stormwater. This slower absorption increases the time the water remains on the surface, allowing for greater heat transfer from the land to the storm—fostering the Brown Ocean Effect. This phenomenon, in which the storm retains or gains energy from saturated warm soils, could become more prevalent. Due to the country's topography, Zone B would be most affected by this type of storm, and over time, the increased surface temperatures and soil saturation could amplify the Brown Ocean Effect, especially in northern Zone A and central Zone B. Currently, storms following this path are mostly major hurricanes (around 60%), although the Brown Ocean Effect has not yet been significantly observed.

- Type 3 – Affecting Zones B and C:

56. If the system takes a more northerly path and the anticyclone is the first to interact with the Mayan Mountains, the storm is redirected northward. This trajectory leads the cyclone through areas already affected by reduced rainfall, resulting in highly saturated soils that amplify the Brown Ocean Effect due to the land's elevated surface temperatures. Moreover, the area between the mainland and Ambergris Caye acts as a persistent heat reservoir, supplying the storm with significant energy. Again, due to the conservation of angular momentum, the storm's core expands as it approaches the coast, increasing its destructive

potential. Although this type of storm path is currently the least frequent, projections suggest its occurrence will increase over time. This pattern is also expected to be the most destructive due to both the energy the system acquires and its prolonged movement over land, greatly increasing risks in Zone C, particularly in terms of flooding.

57. One reason for the increasing likelihood of northerly trajectories is the observed slowdown in storm movement. Since 1947, the average forward speed of storms and hurricanes has decreased by 17%. This slowdown enhances the Coriolis effect, causing storms to veer further north. It is also believed that reduced atmospheric convection contributes to this trend. These shifts suggest that, while currently less common, Type 3 storms may become significantly more frequent and damaging in the future, a finding echoed in multiple studies.



Zone	Exposure	Trend
Zone A	Low	Decreasing
Zone B	Medium	Increasing
Zone C	High	Increasing

Figure 11: Projected Hurricane Exposure in Belize by Zone
Source:(NCCO 2021)

Key Findings include:

- Belize is highly vulnerable to hurricanes due to its location along frequent storm paths in the northwestern Caribbean.
- Northern Belize, especially Ambergris Caye and Caye Caulker, is at highest risk, being the usual entry-exit point for hurricanes.
- Subtropical high-pressure systems influence hurricane paths, steering storms northward through Belize.
- Warm ocean waters and the brown ocean effect increase hurricane strength and inland impact, highlighting the need for better water drainage infrastructure.

National Disaster Preparedness Baseline Assessment

58. In 2021, the Government of Belize, through the National Emergency Management Organization (NEMO) and with support from the Pacific Disaster Center, conducted a National Disaster Preparedness Baseline Assessment (Annex 2). The assessment identified critical gaps and systemic challenges that continue to hinder effective disaster management (DM) and disaster risk reduction (DRR) efforts.
59. A key finding was the chronic insufficiency of financial resources, which affects nearly every

aspect of disaster management. The current DM budget is embedded within individual agency budgets rather than allocated as a dedicated national line item. Legislation does not mandate funding for DM activities, and NEMO's budget is largely limited to operational costs, basic training, and hurricane preparedness. Critical needs such as infrastructure upgrades, hurricane relief, and emergency operations are addressed on an ad hoc basis, as no contingency or relief funds exist. This reactive funding model limits the country's ability to implement proactive, long-term disaster resilience programs. The assessment also found that the enabling environment—including the legal and institutional framework—remains underdeveloped.

- Gaps in legislation governing all phases of disaster management

60. There are significant gaps in legislation governing all phases of disaster management, legal provisions for international cooperation, mandates for institutional structures at national and sub-national levels, and procedures for resource mobilization during emergencies. Additionally, disaster management legislation is not fully integrated or well understood across government entities. While existing plans such as the National Hazard Mitigation Plan (NHMP) are structured into volumes addressing various hazards and functions, most are outdated or incomplete, with some over a decade old.
61. The National Disaster Preparedness and Response Plan (NDPRP), which is legally required to be updated annually under the Disaster Preparedness and Response Act (2000), is meant to define preparedness protocols across ministries, coordinate implementation, and establish command structures, which are not currently in place. Although continuity of operations (COOP) and continuity of government (COG) planning is required, most plans remain under development. Belize has a dedicated Emergency Operations Center (EOC), but it is under-resourced and not fully capable of coordinating large-scale disaster response. Further, Belize participates in the Caribbean Catastrophe Risk Insurance Facility (CCRIF), coverage remains limited due to affordability issues, resulting in low private sector participation. Collectively, these findings highlight the urgent need for comprehensive policy reform, capacity development, and investment in disaster preparedness and risk reduction systems.

- Lack of Disaster Management plans and strategies at national or local levels

62. There is a general absence of comprehensive disaster management (DM) plans and strategies at both the national and local levels, which limits the ability to guide and sustain capacity development efforts. Additionally, there are no formal assessment protocols in place to evaluate DM capacity or resource needs, primarily due to limited structured, forward-looking planning in this area. Although NEMO is the designated agency responsible for coordinating and supporting DM and disaster risk reduction (DRR) capacity development in Belize, it currently lacks the formal authority to mandate regular national-level training and exercises. As a result, such activities are carried out on an ad hoc basis. While training is included as a recurring budget item, it is often managed by staff who also have other full-time responsibilities. NEMO lacks the necessary resources to offer consistent, high-quality training and education programs. Although the organization conducts public awareness and education initiatives, the scale and effectiveness of these efforts remain unclear. Support for professionalizing disaster management through higher education is still in its early stages. Overall, capacity development in Belize is significantly constrained by the lack of strategic planning, institutional capacity, and financial resources.
63. There is also limited capacity and resources necessary to conduct comprehensive risk assessments, and NEMO does not maintain risk mapping capabilities. There are no institutionalized mandates or mechanisms requiring regular risk assessments, even though such assessments are essential for informing disaster management (DM) and disaster risk

reduction (DRR) planning. As a result, risk assessments are not routinely performed. The use of Geographic Information Systems (GIS) for risk data collection and analysis is absent, and there are no regulatory requirements at the national or subnational levels for risk-based planning. These gaps also hinder capacity development efforts and limit the ability to integrate risk data into the national development process. While some progress has been made in communication and information management, particularly in disaster assessments, significant gaps remain.

- Early warning systems are fragmented and lack centralization

64. Major hazards are monitored, with NEMO coordinating hazard information based on advisories from the National Meteorological Service (NMS) or the Ministry of Natural Resources (MNR), using up-to-date methods for certain hazard types. However, early warning systems (EWS) are fragmented and lack centralization. Notification methods vary by location, and in many areas, hazard alerts are still delivered door to door by Community Disaster Response Team (CDRT) volunteers. Although standard procedures for early warning are in development, current systems remain heavily reliant on volunteer networks, particularly in rural or underserved areas. EWS coverage is estimated to reach only a portion of the population, and while some communities receive pre-disaster training, consistent public education on early warning messages and response actions is lacking.

- NEMO's Damage Assessment and Needs Analysis

65. NEMO's Damage Assessment and Needs Analysis (DANA) Committee has a Plan of Action that outlines procedures for initiating assessments within two to eight hours after the onset of a disaster. These assessments inform critical decisions, including the declaration of disaster events, and generally show strong performance in immediate post-disaster contexts. However, while assessment data play an important role in incident response planning, they are not systematically integrated into long-term preparedness efforts. This is partly due to the absence of mechanisms for incorporating both pre- and post-disaster data into risk modeling and predictive analysis, which limits Belize's ability to reduce vulnerability and build resilience to future events.

<u>Financial Barriers to Climate-Resilient Housing in Belize.</u>

66. In Belize, the financial sector consists of a mix of formal, semi-formal, and informal entities, including domestic and international banks, credit unions, and insurance companies. Despite this diversity, the system is highly concentrated, with the three largest domestic commercial banks controlling approximately 84% of the market's assets, loans, and deposits. This concentration results in limited competition, which typically correlates with higher financing costs and less accessible services. The high cost of financing remains a significant barrier for many Belizeans, especially those seeking to build climate-resilient homes. While the country's financial system has deepened over time, it has shown a consistent decline in recent years. The average lending rate in Belize is around 9%, significantly higher than the weighted deposit rate of 1.2%. The difference, or interest rate spread, remains substantial at 7.1% as of 2018, reflecting the high-risk premiums and inefficiencies within the market. Compounding this lack of access to affordable financing is the challenge of inequity in accessing finance. Accessing loans are more common among men, who receive 61% of bank loans, compared to 39% for women (UNWOMEN et. al, 2021). Where residential lending is concerned, more loans were provided to men, but the sizes of the loans are similar for men and women. Among indigenous communities, ownership of land and property (predominantly male) is related to why there are more men accessing these financial resources.
67. Access to affordable finance for critical needs such as climate-resilient housing is further

limited by underdeveloped financial infrastructure, shallow capital markets, and low financial literacy. While the government and some private players have introduced small-scale financial products targeting underserved groups, including women, small farmers, and rural communities, these initiatives remain limited in scope and have not reached widespread adoption. The absence of innovative, targeted financial products—such as affordable microfinance for climate-resilient homes—combined with regulatory and technological barriers, prevents many Belizeans from accessing financing solutions that could help them build more resilient housing in the face of increasingly frequent storms and floods. A more competitive, inclusive, and innovative financial ecosystem is needed to reduce financing costs and expand access to affordable, climate-adaptive housing solutions.

An indebt analysis on the financial Barriers to climate resilient housing will be conducted during the development of the full funding proposal.

Other Needs and Barriers to be addressed.

68. Strengthening climate adaptation and early warning systems is a critical need due to the increasing frequency and intensity of hurricanes and floods. This requires investment in hydrology services for flood modeling, enhancement of meteorological (MET) capabilities with radar, forecasting tools, automated weather stations, and the integration of data from hydrology, MET, and NEMO to generate effective alerts. However, system integration remains a major barrier, with current services operating in silos, limiting the delivery of coordinated, real-time information. Additionally, there is a need to upgrade radar systems, satellite receivers, sea buoys, and high-performance computing infrastructure, primarily due to funding constraints and technical capacity gaps.
69. The National Common Alerting Protocol (CAP) system operated by NEMO, though operational, lacks full integration with telecommunications networks, which limits its ability to deliver geo-targeted alerts via mobile phones, television, and radio. To meet this need, investments are required in hardware, software, and strategic telecom partnerships. However, technical limitations and weak engagement with telecom providers present ongoing barriers to widespread and reliable public alerting, especially in rural areas with limited network coverage.
70. Improving housing resiliency is a key priority, particularly in coastal zones vulnerable to storm surge and flooding. There is a strong need to retrofit existing homes and shelters, promote inland construction, and support households through a proposed national fund that would offer low-interest loans for retrofitting, reconstruction, or relocation. Yet, barriers such as financial inaccessibility, limited public awareness of safer housing options, and resistance to relocation persist. Shelter assessments have shown that about 40% of existing shelters require retrofitting, but a lack of resources and technical oversight hinders progress.
71. Engaging the construction sector is essential to scaling up resilient housing solutions. Training for small-scale builders on climate-resilient construction, along with public awareness campaigns, would help drive safer building practices. However, many builders lack access to technical data and design standards, and households may not prioritize or afford resilient upgrades without targeted incentives or education.
72. In the area of infrastructure and warehousing, there is an urgent need to retrofit or relocate vulnerable NEMO facilities, particularly the Ladyville warehouse, which is at high risk of flooding. All warehouses should be equipped with solar backup power and water purification systems to ensure operational functionality during disasters. However, limited budgets often impede timely upgrades, leaving these critical facilities exposed.

73. The development of a locally managed Disaster Management Information System is also a priority. This system would support real-time damage assessments, integrate risk mapping and early warning tools, and centralize data management. Local development is preferred to avoid costly foreign subscriptions and to ensure context-appropriate design. However, the lack of technical expertise and skilled personnel to build and maintain such systems poses a significant barrier, as does the current dependence on fragmented or outdated data platforms.
74. Capacity building and training are urgently needed to support long-term disaster management goals. Recruiting and training meteorologists, forecasters, and technicians, particularly in hurricane modeling, forecasting tools, and data analysis—is essential. Additionally, establishing Community Emergency Response Teams (CERTs) in urban and eventually rural areas would strengthen grassroots response capacity. However, human resource shortages and limited training programs present serious implementation challenges.
75. In terms of data and communication systems, there is a need to integrate satellite, radar, and ground-based observations into a centralized system. Early warning communication tools such as SMS, mobile apps, and radio alerts must be developed to ensure rapid public dissemination. Yet, these improvements are hindered by technological limitations, inconsistent data availability, and underdeveloped communication infrastructure, especially in underserved areas.
76. Finally, stakeholder engagement and communication are essential for improving public resilience and coordination across agencies. Partnerships with disaster management authorities, local governments, and the media need to be strengthened to support cohesive emergency messaging and community outreach. Despite this, institutional coordination remains weak, and community engagement is often sporadic or reactive. Sustained investment in education and trust-building is needed to shift public behavior and improve disaster preparedness at the local level.

Proposed solution to the problem

77. To address the increasing vulnerability of communities in Belize to climate-related hazards outlined above, this project proposes the implementation of climate-resilient and inclusive housing solutions, supported by an innovative revolving finance mechanism. A national fund will be established to provide low-interest loans, enabling vulnerable households to retrofit, reconstruct, or relocate their homes to safer areas. This approach not only reduces immediate risks but also supports long-term adaptation. The project will also invest in building local capacity for resilient construction practices and community planning, ensuring sustainability and local ownership. To further strengthen national climate resilience, the project will enhance the capabilities of the Belize National Meteorological Service and the National Emergency Management Organization, improving early warning systems and disaster preparedness. Together, these interventions will create a scalable model for resilient housing finance and disaster risk reduction, protecting lives, livelihoods, and infrastructure across Belize.

Project/Programme Objectives:

List the main objectives of the project/programme.

78. The project aims to strengthen national disaster preparedness and response capacities,

improving hurricane monitoring and early warning systems, and promoting climate-resilient housing and infrastructure through an innovative financing mechanism. Specifically, the objectives of the project are:

- Enhance the capacity of the National Emergency Management Organization (NEMO) to effectively prepare for, respond to, and recover from hurricanes by improving institutional frameworks, emergency response protocols and infrastructure, and community engagement strategies. This will ensure timely and coordinated disaster management, ultimately reducing loss of life and damage to property.
- Support the Belize National Meteorological Service to upgrade its hurricane monitoring and tracking capabilities by investing in advanced technologies, training, and data management systems. Strengthened meteorological services will provide more accurate and timely early warnings, enabling authorities to take proactive measures ahead of climate-related hazards.
- Establish a revolving finance fund to provide accessible, low-interest loans for vulnerable households and communities to retrofit, reconstruct, or relocate homes and critical infrastructure to safer, climate-resilient standards. This fund will encourage sustainable investments in resilient construction and infrastructure upgrades, reducing exposure to climate hazards such as hurricanes and flooding.
- Additionally, the project will build local capacity through training and technical support in resilient building practices and community-based planning, fostering local ownership and ensuring the sustainability of adaptation measures. By integrating institutional strengthening, improved early warning systems, and financial empowerment of vulnerable communities.

Project/Programme Components and Financing:

Fill in the table presenting the relationships among project components, activities, expected concrete outputs, and the corresponding budgets. If necessary, please refer to the attached instructions for a detailed description of each term.

For the case of a programme, individual components are likely to refer to specific sub-sets of stakeholders, regions and/or sectors that can be addressed through a set of well defined interventions / projects.

Project/Programme Components	Expected Concrete Outputs	Expected Outcomes	Amount (US$)
1. Enhance the Capacity of Belize's National Emergency Management Organization	1.1 Early warning system focused on hurricane and storm preparedness upgraded to deliver geo-targeted alerts through mobile notifications and TV/radio interruptions.	1.1.1. National Systems for Hurricane Preparedness, Response, and Recovery Strengthened.	$2,000,000

	1.2. Disaster Management Information System (DMIS) is established, enabling real-time damage assessments via mobile devices, and integrating early warning systems, risk mapping, and historical data. 1.3 Critical infrastructure for hurricane response and recovery retrofitted to with flood protection, solar power, and water purification systems to ensure reliable hurricane response and recovery operations. 1.4 Local disaster preparedness and response capacity is enhanced through strengthened data analysis, network administration, and disaster mitigation planning and policies.		
2. Support to the National Meteorological Service for Enhanced Hurricane Monitoring and Tracking.	2.1 National meteorological and hydrological services are strengthened through investments in flood modeling, forecasting tools, and weather radar systems, satellite receivers, and high-performance computing infrastructure. 2.2 Enhanced capacities in hurricane modeling and forecasting tools. 2.3 Integrated data management system established by	2.1.1 Meteorological and Hydrological Services for Improved Hurricane Monitoring and Forecasting Strengthened	$2,000,000

	combining satellite, radar, and ground-based observations with centralized data archiving.		
3. Climate-Resilient Housing and Critical Infrastructure through Innovative Finance for Vulnerable Communities in Belize	3.1 Legal, financial, and institutional frameworks to ensure the sustainable management and governance of the revolving fund for climate-resilient housing and infrastructure established 3.2. At least 1000 homes in vulnerable communities are retrofitted, upgraded, or relocated to climate-resilient standards. 3.3. At least 10 public buildings designated as hurricane shelters or utilized during storms are reinforced and upgraded to provide safe and reliable refuge during extreme weather events. 3.4 Local actors are empowered with the knowledge and skills to build and maintain resilient structures, supported by transparent reporting mechanisms and the systematic sharing of lessons learned to promote continuous improvement and community resilience.	3.1.1 Sustainable Financing and Local Capacity for Climate-Resilient Housing and Infrastructure Strengthened	$17,500,000
4. Monitoring and Evaluation: This activity will support Monitoring & Evaluation (M&E), Grievance Redress Mechanism (GRM) awareness, safeguard compliance, and knowledge Management			$1,000,000

5. Project/Programme Execution cost	$368,700
6. Total Project/Programme Cost	$ 24,948,700
7. Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable)	$2,080,000
Amount of Financing Requested	$ 24,948,700

Projected Calendar:

Indicate the dates of the following milestones for the proposed project/programme

Milestones	Expected Dates
Start of Project/Programme Implementation	January 2027
Mid-term Review (if planned)	June 2029
Project/Programme Closing	January 2032
Terminal Evaluation	December 2031

PART II: PROJECT / PROGRAMME JUSTIFICATION

A. Describe the project/programme components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience.

79. The Government of Belize acknowledges that, despite its ambitious adaptation efforts across multiple sectors, the country remains acutely vulnerable to the adverse impacts of climate change and the inevitable loss and damage caused by extreme weather events. The increasing frequency and intensity of storms and hurricanes, combined with social vulnerabilities, pose serious threats to livelihoods, critical infrastructure, and the well-being of its people. Addressing the risks is therefore essential to safeguarding the progress achieved through adaptation and resilience-building, particularly in key sectors such as human settlements and infrastructure. In this context, the proposed project activities are focused on strengthening national capacity to anticipate, withstand, and recover from climate-related shocks, while prioritizing the protection of vulnerable populations. This includes the integration of risk reduction, disaster preparedness, and climate-resilient development across communities, alongside the enhancement of social safety nets.

<u>Component One: Enhance the Capacity of Belize's National Emergency Management Organization</u>

80. This component aims to enhance the country's overall capacity to manage hurricane-

related risks more effectively and efficiently. This will be achieved by improving institutional frameworks, coordination mechanisms, and operational readiness across all phases of the disaster management cycle. Strengthened systems will enable timely preparedness actions, faster and more coordinated emergency responses, and more resilient recovery processes. Efforts under this outcome will ensure that NEMO is better equipped with the tools, information systems, standards, and infrastructure needed to anticipate, withstand, and recover from the impacts of hurricanes.

81. The National Emergency Management Organization (NEMO) was officially established on February 1, 1999, following the threat posed by Category 5 Hurricane Mitch. Initially created to coordinate preparedness and response efforts for hurricanes and floods, NEMO has since expanded its mandate to address a broader range of natural and man-made hazards. As the sole government authority responsible for national emergency management, NEMO is mandated to ensure that Belize remains in a constant state of readiness to respond to any emergency requiring national coordination. Operating as a full-time government department, NEMO is tasked with leading disaster risk management efforts across the public and private sectors including training, preparedness, mitigation, response, and recovery.

Output 1.1: Early warning system focused on hurricane and storm preparedness upgraded to deliver geo-targeted alerts through mobile notifications and TV/radio interruptions.

82. Effective early warning systems are a cornerstone of disaster risk reduction, enabling communities, authorities, and response agencies to act quickly and minimize the impacts of hazards. This project seeks to strengthen national early warning capacities across the entire warning chain: from hazard detection and data analysis to timely, accessible communication with all segments of the population. By modernizing the National Emergency Operations Center (NEOC), improving data processing capabilities, and ensuring inclusive dissemination of warnings, the project aims to build a more resilient and responsive early warning system that leaves no one behind (Figure 12).

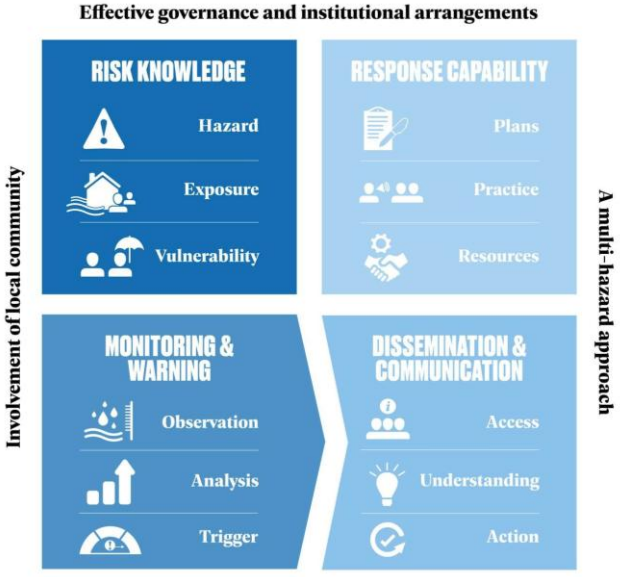


Figure 12: Principles of developing the early warning system

83. This project will significantly enhance the country's early warning system by first equipping the National Emergency Operations Center (NEOC) with updated communication and

computer equipment. A modernized NEOC will serve as the central hub for receiving, processing, and disseminating early warning information. Upgraded hardware, software, and secure communication infrastructure will enable faster, more reliable coordination and ensure continuity of operations during emergencies.

84. An essential aspect of strengthening early warning lies in the ability to effectively process multi-hazard monitoring data. The project will invest in systems that can integrate data from various sources and translate that information into actionable early warnings. By improving the analytical capabilities and automation of these systems, NEMO will be better equipped to issue timely and accurate alerts that reflect the full scope and scale of potential threats.
85. Recognizing that timely information alone is not sufficient if it does not reach those at risk, the project will also develop alternative mechanisms to communicate early warnings to populations in areas with little or no access to internet, television, or radio. These mechanisms may include community sirens, mobile loudspeakers, SMS-based alerts, and other innovative, low-tech solutions that function independently of conventional infrastructure. These efforts ensure that critical warnings reach even the most remote or underserved communities *(to be designed with community members during the development of the full funding proposal).*
86. To make early warnings actionable, it is vital that messages are understood by everyone, regardless of education level. Therefore, the project will design early warning communications using plain language, culturally relevant visuals, and accessible formats tailored for individuals with less than a secondary education. This will help ensure that people can not only receive but also clearly interpret and respond to warnings.
87. Lastly, the project will promote inclusivity in the early warning system by upgrading hazard monitoring technologies and encouraging the use of information and communication technologies (ICT) among vulnerable population groups. Special attention will be given to the elderly, persons with disabilities, and those who are socially isolated, who are often the least likely to receive and act upon warnings. By providing accessible tools, targeted outreach, and training, the project will help these groups stay informed and respond effectively before, during, and after hazard events and respond effectively before, during, and after hazard events.

Output 1.2: Management Information System (DMIS) is established, enabling real-time damage assessments via mobile devices, and integrating early warning systems, risk mapping, and historical data.

88. Under this output, NEMO will achieve several key improvements aimed at enhancing disaster management and disaster risk reduction through better data accessibility, coordination, and informed decision-making. One of the primary goals is to develop a national common operating picture platform. This platform will provide a unified view of real-time information and situational awareness across all levels of government, thereby improving coordination, collaboration, and the overall efficiency of emergency response operations (Figure 13).

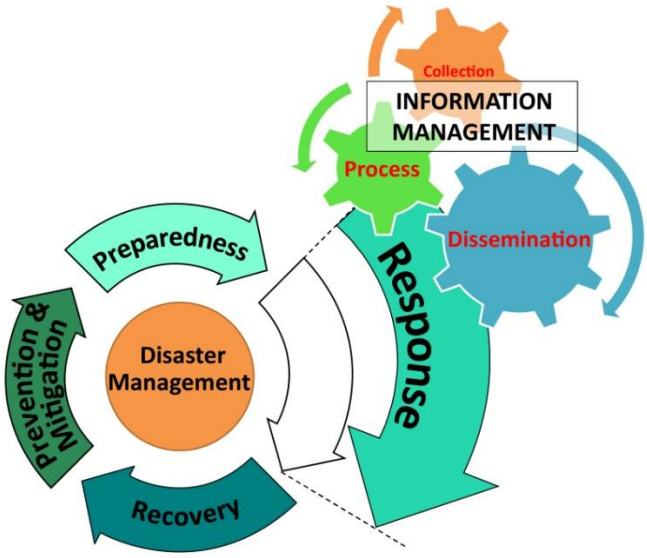


Figure 13: Disaster Information Management

89. To further support information management, the project will establish a centralized, digitized repository to house all relevant disaster-related data, documentation, and information. This central hub will allow for easier access to historical and real-time information by NEMO, government agencies, and partners, supporting both operational planning and post-disaster analysis.
90. In parallel, the project will lead the development of national standards for data collection, management, storage, and sharing. These standards will ensure that all disaster management data are captured in a consistent, high-quality, and fully digitized format. The standardized data framework will facilitate interoperability between government agencies, NGOs, and other stakeholders, enhancing evidence-based decision-making before, during, and after disasters.
91. Finally, to support timely response and recovery, the project will build capacity for conducting real-time damage assessments. This includes deploying tools and methodologies that enable the rapid collection and analysis of impact data in the immediate aftermath of a disaster, allowing NEMO, Ministry of Natural Resources and Ministry Sustainable Development and Climate Change and other partners to better prioritize resources, inform the public, and guide early recovery planning.

Output 1.3: Critical infrastructure for hurricane response and recovery retrofitted with flood and wind protection, solar power, and water purification systems to ensure reliable hurricane response and recovery operations.

92. As part of efforts to strengthen national hurricane preparedness and response systems, this output will ensure that NEMO's central warehouse and designated response centers identified as high-risk are retrofitted to withstand the impacts of up to a Category 4 hurricane. These critical facilities (i.e., emergency operations centers and emergency warehouses) will be structurally reinforced and equipped with solar energy backup systems to maintain operations during power outages, as well as water purification systems to support continuity of relief efforts and basic services in the aftermath of a storm.
93. The scope and specifications of the retrofitting work will be informed by a detailed assessment and engineering designs, which will be completed during the development of the full funding proposals. By upgrading the physical resilience and operational sustainability of these key emergency hubs, the project will enhance NEMO's ability to

coordinate and deliver timely humanitarian assistance before, during, and after major hurricane events.

94. Local disaster preparedness and response capacity will be significantly enhanced through a series of targeted achievements aimed at strengthening data analysis, network administration, and disaster mitigation planning and policies. First, national and local training and exercise mandates will be established with NEMO as the lead agency, ensuring that local responders and officials are regularly trained and tested in disaster scenarios to maintain readiness. Complementing this, comprehensive disaster risk management training and education curriculum will be developed to address emerging challenges and include all relevant local stakeholders, thereby building capacity across communities and organizations at the grassroots level.
95. To support resilient recovery efforts at the local level, risk financing mechanisms tailored to the private sector will be introduced, helping Small and Medium-sized Enterprises (SEMs) better prepare for and rebound from disaster impacts (special consideration will be given to women-led SMEs). Strengthening policy and planning frameworks will ensure that NGOs, private sector partners, and other local organizations are fully integrated and formally engaged in coordinated disaster management efforts.
96. Moreover, the project will enhance national and subnational multi-hazard planning and provide robust policy support to ensure the effective integration of Disaster Risk Reduction across all sectors and levels of government. This will facilitate a more coherent and unified approach to risk reduction, aligning local and national efforts to build resilience against diverse hazards.
97. Finally, a national plan will be developed to guide the integration of DRR, Climate Change Adaptation, and the Medium-Term Development Goals 2 (MTDS) into national and sub-national planning processes. This will include active involvement of local governments to ensure that mitigation policies and practices are aligned with broader national and global resilience goals. The plan will also establish processes to monitor and track progress, ensuring continuous improvement of local preparedness and response capacity through data-driven decision-making and strengthened administrative networks.

Component 2: Support to the National Meteorological Service for Enhanced Hurricane Monitoring and Tracking.

98. The project will strengthen Belize's capabilities in hurricane monitoring and forecasting by investing in critical meteorological and hydrological infrastructure and technical capacity. Belize's National Meteorological and Department of Hydrology will receive upgraded weather radar systems, satellite receivers, and high-performance computing infrastructure to support hurricane modeling and forecasting tools. These technological enhancements will improve the accuracy and timeliness of hurricane tracking and intensity predictions. Alongside this, specialized training will be provided to meteorologists and hydrologists to build expertise in utilizing advanced forecasting models. An integrated data management system will be established, combining satellite, radar, and ground-based observations into a centralized archive, enabling real-time data analysis and more effective information sharing. Together, these efforts will significantly strengthen Belize's hurricane monitoring and forecasting capabilities, leading to earlier warnings and better preparedness for hurricane impacts.
99. The National Meteorological Service of Belize (NMS) is the country's authoritative agency for weather and climate information. It plays a critical role in safeguarding lives, supporting key economic sectors, and promoting sustainable national development. The NMS provides

a wide range of services, including daily public weather forecasts disseminated via radio, television, newspapers, and its official website. It delivers aviation weather information to ensure the safety of air travel, and marine forecasts tailored for the shipping, fishing, and tourism industries. Specialized agrometeorological services support farmers and agricultural planning through rainfall outlooks, drought monitoring, and seasonal advisories. The Service also plays a key role in disaster risk reduction by working closely with the National Emergency Management Organization (NEMO), offering expert guidance on hurricanes, floods, and other hazardous weather events that could threaten the country.

100. Beyond forecasting, the Department of Hydrology is responsible for hydrometeorological monitoring, collecting and analyzing data on rainfall, river levels, and water resources to support flood prediction and water management. It also contributes to climate monitoring and reporting, analyzing long-term trends in temperature, rainfall, and extreme weather events to guide national planning and policy. The Service provides technical input on Environmental Impact Assessments through its participation in the National Environmental Appraisal Committee (NEAC), and it supports climate change efforts as a member of the Belize National Climate Change Committee.

101. Operationally, the NMS maintains a network of weather observation stations, weather radar for storm tracking, and an upper-air observation site for atmospheric profiling. Forecasters use advanced tools including satellite reception systems and numerical weather prediction models. The department is staffed by trained meteorologists, forecasters, technicians, and support personnel. Internationally, Belize is a member of the World Meteorological Organization (WMO), and the NMS represents the country in the Intergovernmental Panel on Climate Change (IPCC), the Caribbean Meteorological Organization (CMO), and the Comité Regional de Recursos Hidráulicos (CRRH) under the Central American Integration System (SICA). Since its origins in 1887 and formal establishment as a national service in 1972, the NMS has evolved into a critical institution supporting Belize's resilience, environmental stewardship, and national development through timely, reliable, and science-based weather and climate services.

Output 2.1: National meteorological and hydrological services are strengthened through investments in flood modeling, forecasting tools, and weather radar systems, satellite receivers, and high-performance computing infrastructure

102. Under this activity, key outputs will be achieved to strengthen Belize's National Meteorological and Department of Hydrology. A comprehensive needs assessment will first be conducted to identify existing capacity gaps, technical requirements, and priority areas for investment. Based on this assessment, targeted investments will be made in national hydrology services to enhance flood modeling capabilities, including the procurement of updated monitoring equipment and modeling software.

103. Meteorological services will be strengthened through the installation and upgrading of weather radar systems, satellite receivers, and advanced forecasting tools to improve hurricane monitoring and early warning accuracy. High-performance computing infrastructure will be deployed to support real-time data processing and complex hurricane modeling.

104. Additionally, technical staff will receive specialized training to operate and maintain these systems effectively. An integrated data management system will also be established, bringing together satellite, radar, and ground-based observations into a centralized archive to support timely decision-making and coordinated disaster response.

Output 2.2: Enhanced capacities in hurricane modeling and forecasting tools

105. Under this activity, the project will support the recruitment of key technical staff, including meteorologists, technicians, and forecasters, to build a more capable and responsive National Meteorological Service. These professionals will receive specialized training in advanced hurricane modeling techniques and forecasting tools to enhance their technical expertise. Regional exchange programs and partnerships with established meteorological centers will be facilitated to promote knowledge sharing and professional development.
106. In parallel, the project will compile and analyze baseline data on hazard risks and vulnerabilities in the target areas to guide the development of a Multi-Hazard Impact-Based Forecast and Early Warning System (MH-IBF-EWS). This will involve identifying relevant weather and climate indicators, defining critical thresholds for different hazards—such as flooding, storm surge, heatwaves, strong winds, drought, and severe thunderstorms—and designing clear, timely, and actionable warning messages for use by the National Meteorological Service and the National Emergency Management Organisation (NEMO).
107. The project will also support the generation of probabilistic forecasts for extreme weather events across various timescales, including sub-seasonal to decadal, tailored to multiple hazards and sectors. Collectively, these efforts will enhance Belize's ability to anticipate, communicate, and respond to hurricane threats and other climate-related risks more effectively.

Output 2.3: Integrated data management system established by combining satellite, radar, and ground-based observations with centralized data archiving.

108. Under this activity, the following outputs will be achieved to improve coordination, data integration, and operational efficiency in Belize's early warning and forecasting systems. First, hydrology, meteorology, and National Emergency Management Organisation (NEMO) data will be integrated to support the generation of timely and actionable alerts for disaster risk reduction.
109. The project will also ensure the integration of multiple data sources, including satellite imagery, weather radar, and ground-based observations, to provide a more comprehensive and accurate understanding of evolving weather and hydrological conditions. To manage this information effectively, a centralized data management and archiving system will be implemented, enabling real-time access, analysis, and storage of critical data. In addition, automated weather stations and sea buoys will be installed across key locations to facilitate continuous and real-time data collection, particularly for monitoring atmospheric and oceanic conditions.
110. Finally, standard operating procedures (SOPs) will be developed and formalized to clearly define the roles and responsibilities between the Meteorological Service and the Hydrology Agency, ensuring coordinated actions during extreme weather events. These outputs will collectively contribute to a more integrated and responsive forecasting and early warning system in Belize.

Component 3: Climate-Resilient Housing and Critical Infrastructure through Innovative Finance for Vulnerable Communities in Belize

111. Component 3 aims to enhance the resilience of vulnerable communities by establishing sustainable financial mechanisms and building local capacity to support climate-resilient housing and infrastructure. The primary outcome of this component is the creation of accessible financing options that empower individuals and communities to invest in safer, more durable housing and public infrastructure. This will be achieved through the establishment of a low-interest Resilient Housing Revolving Fund, which will provide affordable loans to households, particularly those in high-risk areas, for the construction or

retrofitting of homes to withstand hurricanes. In addition, grants will be provided to retrofit critical community infrastructure, such as shelters, schools, and health centers, to ensure they remain operational and safe during extreme weather events. By combining financial support with technical assistance and implemented in partnership with the Development Finance Corporation (DFC) and other local entities, this component will build the foundation for scalable, community-led climate resilience and promote long-term adaptation through inclusive and sustainable financing solutions.

112. DFC, Belize's only national development bank was established in 1963. DFC plays a pivotal role in supporting the country's sustainable economic growth by providing development financing to individuals, businesses, and organizations. As a non-deposit financial institution, DFC sources funding from regional and international lenders at preferential rates and on-lends to Belizean nationals, residents, and locally registered entities with majority Belizean ownership. Guided by its mission to offer innovative financial solutions that contribute to resilient and equitable development, and its vision of becoming a leading development finance institution driven by digital transformation and strategic partnerships, DFC aligns closely with the goals of this activity. Its strategic focus areas, including climate resiliency, impact broadening, and alliance-building—make DFC a key implementing partner. The Corporation's strong track record in supporting residential and productive sector growth, including an 80% increase in its residential loan portfolio between 2019 and 2023, demonstrates its capacity to contribute meaningfully to this initiative.

Output 3.1: Legal, financial, and institutional frameworks to ensure sustainable management and governance of the revolving fund for climate-resilient housing and infrastructure established.

113. An important output of this component will be the design and establishment of a low-interest Resilient Housing Revolving Fund, aimed at providing affordable financing for climate-resilient housing to vulnerable populations, including women, Indigenous peoples, and other at-risk groups. This fund's design will be informed by a comprehensive vulnerability assessment and a clearly defined selection criteria, both to be developed during the preparation of the full funding proposal to ensure equitable and inclusive access.

114. A strong policy framework will be established to guide the fund's operation, covering eligibility requirements, loan conditions, environmental and social safeguards, as well as transparency and accountability measures. A dedicated Fund Management Unit (FMU) will be set up to oversee fund administration, monitoring, and reporting.

115. Loans will be provided directly through the Development Finance Corporation, leveraging its experience and institutional capacity to deliver financial products effectively. Through DFC's existing networks and expertise, the fund will ensure that financing reaches those most in need. This approach will empower women, Indigenous peoples, and other vulnerable groups to build or retrofit homes that can better withstand hurricanes and extreme weather, supporting long-term community resilience.

Output 3.2: At least 1000 homes in vulnerable communities are retrofitted, upgraded, or relocated to climate-resilient standards.

116. This outcome will be accomplished by retrofitting, upgrading, or construction of at least 1000 homes in vulnerable communities to meet climate-resilient standards. The selection and implementation process will be guided by a thorough Environmental and Social Risk Screening to ensure that interventions minimize negative impacts and promote sustainability. Additionally, all works will comply with existing building codes, land use, and zoning policies to ensure safety, legality, and suitability to local conditions.

117. Beneficiaries who qualify for new construction will choose from a range of pre-approved resilient housing designs, specifically tailored to the different hazard zones and environmental conditions within Belize. This approach ensures that homes are built to withstand local climate risks such as hurricanes, flooding, and storm surge.
118. To further reduce financial vulnerability and support risk management, the project will develop a specialized insurance scheme in partnership with local insurance providers. This scheme will offer coverage at a reduced cost to beneficiaries, helping protect their investments and encourage participation. This activity complements ongoing investments by the Government of Belize to provide low-income homes for families and will primarily target the working poor, ensuring that climate resilience reaches those most in need.
119. A draft loan product, including preliminary terms and conditions, has been prepared and is attached as an Annex 3. However, this draft will be carefully reviewed, refined, and finalized during the full funding proposal development phase to better meet the needs of beneficiaries and align with the overall project objectives.

Output 3.3: At least 10 public buildings designated as hurricane shelters or utilized during storms are reinforced and upgraded to provide safe and reliable refuge during extreme weather events.

120. This activity will complement the retrofitting and resilient housing initiative by providing grant financing to reinforce and upgrade at least 10 public buildings designated as hurricane shelters or utilized during storms. These upgrades will ensure the shelters provide safe and reliable refuge during extreme weather events. The selection and design of these retrofits will be informed by a comprehensive vulnerability and risk assessment, to be conducted during the project preparation phase, ensuring that the most at-risk facilities are prioritized.
121. The retrofit work will primarily focus on enhancing the buildings' ability to withstand high winds from storms and hurricanes, as well as installing water storage and solar power systems to ensure continued operation during power outages and storm events. By strengthening critical community infrastructure alongside private housing improvements, the project creates a holistic approach to resilience, addressing both individual household safety and community-wide emergency preparedness. This activity will also be implemented through partnership with DFC.

Output 3.4: Local actors are empowered with the knowledge and skills to build and maintain resilient structures.

122. This output will be accomplished by empowering local actors, with a strong emphasis on gender inclusivity, with the knowledge and skills necessary to build and maintain resilient structures, thereby strengthening community resilience. Comprehensive training programs will be designed to actively include women, small-scale builders, contractors, and community members, focusing on climate-resilient construction techniques that improve the durability of homes and public buildings against storms and hurricanes. These programs will be supported by user-friendly manuals and guidelines tailored to local contexts, ensuring accessibility for all participants.
123. Workshops and community engagement sessions will specifically encourage the participation of women and marginalized groups, fostering inclusive dialogue and decision-making around resilient building practices. Targeted information campaigns will promote storm-resilient designs broadly, with materials and messaging crafted to reach diverse audiences and address gender-specific needs and challenges.
124. Builders, including women builders where applicable, will be equipped with up-to-date data and technical information to advise clients effectively on resilient construction options

suited to their environment. Transparent reporting mechanisms will capture progress and lessons learned, with a focus on measuring gender-responsive outcomes to ensure continuous improvement and equitable benefits across communities. This inclusive approach will help build a culture of resilience that empowers all community members, regardless of gender.

Monitoring and Evaluation

125. The project will support the implementation of robust systems for Monitoring & Evaluation (M&E), community level- Grievance Redress Mechanism (GRM) awareness, environmental and social safeguard compliance, and the documentation of lessons learned, success stories, and human impact narratives *(to be elaborated during the development of the full funding proposal)*.
126. GRM awareness efforts will include the development and dissemination of accessible materials and the delivery of outreach sessions to ensure that all stakeholders, marginalized groups, understand how to access and use the GRM to provide feedback or raise concerns.
127. To ensure strong implementation of environmental and social safeguards across all project components, the project will recruit two dedicated technical specialists: an Environmental Specialist, who will oversee the integration of environmental safeguards and monitor compliance with relevant standards and procedures; and a Social Inclusion and Gender Specialist, who will lead the incorporation of gender equity and social inclusion strategies into project planning, implementation, and monitoring. Both specialists will provide capacity building to implementing partners and support the development of context-sensitive safeguard tools and protocols.
128. In parallel, this activity will include structured documentation of lessons learned, success stories, and human impact stories throughout the project lifecycle. These stories will capture the real-life outcomes of project interventions, promote knowledge sharing, and inform adaptive project management. M&E systems will be designed to track progress against defined indicators, support continuous learning, and contribute to midterm and final evaluations.

Adaptation Pathway

129. The adaptation pathway for this project follows a structured, phased approach that builds Belize's resilience to climate-related hazards by progressively addressing institutional, technical, and community-level vulnerabilities. The pathway begins with strengthening the foundational capacity of national institutions, specifically NEMO and the Belize National Meteorological Service, through investments in early warning systems, risk data management, and forecasting infrastructure. These foundational improvements enable more accurate, timely, and coordinated disaster preparedness and response.
130. Simultaneously, the pathway expands to local implementation by enhancing community-level capacity through training, retrofitting critical emergency infrastructure, and localized disaster risk planning. As institutional and technical systems are fortified, the project advances to support long-term resilience through an innovative finance mechanism, which provides accessible funding for climate-resilient housing and infrastructure. By addressing financial barriers and encouraging private and public investment in resilient construction, the pathway facilitates adaptive behavior at the household and community level.
131. Over time, these combined interventions reduce systemic risk, strengthen adaptive capacity, and establish a sustainable model for responding to the increasing frequency and intensity of hurricanes and other climate impacts in Belize. The pathway is iterative and flexible, enabling adjustments based on new climate data, lessons learned, and changing

local needs, ensuring that resilience gains are maintained and scaled over the long term.

B. Describe how the project/programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project/programme will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy and Gender Policy of the Adaptation Fund. Benefits to

132. As described above, Belize is increasingly vulnerable to the devastating impacts of storms and hurricanes, which frequently result in the destruction of homes, displacement of families, and long-term disruption to communities. The proposed program directly addresses these risks by strengthening national and community-level capacities to monitor, prepare for, and recover from such extreme weather events. By prioritizing household-level resilience, especially for the working poor and those vulnerable to poverty. The program also ensures that populations, such as indigenous persons, single mothers, persons with disabilities, and children, are better protected from the destruction of their homes and the loss of security that follows.

Social Benefit

133. The program is specifically designed to support the most at-risk households at all stages of a disaster with a strong focus on minimizing vulnerability and enhancing resilience. In areas frequently impacted by severe storms, the initiative invests in risk-informed housing upgrades and construction, the development of safe and accessible emergency shelters, and inclusive disaster risk planning that considers the specific needs of different population groups. A key component of the program is its gender-responsive approach, acknowledging that women, particularly those heading households, often bear a disproportionate burden during recovery while facing systemic barriers to resources and decision-making. Emergency shelters will be designed to ensure safety and dignity for women and children, and post-disaster recovery efforts will intentionally include women in leadership roles, community planning, and rebuilding activities.

134. In addition to improving safety and resilience, the program will realize significant social benefits by reducing the displacement of families, especially female-headed households and the elderly male, during and after disasters. Minimizing displacement not only enhances physical safety, including protection from risks such as sexual exploitation, but also promotes continuity in essential services such as education. To address broader issues of access, gender inequality, and discrimination, the project will apply carefully developed beneficiary selection criteria grounded in comprehensive assessments conducted during both the design and implementation phases. These assessments will also inform the validation of risk profiles and the development of effective mitigation strategies.

135. Recognizing that climate-related events can push those on the margins of poverty further into hardship, the program targets the working poor and households most vulnerable to economic shocks. Housing, often a family's most critical asset, will be a primary focus of investment. By reinforcing and protecting this asset, the program helps prevent vulnerable families from sliding into poverty, delivering long-term social benefits and supporting more equitable and resilient development across Belize.

Economic Benefit

136. The destruction of homes represents a significant setback for both families and

national development. This program addresses the issue by promoting resilient construction practices, ensuring that homes are better equipped to withstand future storms and reduce recurring economic losses. It also enhances disaster preparedness through improved monitoring and early warning systems, enabling quicker, more equitable responses and ensuring that emergency aid reaches affected communities promptly.

137. During the recovery phase, the program supports job creation through community-based reconstruction efforts, offering training and employment opportunities in resilient building techniques and will target women, youth, and local tradespeople. By creating more inclusive economic opportunities, the program stimulates local economies and builds long-term resilience.

138. Compounding the challenge of rebuilding is the limited access to affordable financing, particularly among marginalized groups. Inequity in accessing finance remains a major barrier. In indigenous communities, where land and property ownership are often male dominated, this disparity is even more pronounced. Addressing these financing gaps, by improving access to affordable, inclusive credit and promoting gender-equitable lending practices, not only supports equitable recovery but also yields broader economic benefits. Increased financial inclusion enables more people to invest in resilient housing and livelihoods, ultimately strengthening the economy and reducing vulnerability to future disasters.

Environmental Benefit

139. The program promotes sustainable housing solutions and environmentally responsible rebuilding practices. All retrofitting and reconstruction efforts will adhere to the Belize Building Act, guided by the 2024 Belize Building Code. This updated code supports the design, planning, permitting, and construction of resilient building structures and dwellings, integrating climate resilience, energy efficiency, and zoning regulations, while accounting for Belize's unique environmental and socio-economic context.

140. In addition, the Belize National Land Use Policy (2025–2033) will be applied to ensure land development respects ecological preservation principles. This includes avoiding damage to sensitive ecosystems such as mangroves, forests, and coastal zones, which serve as natural buffers against storms. These efforts will be further supported by the Development Finance Corporation's (DFC) Environmental and Social Screening, along with a comprehensive Environmental and Social Impact Assessment (ESIA) to be conducted as part of the full funding proposal.

141. The ESIA will be used to clearly assess potential risks related to the protection of natural habitats, conservation of biological diversity, pollution prevention, and resource efficiency. Where risks are identified, an Environmental and Social Management Plan (ESMP) will outline targeted mitigation measures to avoid or minimize adverse impacts. To further address resource efficiency, a waste management plan and/or a resource efficiency plan will be developed for the project, with particular emphasis on managing construction waste responsibly.

142. Where project activities involve the installation of monitoring stations within waterways, protocols and best practices will be developed in close coordination with the National Hydrology Service. These best practices will be strictly followed during implementation to protect water resources and related ecosystems. The program will also prioritize the use of eco-friendly and durable materials for housing repairs. This approach not only supports environmental sustainability but also contributes to long-term resilience against climate-related threats and reduces the need for future reconstruction.

143. Disaster preparedness and monitoring are central to the program's success. Investments will be made in real-time storm tracking systems, early warning mechanisms, and community-based education campaigns to ensure households are informed and prepared for incoming storms. Local disaster response teams will receive training to support evacuations, distribute emergency supplies, and provide immediate assistance to affected families. Furthermore, the program will incorporate hazard mapping and risk assessments into housing and infrastructure planning. This proactive approach helps prevent reconstruction in high-risk areas, significantly reducing long-term exposure to disaster risks and promoting safer, more resilient communities.

C. Describe or provide an analysis of the cost-effectiveness of the proposed project/programme.

144. The following provides a comparison of the proposed components against viable alternatives aimed at achieving the same impact, emphasizing economic considerations wherever possible.

Viable Alternative	**Assessment of Alternative Cost Effectiveness**
Component One: Enhance the Capacity of Belize's National Emergency Management Organization This component strengthens national capacity to manage hurricane risks by improving institutions, coordination, and readiness across all disaster phases. It equips NEMO with the tools, systems, and infrastructure needed for timely preparedness, effective response, and resilient recovery.	
Business -as -usual and or Do nothing	If actions are not to improve early warning systems, the country will face significantly increased vulnerability especially among high-risk communities and critical infrastructure. Without effective early warning systems, the ability to detect hazards, analyze risk data, and communicate timely alerts will remain weak, leaving populations unprepared and exposed to the full force of hurricanes and other hazards. This lack of preparedness could lead to delayed evacuations, disorganized emergency response, and a higher risk of loss of life and livelihoods. Vulnerable groups including those in informal settlements, low-income areas, and hazard-prone coastal zones—would be disproportionately affected. The destruction of homes, schools, health facilities, and essential infrastructure would not only cause human suffering but also result in massive economic losses. From a cost-effectiveness perspective, investing in early warning systems offers high returns. Timely warnings reduce damage and save lives at a fraction of the cost of post-disaster response and recovery. Strengthening the National Emergency Operations Center, improving real-time data processing, and ensuring inclusive and accessible communication help minimize disruptions, lower emergency spending, and protect development gains. In contrast, inaction would lead to escalating disaster response costs, slower recovery times, and increased poverty and inequality.

	Strengthening early warning systems is therefore cost-effective investment in resilience and sustainable development.
Business -as -usual and or Do nothing	If these actions are not taken to establish a Management Information System, national vulnerability to storms and hurricanes will increase significantly. Without enhanced data accessibility, coordination, and informed decision-making, disaster management efforts will remain fragmented and inefficient. The absence of a national common operating picture platform will leave real-time information siloed across agencies, resulting in slower response times, miscommunication, and poor situational awareness during emergencies. This lack of coordination will critically undermine NEMO's ability to respond effectively to severe weather events. It could lead to delayed evacuations, duplication of efforts, inefficient use of limited resources, and uncoordinated delivery of emergency services. High-risk communities would be disproportionately affected, facing greater exposure to injury, displacement, and destruction of homes and livelihoods. The human and economic costs of inaction are substantial. Damage to infrastructure, prolonged service disruptions, and extended recovery periods translate into significant public and private financial burdens. Vulnerable populations would be pushed further into poverty due to repeated asset losses and lack of timely support. In contrast, investing in a centralized, real-time coordination platform is a highly cost-effective measure. It enables faster and more targeted emergency response, reducing unnecessary expenditures, improving resource allocation, and minimizing losses. By providing a unified view of the disaster landscape, it ensures that every dollar spent on preparedness and response has greater impact. Strengthening decision-making and coordination capabilities today helps avoid far higher costs tomorrow, both in lives and in economic terms.
Business -as -usual and or Do nothing	If investments are not made in climate proofing NEMOs emergency operations centers and emergency warehouses, the country's ability to respond effectively to hurricanes and severe storms will be significantly compromised, increasing vulnerability for already high-risk communities. NEMO's central warehouse and designated emergency response centers are critical for coordinating relief operations and will remain structurally inadequate and highly susceptible to damage or destruction during major hurricanes. In the event of a severe storm, unreinforced facilities may become inoperable at the precise moment they are most needed, delaying emergency response, disrupting logistics, and limiting access to essential supplies. Power outages and lack of clean water would further cripple operations, hindering the delivery of food, medical aid, and shelter materials. Vulnerable populations would face prolonged

	exposure to unsafe conditions, increased risk of disease, and delayed recovery, deepening poverty and long-term social impacts. From a cost-effectiveness perspective, the failure to invest in retrofitting now would lead to far higher costs later. The repair or total replacement of damaged warehouses and operations centers, coupled with the economic and human toll of a poorly coordinated emergency response, would vastly exceed the upfront investment in resilience. Furthermore, breakdowns in logistics and delays in humanitarian delivery often result in higher mortality and morbidity, as well as increased reliance on costly international aid. Conversely, retrofitting these facilities with reinforced structures, solar power, and water purification systems is a high-impact, cost-effective solution. It ensures continuity of emergency operations, reduces disaster response and recovery costs, and safeguards public investments in critical infrastructure. Ultimately, it protects lives, livelihoods, and national development gains by enabling a faster, more efficient, and more resilient response to future hurricanes.
Business -as -usual and or Do nothing	If the proposed actions to strengthen local disaster preparedness and response are not taken, communities will face significantly increased vulnerability to storms and hurricanes, as well as higher long-term economic costs. Without regular training and exercises for local responders and officials, emergency response efforts are likely to be slow, disorganized, and less effective, leading to greater risk of loss of life, property damage, and disruption. The absence of a comprehensive disaster risk management curriculum will leave community members and stakeholders underprepared and unaware of essential protocols such as evacuation procedures, early warning systems, and recovery strategies. This lack of knowledge and coordination can result in chaos during disasters and slow recovery afterward. Moreover, without the development of inclusive policy and planning frameworks, local organizations, NGOs, and private sector partners will remain fragmented and underutilized in disaster management, reducing the efficiency and effectiveness of coordinated responses. Economically, the absence of tailored risk financing mechanisms, particularly for small and medium-sized enterprises (SMEs), will leave businesses vulnerable to collapse after a disaster. This is especially critical for women-led SMEs, which often face greater barriers to accessing recovery resources. Without these financial safeguards, economic recovery will be slow, job losses will increase, and local economies may face long-term setbacks. In turn, governments may be forced to allocate more funds for disaster relief and reconstruction, resources that could otherwise support development in health, education, and infrastructure. Overall, the failure to implement these preparedness measures would make disaster impacts more severe,

	costly, and prolonged, whereas investing in them now would greatly enhance resilience and cost-effectiveness in the long run.
Component 2: Support to the National Meteorological Service for Enhanced Hurricane Monitoring and Tracking The component will improve Belize's ability to monitor and forecast hurricanes by upgrading technology, training experts, and integrating data systems. This will lead to more accurate forecasts, earlier warnings, and better preparedness for hurricane impacts.	
Business -as -usual and or Do nothing	Without investing in modern hydrological and meteorological systems under component 2, existing gaps in infrastructure and technical capacity will persist. This will undermine the accuracy of flood modeling and hurricane forecasting, resulting in delayed or insufficient early warnings. Communities will have less time to prepare or evacuate, leading to greater loss of life, more severe property damage, and higher costs in emergency response and recovery efforts. The failure to upgrade radar systems, satellite receivers, and computing infrastructure will also limit Belize's ability to process real-time data and deliver precise forecasts. Inaccurate or late warnings can significantly increase the scale of disaster impacts, making post-disaster recovery far more expensive than preventative investments. Moreover, without proper training for technical staff, new systems could be underutilized or mismanaged, wasting resources and further diminishing forecasting reliability. Not establishing an integrated data management system would hinder effective information sharing and coordinated disaster response, resulting in duplicated efforts and inefficient use of funds. In contrast, the proposed investments are cost-effective in the long run—reducing the financial burden of disaster relief, protecting critical infrastructure, preserving livelihoods, and minimizing economic disruption.
Component 3: Climate-Resilient Housing and Critical Infrastructure through Innovative Finance for Vulnerable Communities in Belize. Component 3 aims to boost community resilience by providing affordable financing for climate-resilient housing and infrastructure. It will offer low-interest loans for safer home construction in high-risk areas and grants to retrofit critical facilities like shelters and schools. By combining financial support with technical assistance, the program promotes long-term, community-led climate adaptation.	
Business -as -usual and or Do nothing	Under a "do nothing" scenario, where Component 3 is not implemented, vulnerable communities in Belize will continue to face significantly increased exposure to the devastating impacts of storms and hurricanes, along with growing long-term economic and social costs. Without accessible financing mechanisms such as the Resilient Housing Revolving Fund, low-income households will remain unable to afford the construction or retrofitting of homes to withstand extreme weather. These families, often among the working poor and most vulnerable to economic shocks, will continue to live in unsafe housing,

	leaving them at greater risk of injury, displacement, and long-term hardship during hurricanes or flooding events. Damage or destruction of homes due to storms can push already marginal households further into poverty, eroding their financial stability and increasing their dependence on government or humanitarian aid. Without targeted interventions, these families may be caught in a recurring cycle of vulnerability and recovery, where each disaster deepens inequality and reduces their capacity to adapt. Moreover, the absence of grant support for retrofitting critical community infrastructure such as shelters, schools, and health centers will reduce community resilience and hinder emergency response, compounding the human and financial costs of climate-related disasters. Economically, this inaction will lead to significantly higher recovery and reconstruction expenses compared to the relatively modest, proactive investments proposed by the program. From a cost-effectiveness standpoint, investing in resilient housing and infrastructure now is far more efficient than bearing the repeated and escalating costs of post-disaster recovery. By reinforcing and protecting the assets of the working poor, the program helps prevent downward economic mobility, delivering long-term social benefits and promoting more equitable, inclusive, and climate-resilient development across Belize. Failure to act would not only leave families and communities physically vulnerable but would also widen social and economic inequalities.

D. Describe how the project/programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national adaptation plan (NAP), national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist.

145. The proposed project is strongly aligned with Belize's national and sub-national sustainable development priorities, which are outlined as follows:

- Belize's Third National Determined Contribution NDC 3.O

The proposed project is highly complementary to the adaptation targets and actions outlined under Belize's NDC 3.0 for the Human Settlements and Infrastructure sector. Specifically, the project directly supports the development of a disaster risk response plan for vulnerable settlements by strengthening the capacity of the National Emergency Management Organization (NEMO) to plan for, respond to, and recover from climate-related hazards such as hurricanes and flooding. Through improved emergency protocols, community engagement, and institutional coordination, the project enhances Belize's ability to protect coastal and low-lying communities that are increasingly exposed to sea level rise and saltwater intrusion.

Additionally, the project contributes to the goal of developing and implementing a resilience infrastructure plan for flooding and hurricanes. It does this by providing

grants to retrofit critical public infrastructure such as schools, shelters, and health centers, to meet climate-resilient standards, ensuring they remain functional during and after disasters. The establishment of the Resilient Housing Revolving Fund further complements this target by facilitating access to low-interest financing for vulnerable households to build or upgrade homes to withstand extreme weather events, thus reinforcing national efforts to reduce the physical and social impacts of future storms.

The project also aligns closely with the NDC 3.0 target to develop a centralized and automated multi-hazard national early warning system by 2030. Through the modernization of Belize's meteorological and hydrological infrastructure, including upgraded radar systems, satellite receivers, high-performance computing tools, and a centralized data management system, the project lays the groundwork for a more accurate, timely, and integrated early warning system. This system will improve real-time hazard monitoring and communication, enabling more effective and proactive disaster risk reduction across the country.

- Medium Term Development Strategy (MTDS) 2022–2026

146. The proposed project is closely aligned with the goals of Belize's Medium Term Development Strategy (MTDS) 2022–2026, particularly its focus on rural transformation, poverty reduction, and climate resilience. By investing in climate-resilient housing and infrastructure in vulnerable communities, especially in rural areas, the project supports the MTDS objective of improving infrastructure such as roads and homes. Through the Resilient Housing Revolving Fund, it provides affordable and accessible financing for low-income households to retrofit or rebuild homes to withstand hurricanes and flooding. This aligns with the government's commitment to ensure that those without resources have access to decent housing, land security, and protection from climate-related shocks. The project also directly supports the MTDS goal of enhancing social protection by safeguarding housing from damage and loss, helping prevent vulnerable families from falling deeper into poverty.

147. Furthermore, the project promotes the adoption and implementation of the ICC building, residential, and zoning codes by ensuring that housing and infrastructure improvements adhere to climate-resilient construction standards. This contributes to the institutionalization of safer, climate-smart development practices across the country. The project also enhances education, awareness, and capacity-building around climate change and disaster risk reduction, another core priority of the MTDS. Through technical training, public outreach, and the development of an integrated early warning system, the project empowers institutions and communities to better anticipate, prepare for, and respond to natural disasters. In doing so, it not only strengthens Belize's adaptive capacity but also supports inclusive, sustainable development in line with the MTDS's overarching vision of improving the quality of life for all Belizeans, now and in the future.

- Horizon 2030 (2010-2030)

148. The proposed project aligns strongly with the vision and priorities outlined in Horizon 2030, Belize's first long-term national development framework. Horizon 2030 emphasizes building a resilient economy and caring for the natural environment as key pillars of national progress. The project directly supports these goals by enhancing the country's capacity to prepare for, respond to, and recover from climate-related disasters, particularly hurricanes and flooding, which are expected to intensify due to climate change.

149. By investing in early warning systems, upgrading meteorological and hydrological infrastructure, and strengthening institutional disaster response capacity, the project contributes to the Horizon 2030 vision of climate-resilient communities that are better equipped to manage environmental risks. The targeted support for coastal and vulnerable communities, many of which are on the frontlines of sea level rise and storm impacts, reflects Horizon 2030's call to address the unique challenges of high-risk areas through environmentally sustainable development planning.

150. In addition, the project's financing mechanism helps build a more resilient and inclusive economy by enabling low-income and marginalized households to invest in durable, climate-resilient housing. This not only protects families from physical and economic displacement but also supports long-term social stability and economic recovery in the aftermath of climate events.

151. Moreover, while the primary focus of the project is adaptation, it complements Horizon 2030's broader sustainability goals, such as promoting sustainable energy and low-carbon development, by encouraging climate-smart construction practices that can integrate renewable energy solutions like solar power. Overall, the project reflects the core principles of Horizon 2030 by promoting environmental stewardship, reducing vulnerability to climate change, and fostering a more resilient and sustainable future for all Belizeans.

- National Climate Change Policy, Strategy and Master Plan (2021-20250)

152. The proposed project is closely aligned with several strategic actions outlined in Belize's National Climate Change Policy, Strategy, and Master Plan (NCCPSMP) 2021–2025, particularly those targeting human settlements, infrastructure resilience, and disaster risk reduction. It supports Action A6.1.1 by focusing on the most vulnerable communities and infrastructure, using risk-informed planning to guide resilient housing investments and community-level interventions. These efforts directly contribute to integrated development planning that reflects the needs of local populations exposed to climate hazards. Additionally, the project promotes the use of updated building codes and climate-resilient standards, advancing Action A6.1.2, which calls for the implementation of climate-sensitive land use policies. This is especially relevant for rural and indigenous communities, aligning with the National Climate Resilience Investment Plan's goals for environmentally responsible infrastructure development.

153. In terms of disaster preparedness, the project contributes to Action A12.1.2 by enhancing NEMO's capacity to update and test national evacuation and disaster risk management plans, using improved climate models and vulnerability assessments to better identify and protect high-risk areas. It also addresses Action A12.1.3 through investments in advanced weather monitoring and forecasting technologies, such as upgraded radar systems and satellite receivers, which are essential for establishing a robust national early warning system capable of triggering timely alerts for hurricanes, storm surges, and other natural hazards. Furthermore, the project supports Action C12.1.2 by strengthening public access to risk information through the enhancement of NEMO's digital platforms, contributing to the development of an integrated information system that educates and informs citizens about climate risks and disaster response. Together, these activities ensure the project is well-aligned with the NCCPSMP's goals of building institutional capacity, improving climate resilience, and supporting inclusive, risk-informed development across Belize.

- Loss and Damage Framework

154. The proposed project aligns closely with the objectives and emerging priorities of Belize's Loss and Damage (L&D) Framework, which is currently under development under the leadership of the National Climate Change Officer with support from United Nations Development Programme Belize Country Office. While the framework is still being finalized, its core focus, identifying priority areas for climate-related losses and quantifying irremediable damage, is directly addressed by the project's emphasis on disaster risk reduction, early warning systems, and resilient infrastructure.

155. The project proactively reduces the risk of future losses and damage by strengthening the country's capacity to monitor and respond to extreme weather events. By investing in advanced meteorological and hydrological systems and improving early warning capabilities, the project helps limit both economic losses (e.g., damage to homes, infrastructure, and livelihoods) and non-economic losses (e.g., loss of life, displacement, and impacts to community well-being) associated with hurricanes and flooding.

156. Furthermore, the Resilient Housing Revolving Fund and infrastructure retrofitting components directly contribute to minimizing avoidable loss and damage, particularly in high-risk and low-income communities. These interventions protect critical assets and reduce long-term recovery costs, aligning with the anticipated aims of the L&D Framework to build resilience and reduce the burden of climate-induced harm on the most vulnerable.

157. As the national L&D framework evolves, this project can serve as a foundational model for integrating L&D considerations into climate adaptation programming—demonstrating practical approaches to quantifying and addressing potential losses while building long-term resilience. Its alignment with L&D priorities positions it to complement and inform the national framework once finalized.

- Climate Finance Strategy of Belize (2021-2026)

158. The proposed project closely supports several key elements of Belize's Climate Finance Strategy (2021–2026), particularly those outlined under Core Strategic Direction 01 and Core Strategic Direction 05, by integrating climate adaptation priorities with national development planning and advancing climate-resilient infrastructure investments.

159. Under Core Strategic Direction 01: Priority Financing for Climate Change Adaptation and Resilience Building, the project prioritizes financing for climate-resilient infrastructure and housing, particularly in vulnerable and underserved communities. By aligning these investments with broader development goals such as rural transformation, poverty reduction, and social protection. The project helps maximize adaptation co-benefits while strengthening critical public infrastructure (e.g., shelters, schools, and health facilities). Additionally, the establishment of the Resilient Housing Revolving Fund reflects the strategy's goal to identify and mobilize relevant financing mechanisms for adaptation, leveraging concessional loans and grants to enable low-income households to invest in resilient housing.

160. In alignment with Core Strategic Direction 05: Climate Proofing of Development Investments, the project advances the goal of climate-proofing both existing and planned infrastructure through direct retrofitting of critical community buildings and promotion of climate-resilient construction standards. It also contributes to raising awareness among key stakeholders—including public institutions, local authorities, and financial intermediaries such as the Development Finance Corporation —about the importance of climate-proofing, risk-informed planning, and resilience financing. By integrating

capacity-building and community outreach into its implementation model, the project addresses the cross-cutting need for sector-wise awareness, in line with the strategy's emphasis on engaging sectors like banking and insurance in adaptation efforts.

161. Furthermore, the project lays the groundwork for the development and operationalization of national climate-resilient infrastructure guidelines by aligning retrofitting activities with the ICC building and zoning codes, reinforcing national efforts to standardize climate-proofing across public and private sector investments.

E. Describe how the project/programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.

162. The project will also be guided by Belize's national laws, policies, and technical standards to ensure compliance. It will adhere to approved building codes, zoning regulations, and land use policies to ensure all infrastructure and housing upgrades are safe, sustainable, and climate resilient. These are as follows:

- Environmental Protection Act Chapter 328 of the Substantive Laws of Belize Revised Edition 2020

163. All project activities will be fully compliant with Belize's Environmental Protection Act (EPA) and its associated regulations, which provide the legal foundation for environmental governance in the country. The EPA, enacted in 1992 and amended in 1998 and 2009, grants the Department of the Environment (DOE) broad authority to oversee environmental protection, including pollution control, natural resource management, and environmental impact assessments. As such, the project will be implemented in strict adherence to all applicable provisions of the Act and its supporting regulations, including the Environmental Impact Assessment Regulations (S.I. 107 of 1995), the Effluent Limitations Regulations (S.I. 94 of 1995), and the Pollution Regulations (S.I. 56 of 1996).

164. This means that all project activities will undergo appropriate environmental screening, permitting, and monitoring as required by law. The project will also support the DOE's objectives by minimizing pollution, protecting water quality, conserving natural resources, and promoting sustainable development practices. Compliance with the EPA ensures not only environmental responsibility, but also regulatory transparency and alignment with Belize's broader environmental and climate goals, including protection of sensitive ecosystems like the Belize Barrier Reef System.

- Belize Building Act Chapter 131

165. The project will strictly comply with and be guided by the Belize Building Code (IBC) throughout all phases of design, planning, permitting, and construction of buildings and dwellings. This ensures that climate resilience, energy efficiency, and appropriate zoning considerations are fully integrated, reflecting both the local context and current market trends. By adhering to the IBC—which incorporates internationally recognized standards from the International Codes (I-Codes) but is customized for Belize's unique environmental and social conditions—the project will uphold the highest levels of transparency, accountability, quality, and, most importantly, safety in all construction activities.

166. Oversight will be provided by the Central Building Authority (CBA), which is

responsible for enforcing the building code through the issuance of permits, regular inspections, and enforcement of compliance measures. This alignment guarantees that all infrastructure and housing developments supported by the project meet nationally mandated standards designed to protect occupants and communities, while enhancing resilience against climate risks and promoting sustainable development.

- National Land Use Policy for Belize (2025-2035)

167. The project will fully comply with and be guided by the National Land Use Policy which outlines the Government of Belize's strategic policies and actions for the sustainable use, management, and development of land across the country. This comprehensive framework covers critical areas such as land cover and land use classification, ecosystem-based sustainable land management, national estate management, and human settlements.

168. In alignment with the Policy Framework, the project will ensure that all activities prioritize the protection and sustainable use of biodiversity, natural assets, and green infrastructure, alongside responsible integrated coastal zone management, particularly relevant for vulnerable coastal communities. Furthermore, the project will actively support knowledge building, public outreach, and stakeholder engagement to promote transparency and community participation in land use decisions. It will adhere to governance principles for land use planning to ensure that development is sustainable, equitable, and climate resilient.

F. Describe if there is duplication of project/programme with other funding sources, if any.

169. The project is designed to complement, rather than duplicate, existing funding sources, aligning closely with the Government of Belize's broader strategy for climate resilience, disaster risk reduction, and poverty alleviation. This integrated approach recognizes the critical nexus between these three areas: strengthening resilience to climate impacts reduces disaster risks, which in turn prevents communities from falling deeper into poverty. Addressing all three simultaneously ensures sustainable, long-term development outcomes that protect vulnerable populations and promote inclusive growth.

170. While the Government of Belize has made significant progress in providing resilient housing for low-income families, a substantial gap remains for the working poor. Many in this group struggle to access financing through traditional banking channels, limiting their ability to invest in safer, more durable homes that can withstand climate hazards. This project specifically targets this underserved segment by offering tailored, accessible financing options that bridge this gap, thereby expanding the reach of government efforts and fostering more equitable resilience across all socio-economic levels.

G. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

171. The project is designed to systematically generate, manage, and disseminate knowledge and information across all three of its core components, ensuring that lessons learned, data insights, and best practices are shared at the local, national, and regional levels. This commitment to inclusive and strategic knowledge management not only supports effective implementation but also establishes a strong foundation for scaling and replication across the Caribbean, a region highly vulnerable to storms, hurricanes,

and the escalating impacts of climate change.

172. A Stakeholder Assessment and Consultation Plan will be developed during the full proposal preparation phase to guide inclusive, participatory information management throughout implementation. Notably, Output 3.4: Local actors are empowered with the knowledge and skills to build and maintain resilient structures is specifically designed to capture, organize, and disseminate lessons learned from community-based activities. This includes field-tested construction methods, locally adapted solutions, and training outcomes that can inform future resilience-building efforts.

173. Throughout implementation of the project, knowledge will be collected and disseminated at three key levels:

- National Level – The Ministry of Economic Transformation will document the project's successes and integrate key insights into the Government of Belize's broader sustainable development and climate resilience strategies. This will ensure that proven approaches inform future policy and program design.
- Financial Sector Level – The Development Finance Corporation (DFC) will focus on sharing lessons with other financial institutions and private sector stakeholders. This aims to crowd in private investment by demonstrating viable models for financing climate-resilient infrastructure, particularly for underserved groups like the working poor.
- Project Level – As the implementing entity, the Protected Areas Conservation Trust (PACT) will oversee and coordinate the overall management and dissemination of knowledge products. This includes developing a range of communication materials, such as technical reports, case studies, and human impact stories that highlight real-world benefits and community-level transformations.

174. Further, at the community level, NEMO and the National Meteorological Service will play a key role in empowering local actors, especially women, small contractors, and community leaders, through inclusive training programs. These programs will focus on climate-resilient construction techniques and include user-friendly manuals tailored to Belizean contexts. By building local capacity to design, construct, and maintain resilient homes and public infrastructure, the project enhances grassroots resilience and ensures that adaptation efforts are sustainable and widely adopted.

175. Targeted information campaigns will further amplify outreach efforts, promoting storm-resilient housing designs and raising awareness among diverse audiences, with materials carefully crafted to address gender-specific needs and vulnerabilities. Collectively, these knowledge-sharing mechanisms will help position the project as a regional model, providing scalable solutions for other Caribbean nations seeking to strengthen disaster preparedness, enhance climate resilience, and promote inclusive, sustainable development.

H. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the

Environmental and Social Policy and Gender Policy of the Adaptation Fund.

176. During the development of the concept note, focus groups and one-on-one interviews were conducted with a diverse range of national stakeholders to ensure the project is responsive to Belize's institutional realities and community needs. These engagements included the Ministry of Natural Resources, National Emergency Management Organization (NEMO), Central Building Authority (CBA), Belize National Indigenous Council (BENIC), and the National Women's Commission, as well as the National Meteorological Services, the Development Finance Corporation (DFC), and RF&G insurance companies, particularly in relation to the design and implementation of the proposed Resilient Housing Revolving Fund.

177. Each stakeholder provided sector-specific insights that directly informed the structure and focus of the concept note. The Ministry of Natural Resources emphasized the need for adherence to land-use regulations, zoning enforcement, and public education around climate-resilient development. NEMO underscored institutional capacity building, improved disaster logistics, and shelter retrofitting. The CBA highlighted the importance of enforcing building codes, contractor training, and regulatory oversight. BENIC and the National Women's Commission shared critical feedback on the financial barriers facing Indigenous communities and women in accessing housing finance, pointing to gaps in collateral requirements, credit access, and gender-sensitive financial literacy.

178. The National Meteorological Services provided input on early warning systems, radar infrastructure, and data integration to support hazard forecasting. The DFC played a central role in outlining the practical design and operational considerations of the revolving fund, ensuring it aligns with local financing conditions and reaches the underserved working poor. Discussions with insurance providers also highlighted opportunities and constraints in linking climate-resilient construction to reduced premiums and broader risk-sharing mechanisms.

179. While the project prioritizes inclusive and comprehensive consultation, it also recognizes the importance of managing stakeholder expectations and avoiding consultation fatigue, particularly among technical agencies with limited capacity. As such, initial engagements were carefully scoped to inform the concept development process without overburdening stakeholders.

180. Upon confirmation from the Adaptation Fund that the project will proceed to the full proposal stage, a robust and inclusive stakeholder consultation process will be launched. This will be guided by a Stakeholder Assessment and Consultation Plan, developed during the proposal preparation phase, to ensure meaningful participation from all key groups, including those consulted during the concept phase. This structured approach will allow the project to build on strong foundations, while deepening community and institutional ownership during full project design and eventual implementation.

I. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.

181. The IPCC 6th Assessment Report (AR6) confirms that human-induced climate change, including more frequent and intense extreme weather events, has already caused widespread adverse impacts and related losses and damages to both people and ecosystems. With high confidence, the report concludes that the most vulnerable

people and systems are disproportionately affected, and that some irreversible impacts have already occurred as natural and human systems are pushed beyond their capacity to adapt. The IPCC also emphasizes that while some development and adaptation efforts have helped reduce vulnerability, the pace and scale of climate impacts, particularly in vulnerable regions, continue to outpace current adaptive capacity. This directly underscore the urgency of investing in adaptation efforts such as the proposed project in Belize, which aims to reduce the acute vulnerability of communities, infrastructure, and institutions to escalating climate risks.

182. Belize, as a Small Island Developing State, is already facing widespread and pervasive climate impacts, including damage to housing and public infrastructure, repeated displacement of communities due to climate change, and increasing socioeconomic losses from storms. This project targets the additional costs of adaptation required to address these challenges, going beyond baseline development needs to deliver targeted, climate-resilient interventions. By establishing a revolving national housing finance mechanism, the project will enable vulnerable households to access low-interest loans to retrofit, reconstruct, or relocate their homes (Component 3). This will reduce exposure to climate hazards and contribute directly to the Adaptation Fund (AF) Output 2.2: Targeted population groups covered by adequate risk reduction systems, and AF Output 4.2: Physical infrastructure improved to withstand climate change and variability-induced stress. These are costs that would not be incurred without the increasing threat of climate-induced extreme weather and thus are squarely within the scope of the full cost of adaptation approach.

183. Additionally, the project supports the strengthening of national systems, including the Belize National Meteorological Service and the National Emergency Management Organization (NEMO)(Component 1 and 2). Investments in these institutions will improve early warning capabilities, forecasting, and response systems, enhancing Belize's ability to manage climate risks proactively. This component directly addresses AF Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses and supports integrated national adaptation planning and disaster preparedness.

184. The project also prioritizes local ownership and awareness through community-based training on resilient construction techniques, participatory adaptation planning, and risk communication (Component 3). These efforts contribute to AF Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at the local level, ensuring that adaptation measures are sustainable, equitable, and responsive to local needs and knowledge.

185. The IPCC has made it clear that climate change is driving irreversible damage and widespread vulnerability, particularly among those with the fewest resources to adapt. This project responds directly to that global warning by implementing concrete, scalable solutions that reduce exposure, build institutional and community capacity, and secure vital infrastructure against future climate threats. It exemplifies the principles of the full cost of adaptation by targeting those costs that exceed development needs and is fully aligned with multiple Adaptation Fund outcomes and outputs. Investment in this initiative is essential to safeguarding lives and infrastructure in Belize in the face of an increasingly volatile climate.

J. Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project/programme.

186. The sustainability of the project outcomes has been a central consideration in the project's design, ensuring that adaptation benefits are long-lasting, replicable, and nationally owned. The project is closely aligned with the Government of Belize's Low-Income Housing Programme, which seeks to provide safe and affordable housing for the most vulnerable populations. This project now compliments this existing program by targeting an under serve section of Belize population. The project enhances its long-term impact and ensures institutional continuity beyond the life of the Adaptation Fund grant.

187. A key sustainability mechanism is the establishment of a revolving housing finance facility, which will provide low-interest loans to working poor households. As loans are repaid, funds will be reinvested into new adaptation housing projects, creating a self-sustaining financial model that continually supports vulnerable populations over time. To further strengthen sustainability, the project has been designed to attract and coordinate private sector investments, particularly through partnerships with domestic insurance companies. These entities have been included in the project's design process and are expected to participate in the revolving fund mechanism promoting uptake of affordable climate risk insurance products. This integration creates an enabling environment for risk-informed investment and long-term market engagement in climate-resilient housing.

188. The project is also aligned with Belize's national development priorities, as outlined in the Medium-Term Development Strategy and related policy frameworks that emphasize inclusive growth, climate resilience, and disaster risk reduction. By reinforcing these national objectives, the project builds on existing political and policy commitments, ensuring institutional support for sustained implementation. All housing interventions under the project will comply with national building codes and environmental regulations, promoting structural integrity, safety, and environmental sustainability. Capacity-building for contractors and builders on resilient construction techniques and compliance with these standards will further embed best practices into the construction sector.

189. Taken together, the elements of government alignment, financial sustainability through a revolving fund, private sector engagement, policy coherence, and regulatory compliance ensure that the project's outcomes are impactful, scalable, and owned by Belizean institutions and communities.

K. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project/programme.

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Compliance with the Law	n/a	**Low risk:** Non-compliance with national regulatory or legal standards for land use planning and building codes. Implementation arrangements for this project will ensure that activities are completed in compliance with

		the law, making this risk low. **Management Required for Compliance:** As part of the ESIA process for this project, ensure that relevant national laws and institutional partners are mapped out. The project's stakeholder engagement plan should ensure consultations with relevant institutional partners like the Central Building Authority.
Access and Equity	n/a	**Medium risk**: Belize's vast land mass vis a vis population size means there is a low population density, with those in rural communities being far removed from services and opportunities like these provided by the housing component of the project. Traditional means of consultations may also pose access challenges for those in remote areas, persons living with disabilities and other groups from participating in key stakeholder engagement processes that inform the benefits of this project. **Management Required for Compliance:** As part of gender assessment and Environmental and social assessment, ensure there is an improved understanding of the vulnerable groups and the constraints they may face in assessing the benefits of the project. These assessments will ensure close engagement with potential beneficiary groups, including representative groups of women, youth, persons with disabilities and

		other groups. A beneficiary selection criterion will also need to be developed to ensure selection of beneficiaries considers a geographic distribution and non-exclusionary provisions.
Marginalized and Vulnerable Groups	n/a	**Medium Risk:** There is some risk that vulnerable groups with limited social capital may be excluded from opportunities relating to access to improved housing. Terms of engagement of the Revolving Finance Fund may also exclude marginalized groups. In activities related to Early warning systems, risk of exclusion based on technological selection and linguistic barriers will have to be accounted for **Management Required for Compliance:** As part of gender assessment and environmental and social assessment, ensure there is an improved understanding of the vulnerable groups and the constraints they may face in assessing the benefits of the project. These assessments will ensure close engagement with potential beneficiary groups, including representative groups of women, youth, persons with disabilities and other groups. A stakeholder engagement plan that includes informed mapping of vulnerable

		stakeholders will be necessary for project implementation.
Human Rights	n/a	**Low risk**: There may be discrimination in distribution of benefits. While the Constitution of Belize prohibits discrimination based on race, place of origin, political opinions, color, creed, or sex, institutional practices and norms may result in rights violations. **Management Required for Compliance:** As part of gender assessment and Environmental and social assessment, ensure there is an improved understanding of the vulnerable groups and the constraints they may face in assessing the benefits of the project. These assessments will ensure close engagement with potential beneficiary groups, including representative groups of women, youth, persons with disabilities and other groups. A beneficiary selection criterion will also need to be developed to ensure selection of beneficiary considers a geographic distribution and non-exclusionary provisions.
Gender Equality and Women's Empowerment	n/a	**Low Risk:** There may be uneven distribution of benefits to people of different gender groups and subgroups. These may be a result of overt or covert practices societally or at the level of executing partners. Additionally, the power dynamics at play in distribution of housing dynamics may create avenues for sexual

		exploitation of beneficiaries. **Management Required for Compliance:** Ensure that a gender assessment is conducted and identifies gender roles, norms, barriers and access issues. Also ensure that a SEAH assessment is done for the project. These assessments will help clarify specific actions that will allow for gender equity, minimize gender risks and empower women.
Core Labour Rights	n/a	**Medium Risk**: Occupational health and safety risks may be present in construction-related activities. Similarly, violation of rights related to overtime pay and payment in accordance with minimum wage laws is potentially relevant in construction related activities. **Management Required for Compliance:** Ensure that ESIA assesses occupational, health and safety (OSH) risks of the project's activities. Develop OSH plans from these assessments. The project will allow for implementation of this plan, including covering costs for personal protective equipment, training etc.
Indigenous Peoples	n/a	**Medium Risk**: There are potential access issues for Indigenous people in remote parts of Belize. Similarly, if the project is not well designed to consider customary land rights, there may be exclusionary activities for holders of this form of land tenure. In activities related to Early

		warning systems, risk of exclusion based on technological selection and linguistic barriers will have to be accounted for. **Management Required for Compliance:** Ensure meaningful consultation with Belize National Indigenous Council and other representative groups of Indigenous people on this project as part of the studies that will inform the final project design. Ensure FPIC process is upheld where project activities are undertaken in indigenous communities.
Involuntary Resettlement	**No Risk:** The project will not undertake activities that will acquire or require easement of private property. Activities under Outcomes 1 and 2 will be done on public lands solely. Activities under outcome 3 will require validation of land documents whether through national systems or customary practices in the Case of Indigenous People.	n/a
Protection of Natural Habitats	n/a	**Low Risk:** There is a low risk of the natural environment being impacted as a result of construction activities and flood modeling, forecasting tool installation. No lands under protected status will be utilized for project activities. The nature of the project activities may cause some disruption to the natural environment, albeit minimal. **Management Required for Compliance:** An ESIA will be used to assess clearly any risk related to protecting natural

		habitat. ESMP should clearly define mitigation measures where risks are identified. Where monitoring stations are placed within waterways, establish protocols and best practices with the National Hydrology Service. Ensure that these best practices are implemented.
Conservation of Biological Diversity	n/a	**Low Risk:** There is a low risk of human-wildlife conflict where construction activities are ongoing and where flood modeling and forecasting tools are being installed. **Management Required for Compliance:** An ESIA will be used to assess clearly any risk related to conservation of biological diversity. ESMP should clearly define mitigation measures where risks are identified.
Climate Change	n/a	**Medium Risk**: Climatic events may cause damage to or loss of weather monitoring devices, especially those placed in Rivers and waterways. **Management Required for Compliance:** Determine and implement protocols and best practices with the National Hydrology Service and the National Meteorology service for securing weather data equipment from the impacts of climatic events.
Pollution Prevention and Resource Efficiency	n/a	**Medium Risk:** The project presents some risk of exposure to pollutants contained in construction materials during restoration works, particularly in emergency shelters. There is also risk of improper disposal of construction debris during

		rehabilitative work. There is some risk, albeit small, of pollution of rivers and waterways through increased levels of turbidity during installation of flood modeling, forecasting tools. **Management Required for Compliance:** An ESIA will assess potential risks to pollution prevention and resource efficiency. A waste management plan, and/or a resource efficiency plan will be developed for the project especially related to construction waste.
Public Health	No risk envisioned to Public Health	n/a
Physical and Cultural Heritage	n/a	**Low risk:** The project may incorporate indigenous and traditional knowledge in the design of the early warning system. There is a low risk of wrongful use of indigenous knowledge acquired for the purpose of the elaboration of the EWS. Given Belize's right cultural history, there may be possibilities for encountering chance finds in construction work. This risk is however considered low since construction activities under this project will likely be rehabilitative works, specifically on Emergency shelters. **Management Required for Compliance:** Meaningful consultations with appropriate indigenous groups will be prioritized where works are done in indigenous communities. Depending on the ESIA Assessment, ensure that a Chance Finds procedure is

		elaborated for the project in consultation with the Department of Archaeology
Land and Soil Conservation	No risk envisioned to land and soil conservation. The nature of this project will not result in degradation to soils.	n/a

PART III: IMPLEMENTATION ARRANGEMENTS

190. The project will be implemented through a country-led execution model, with the Ministry of Economic Transformation serving as the lead government partner. The project will be implemented in close collaboration with the Protected Areas Conservation Trust (PACT), which will act as both the National Implementing Entity (NIE) and the Executing Entity, ensuring fiduciary management, compliance with Adaptation Fund standards, and timely delivery of project activities.

191. To ensure effective coordination and technical support, the project will engage key national agencies as coordination partners. The Development Finance Corporation (DFC), the National Emergency Management Organization (NEMO), and the Belize National Meteorological Service will serve as core coordination entities, each responsible for guiding and supporting specific components of the project:

- NEMO will coordinate activities under Component 1, focusing on early warning systems, disaster preparedness, and institutional capacity for hurricane response and recovery.
- The Meteorological Service will lead coordination of Component 2, which aims to strengthen meteorological and hydrological services for improved hurricane monitoring and forecasting.
- The DFC will support the implementation of Component 3, which centers on sustainable housing finance and the establishment and management of a revolving fund for climate-resilient infrastructure.

192. To ensure cross-sectoral alignment, transparency, and strategic oversight, a Project Steering Committee (PSC) will be established. The PSC will be chaired by the Ministry of Economic Transformation and will include representatives from:

- Ministry of Finance
- Ministry of the Public Service, Governance & Disaster Risk Management
- Ministry of Sustainable Development, Climate Change and Solid Waste Management
- Ministry of Infrastructure Development and Housing

This Steering Committee will provide high-level guidance, monitor project progress, and support policy alignment with national climate adaptation and development priorities.

193. In addition, a Technical Sub-Committee will be formed to provide expert input, review technical deliverables, and ensure coherence with sectoral strategies and environmental regulations. This Sub-Committee will include representatives from:

- Central Building Authority (CBA)
- Department of the Environment
- Ministry of Natural Resources, Petroleum & Mining
- Ministry of Human Development, Family Support & Gender Affairs
- Ministry of Constitution and Religious Affairs, Indigenous Affairs and Transportation.

194. These institutional arrangements are designed to promote inclusive governance, cross-sectoral coordination, and sustainability, ensuring that the project effectively contributes to Belize's national climate adaptation goals and strengthens long-term resilience across all levels of society. See implementation diagram below

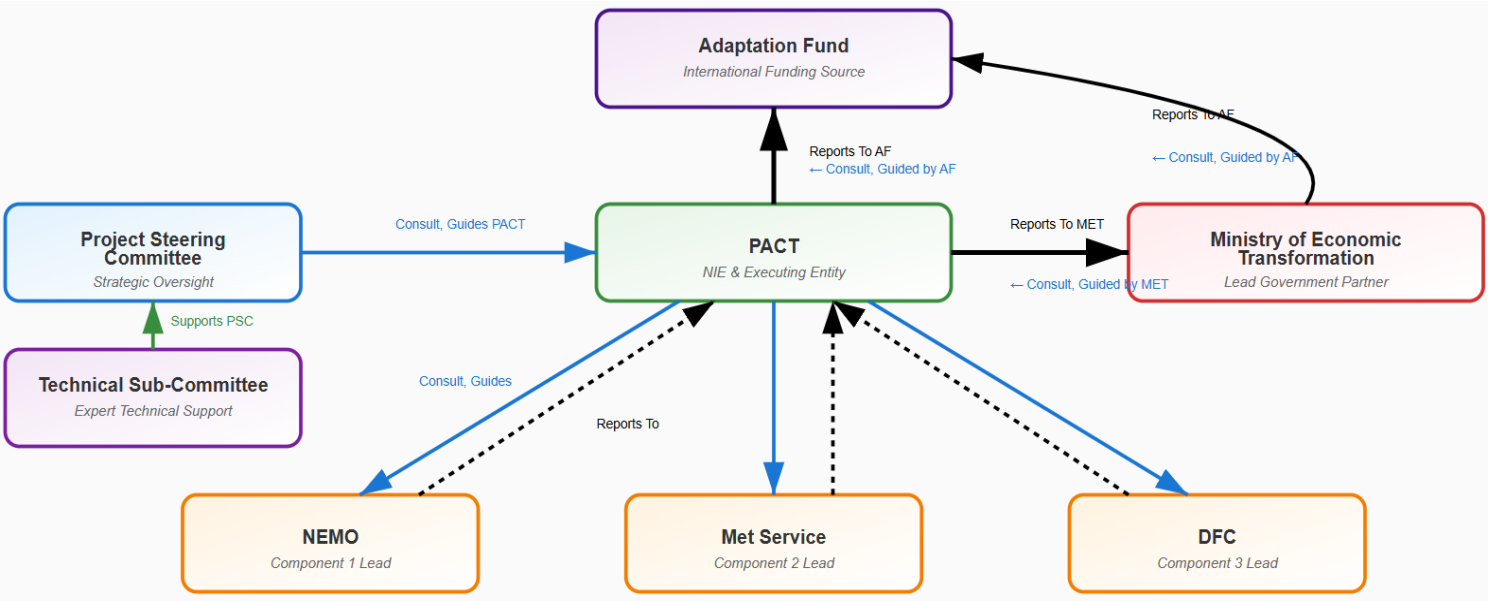


Figure 12: Project Implementation Arrangements

Flow of Funds

195. Funds from the Adaptation Fund will be disbursed directly to the Protected Areas Conservation Trust through a Fund Legal Agreement. As the National Implementing Entity, PACT will be responsible for the receipt, management, and reporting of these funds in line with the fiduciary and operational requirements of the Adaptation Fund. To facilitate execution at the national level, PACT will establish Memoranda of Understanding (MOUs) outlining activity-level agreements with key government agencies, including the National Emergency Management Organization, the Belize National Meteorological Service, and the Development Finance Corporation. These MOUs will define roles, responsibilities, disbursement terms, and reporting obligations (Figure 13).

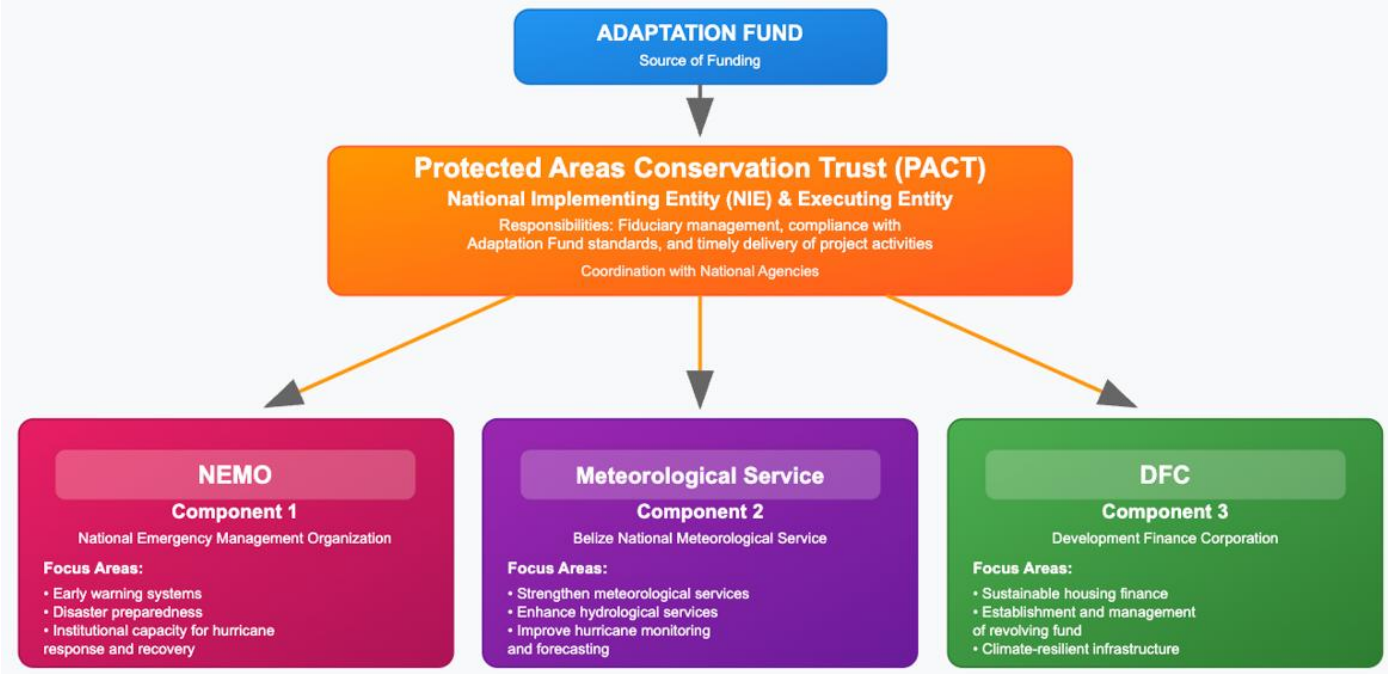


Figure 13: Flow of Funds

A. Demonstrate how the project/programme aligns with the Results Framework of the Adaptation Fund

Project Objective(s)[1]	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
Enhanced the capacity of the National Emergency Management Organization to effectively prepare for, respond to, and recover from hurricanes by improving institutional frameworks, emergency response protocols and infrastructure, and community engagement strategies.	% increase of risk-exposed communities protected through adaptation measures # of people with improved access to timely early warning alerts for hurricanes and extreme weather events % of women (including female-headed households) with improved access to early warning systems, disaster preparedness resources, and climate-resilient infrastructure	**Outcome 1:** Reduced exposure to climate-related hazards and threats	1. Relevant threat and hazard information generated and disseminated to stakeholders on a timely basis	$ 500,000
Enhanced the capacity of the National Emergency Management Organization to effectively prepare for, respond to, and recover from hurricanes by improving institutional frameworks, emergency response protocols and infrastructure, and community engagement strategies.	# of disaster management personnel trained in climate risk analysis, data systems, and mitigation planning % of participants in training and capacity-building activities who are women, disaggregated by age and leadership role % of retrofitted infrastructure with uninterrupted functionality during/after extreme weather events Disaster Management Information System platform developed and operational, integrating real-time damage reporting, risk mapping,	**Outcome 2:** Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic & environmental losses	2.1. Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased	$ 1,000,000

	and historical data (Yes/No) # of disaster response agencies using Disaster Management Information System for real-time data and decision-making for extreme weather events # of climate risk assessments and early warning outputs supported by the integrated data system			
Strengthened meteorological and hydrological services to provide accurate and timely early warnings, enabling authorities to take proactive measures ahead of climate-related hazards.	# of new or upgraded flood modeling and forecasting systems operational within national meteorological and hydrological services # of technical staff trained in use and maintenance of upgraded forecasting tools and infrastructure % of trained NMHS personnel who are women, disaggregated by technical role and seniority			$2,000,000
Enhanced the capacity of the National Emergency Management Organization to effectively prepare for, respond to, and recover from hurricanes by improving institutional frameworks, emergency response protocols and infrastructure, and community engagement strategies.	% of target communities reporting increased awareness and responsiveness to storm warnings # of local institutions applying data-driven approaches to hazard preparedness and response % increase in local government capacity to respond effectively to climate-induced disasters (based on pre- and post-training assessments) Gender-responsive disaster preparedness and response protocols developed and adopted (Yes/No)	**Outcome 3:** Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	$ 500,000
Establish a revolving fund to provide	# of people with continued access to essential	**Outcome 4:** Increased adaptive	4.2. Physical infrastructure	$17,500,000

accessible, low-interest loans for vulnerable households and communities to retrofit, reconstruct, or relocate homes and critical infrastructure to safer, climate-resilient standards	services during disasters due to retrofitted facilities Financial management and governance structures for the revolving fund established and functioning (Yes/No) % of fund disbursements reaching climate-vulnerable households # of homes in climate-vulnerable areas retrofitted, reconstructed, or relocated to meet national climate-resilient housing standards % of women-headed households benefiting from resilient housing solutions supported by the revolving fund # of direct beneficiaries (disaggregated by gender and vulnerability criteria) housed in retrofitted or constructed resilient homes # of public infrastructure retrofitted or upgraded with flood protection, structural reinforcement, water, and energy resilience features # of local builders, contractors, and community members trained in climate-resilient construction practices # of knowledge products (e.g., manuals, case studies, reports) developed and shared at local and national levels	capacity within relevant development sector services and infrastructure assets	improved to withstand climate change and variability-induced stress	
Project Outcome(s)	**Project Outcome Indicator(s)**	**Fund Output**	**Fund Output Indicator**	**Grant Amount (USD)**

Outcome 1.1.1 National Systems for Hurricane Preparedness, Response, and Recovery Strengthened	Percentage of target population covered by adequate hurricane risk-reduction systems, including early warning services, climate-resilient shelters, and coordinated preparedness and response protocols Number of communities covered by improved warning system and weather information	**Output 1.2:** Targeted population groups covered by adequate risk reduction systems	1.2.1. Percentage of target population covered by adequate risk-reduction systems	
Outcome 1.1.1 National Systems for Hurricane Preparedness, Response, and Recovery Strengthened	Number of targeted institutions with increased capacity to minimize exposure to hurricane-related climate variability risks	**Output 2.1:** Strengthened capacity of national and sub-national centres and networks to respond rapidly to extreme weather events	2.1.2 No. of targeted institutions with increased capacity to minimize exposure to climate variability risks (by type, sector and scale)	
Outcome 2.1.1 Meteorological and Hydrological Services for Improved Hurricane Monitoring and Forecasting Strengthened	Number of climate risk monitoring tools, models, or technical guidelines developed and shared with relevant stakeholders to support improved hurricane forecasting and early warning	**Output 3.2:** Strengthened capacity of national and subnational stakeholders and entities to capture and disseminate knowledge and learning	3.2.2 No. of tools and guidelines developed (thematic, sectoral, institutional) and shared with relevant stakeholders	
Outcome 3.1.1 Sustainable Financing and Local Capacity for Climate-Resilient Housing and Infrastructure Strengthened	Number of climate-resilient housing units and critical infrastructure assets strengthened, constructed, or relocated to withstand impacts of climate variability and change, supported through sustainable financing mechanisms	**Output 4:** Vulnerable development sector services and infrastructure assets strengthened in response to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by sector and scale)	

Annex 1: References

Chen, Shangfeng, Wen Chen, Renguang Wu, Bin Yu, Hans-F. Graf, Qingyu Cai, Jun Ying, and Wanqiu Xing. 2025. *Atlantic multidecadal variability controls Arctic-ENSO connection.* Climate and Atmospheric Science 8, no. 1 .

CIMH, Caribbean Institute for Meteorology and Hydrology (graphics) and National Meteorological. 2025. *Country Data.* Accessed 8 6, 2025. https://carogen.cimh.edu.bb/index.php/component/countrydata/component/countrydata/countrydata?option=com_countrydata&task=showcountrydata&country=Belize&station=Central-Farm&dataset=max.

CZMIA, Coastal Zone Management Authority and Institute. 2025. "Integrated Coastal Zone Management Plan 2025-2029." Belize .

Elections and Boundaries Department, Government of Belize. 2025. *Total Electors by Municipality, Polling Area and sex.* Accessed 8 6, 2025. https://elections.gov.bz/statistics/.

Fruttero, Anna, Daniel Halim, Chiara Broccolini, Bernardo Coelho, Horace Gninafon, and Noël Muller. 2024. *Gendered impacts of climate change: evidence from weather shocks.* Environmental Research: Climate 3, no. 4.

GOB, Government of Belize, Ministry of Economic Trasfromation. 2025. "Map of Belize." *Administrative Districits and Urban Centers.* July.

IPCC, Intergovernmental Panel on Climate Change. 2023. *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change .* Geneva, Switzerland: IPCC.

Méndez-Tejeda, Rafael, and José J. Hernández-Ayala. 2023. *Links between climate change and hurricanes in the North Atlantic.* PLOS climate 2, no. 4.

NCCO, National Climate Change Office, Ministry of Sustainable Development, Climate Change and Disaster Risk Managment. 2022. *Belize's Fourth National Communication.* Belmopan: Government of Belize.

NCCO, National Climate Change Office, Ministry of Sustainable Development, Climate, and Disaster Risk Managment. 2021. *National Climate Change Policy, Strategy and Master Plan.* Belmopan: Government of Belize.

Niño, Atlantic. 2021. "Accumulated Cyclone Energy (ACE): a measure of."

NOAA, The National Oceanic and Atmospheric Administration. 2025. *NOAA Historical Hurricane Tracks.* 8. Accessed 8 6, 2025. https://oceanservice.noaa.gov/news/historical-hurricanes/.

SIB, Statistical Insitute of Belize, Government of Belize. 2022. *Housing and Population Census.* Belmopan: Government of Belize.

SIB, Statistical Insitute of Belize, Government of Belize. 2024. *Multidimensional Poverty Study.* Belmopan: Government of Belize.

Taylor, Harvey Thurm, Bill Ward, Mark Willis, and Walt Zaleski. 2010. *The saffir-simpson hurricane wind scale.* Washington, DC,: Atmospheric Administration:.

UNDP, United Nations Development Programme. 2023. *Post Disaster Needs Assessment (PDNA):Floods due to Hurricane Lisa in Belize.* Belmopan: UNDP.

UNESCO, United Nations Educational, Scientific and Cultural Organization 1992-2025. 2025. *World Heritage Convention.* Accessed 8 6, 2025. https://whc.unesco.org/en/list/764/.

WMO, World Meteorological Organization. 2024. *State of the Global Climate .* Geneva 2, Switzerland: World Meteorological Organization.

[1] The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. **Record of endorsement on behalf of the government**[2] *Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:*

(Enter Name, Position, Ministry)	Date*: (Month, day, year)*

B. **Implementing Entity certification** *Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address*

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (……list here…..) and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy and the Gender Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.

[6.] Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

Name & Signature Implementing Entity Coordinator	
Date: *(Month, Day, Year)*	Tel. and email:
Project Contact Person:	
Tel. And Email:	

ADAPTATION FUND

Letter of Endorsement by Government

GOVERNMENT OF BELIZE

Ministry of Finance, Investment, **Economic Transformation**,
Civil Aviation & E-Governance

P.O. Box 42
Ground Floor, Sir Edney Cain Building
Belmopan City
Belize, Central America

Tel: (501) 880-2526
(501) 880-2527
Email: econdev@med.gov.bz

07th August 2025

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: Endorsement for Strengthening Disaster Preparedness, Early Warning Systems, and Climate Resilient Housing

In my capacity as designated authority for the Adaptation Fund in Belize, I confirm that the above national grant proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in Belize.

Accordingly, I am pleased to endorse the above grant proposal with support from the Adaptation Fund. If approved, the project will be implemented by Protected Area Conservation Trust (PACT) and executed by PACT and Development Finance Corporation (DFC).

Sincerely,

Mr. Carlos Pol
Chief Executive Officer

BELIZE

NATIONAL DISASTER PREPAREDNESS BASELINE ASSESSMENT

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

PDC | GLOBAL

AUTHORS

LEAD AUTHORS

Dan Morath, MS, GISP
Paulo C. Fernandes Jr., GISP
Irmak Renda-Tanali, D.Sc.
Sarah Bryan, MSc
Adam Gramann, MSc
Annie Collopy, MSc

CONTRIBUTING AUTHOR

Erin Hughey, PhD

BELIZE NDPBA LEAD

Paulo C. Fernandes Jr., GISP
Latin America and Caribbean Advisor
pfernandes@pdc.org

NDPBA PROGRAM VISUALIZATION & COMMUNICATION

Chani Goering
Communication and Outreach Manager
cgoering@pdc.org

NDPBA PROGRAM MANAGER

Dan Morath, MS, GISP
Senior Disaster Risk Specialist
dmorath@pdc.org

NDPBA PROGRAM DIRECTOR

Erin Hughey, PhD
Director of Global Operations
ehughey@pdc.org

ACKNOWLEDGEMENTS

Pacific Disaster Center (PDC) would like to acknowledge all agencies and organizations that provided insightful inputs and guidance leading to the completion of this analysis and report. This program has advanced during a global pandemic, making all activities in day-to-day life more challenging. However, there were many individuals who provided significant contributions to the meetings, workshops, surveys, interviews, data collation, data validation, and general guidance and support – to all of you we say MAHALO (thank you). We offer a special thanks to the National Emergency Management Organization (NEMO) and Mr. Shelton Defour for the continued commitment to building a disaster resilient Belize and supporting this project.

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

LIST OF ABBREVIATIONS

2030 Agenda; SDGs: Sustainable Development Goals

ACS: Association of Caribbean States

ANDA: Association of National Development Agencies

BATSUB: British Army Training Support Unit Belize

BCCAP: Belize Climate Change Adaptation Policy

BCG: Belize Coast Guard

BCRIP: Belize Climate Resilient Infrastructure Project

BDF: Belize Defence Force

BECOL: Belize Electric Company, Ltd

BHRAF: Belize Hazard and Risk Assessment Framework

BJNSC: Belize Joint National Steering Committee

BNE: Belize Natural Energy

BNSS: Belize National Statistical System

BPW: Bureau of Public Works

BRCS: Belize Red Cross Society

BSIF: Belize Social Investment Fund

BTB: Belize Tourism Board

BURDPP: Belize Urban Resilience and Disaster Prevention Project

CAFFGS: Central American Flash Flood Guidance System

CARICOM: Caribbean Community

CCA: Climate change adaptation

CCAPVAA: Climate Change Adaptation Plan and Vulnerability and Adaptation Assessment

CCCCC: Caribbean Community Climate Change Centre

CCDRMF: Canada Caribbean Disaster Risk Management Fund

CCRIF: Caribbean Catastrophe Risk Insurance Facility

CDAC: CARICOM Disaster Assessment and Coordination (CDEMA)

CDB: Caribbean Development Bank

CDEMA: Caribbean Disaster Emergency Management Agency

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

CDM: Comprehensive Disaster Management

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

CDRU: CARICOM Disaster Relief Unit

CEO: Chief Executive Officer

CERC: Contingent Emergency Response Component

CERT: Community Emergency Response Team

CIMH: Caribbean Institute for Meteorology and Hydrology

COG: Continuity of Government

COOP: Continuity of Operations

COP: Common Operating Picture

COST: CARICOM Operational Support Team (CDEMA)

CSO: Civil society organization

DANA: Damage Assessment and Needs Analysis

DANAC: Damage Assessment and Needs Analysis Committee

DC: Diplomatic Corps

DEC: District Emergency Committee

DED: Department of Economic Development

DHS: Department of Human Services

DM: Disaster management

DPPSD: Department of Public-Private Sector Dialogue

DPR Act/2000: Disaster Preparedness and Response Act, 2000

DRR: Disaster risk reduction

DRRM: Disaster risk reduction and management

DSD: Department of Sustainable Development

EAF: Emergency Assistance Fund (CDEMA)

EC: Environment Committee

EDC: Economic Development Council

EICWC: Education, Information, Communication and Warning Committee

EMC: Emergency Management Coordinator

EMT: Emergency medical technician

EMZ: Emergency Management Zone

EOC: Emergency Operations Center

EPA: Environmental Protection Act

ERT: Emergency Response Team

ESF: Emergency support function

ESMF: Environment and Social Management Framework

EWS: Early Warning Systems

FAC: Foreign Assistance Committee

FFPA: Forest Fire Protection Act

GDP: Gross domestic product

GFDRR: Global Facility for Disaster Reduction and Recovery

GIS: Geographic information system

GO: Government Organization

GOB: Government of Belize

HPPB: Humana People to People Belize

HRMC: Human Resource Management Committee

HSC: Housing and Shelter Committee

HTPA: Housing and Town Planning Act

IADB: Inter-American Development Bank

ICG/CARIBE-EWS: Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Districts

IFRC: International Federation of Red Cross and Red Crescent Societies

iGOPP: Index of Governance and Public Policy (in Disaster Risk Management)

LU Act: Land Utilization Act

MAFFESD: Ministry of Agriculture, Fisheries, Forestry, the Environment and Sustainable Development

MCE: Multi-Criteria Evaluation

MCPHC: Medical Care and Public Health Committee

MCSDFC 2017-2021: Multi-Country Sustainable Development Framework in the Caribbean 2017 – 2021

MDGs: Millennium Development Goals

MED: Ministry of Economic Development

MEDP: Ministry of Economic Development and Petroleum

MFA: Ministry of Foreign Affairs

MHA: Ministry of Home Affairs

MHD: Ministry of Human Development

MHUD: Ministry of Housing and Urban Development

MIFT: Ministry of Industry and Foreign Trade

MIWC: Mitigation and Infrastructure Work Committee

MLLG: Ministry of Labour and Local Government

MLO: Military Liaison Office

MND: Ministry of National Development

MNR: Ministry of Natural Resources

MNRE: Ministry of Natural Resources and Environment

MNS: Ministry of National Security

MoA: Ministry of Agriculture

MoE: Ministry of Education

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

MoF: Ministry of Finance

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

MoH: Ministry of Housing; Ministry of Health

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

MoW: Ministry of Works

MPS: Ministry of Public Services

MPUTC: Ministry of Public Utilities, Transportation and Communications

MPW: Ministry of Public Works

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

MSME: Micro, Small, and Medium Enterprises

MTW: Ministry of Transport and Works

NAC: National Advisory Committee

NCCO: National Climate Change Office

NDC: Nationally determined contribution

NDF: National Development Framework

NDMS: National Disaster Management Strategy

NDS 2030: National Development Strategy 2030

NEC: National Emergency Coordinator

NEMO: National Emergency Management Organization

NEOC: National Emergency Operations Center

NEPS: National Environmental Policy and Strategy

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

NFS: National Fire Service

NGO: Non-governmental organization

NHMP: National Hazard Mitigation Plan; National Hazard Mitigation Policy

NHS: National Hydrological Service

NLUP: National Land Use Policy

NMS: National Meteorological Service

NWC: National Women's Commission

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

OAS: Organizations of

American States

OC: Operational Committee

OECS: Organization of Eastern Caribbean States

OFDA: Office of US Foreign Disaster Assistance

OSIPP: Office of Supervisor of Insurance & Private Pensions

PAHO: Pan American Health Organization

PHA: Public Health Act

PM: Prime Minister

POA: Plan of Action

PPP: Public/private partnership

PS: Participating State (of CDEMA)

PSR: Public Service Regulation

PTWC: Pacific Tsunami Warning Centre

RC: Recovery Committee

RCC: District Coordination Center (CDEMA)

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

RNAT: Rapid Needs Assessment Team

RNGP: Revised National Gender Policy

RRM: District Response Mechanism

RSART: District Search and Rescue Team

RTC: District Training Centre

RUAC: Restoration of Utilities and Access Committee

SI: Statutory Instrument

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

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

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

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

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

SL: Subsidiary Laws

SOP: Standard operating procedure

SREC: Search, Rescue, and Evacuation Committee

SUMA: Supplies Management

TAP: Technology Action Plan

TC: Transport Committee

TNA: Technology Needs Assessment

TTMB: Taiwan Technical Mission in Belize

UB: University of Belize

UBDPS: University of Belize Department of Public Safety

UN: United Nations

UNCAC: United Nations Convention against Corruption

UNDAC: United Nations Disaster Assessment and Coordination

UNDP: United Nations Development Programme

UNFCCC: United Nations Framework Convention on Climate Change

UNICEF: United Nations Children's Fund

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

USAID: U.S Agency for International Development

USGS: United States Geological Survey

VNR: Voluntary National Review

WB: World Bank (The)

WHO: World Health Organization

TABLE OF CONTENTS

EXECUTIVE SUMMARY

BELIZE NATIONAL DISASTER PREPAREDNESS BASELINE ASSESSMENT

OVERVIEW

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

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

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

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

SUMMARY OF FINDINGS

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

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

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

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

NATURAL HAZARD EXPOSURE

110,000

people affected by natural disasters (2010 - 2020)

60,000

people affected by Hurricane Eta in 2020

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

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

RECENT MAJOR DISASTERS

2015
Belize City Heavy Rains and Floods

2020
Hurricane Eta

Affected 60,000 people

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

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

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

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

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

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

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

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

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

RECOMMENDATIONS

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

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

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

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

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

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

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

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

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

8 **Review dedicated facilities and equipment.**

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

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

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

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

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

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

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

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

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

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

19 **Reduce marginalization** and promote gender equality.

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

AN INTRODUCTION

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

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

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

BELIZE NDPBA

APPLYING ASSESSMENT RESULTS

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

STRENGTHEN PARTNERSHIPS

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

SUPPORT SENDAI COMMITMENTS

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

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

INCREASE RESILIENCE

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

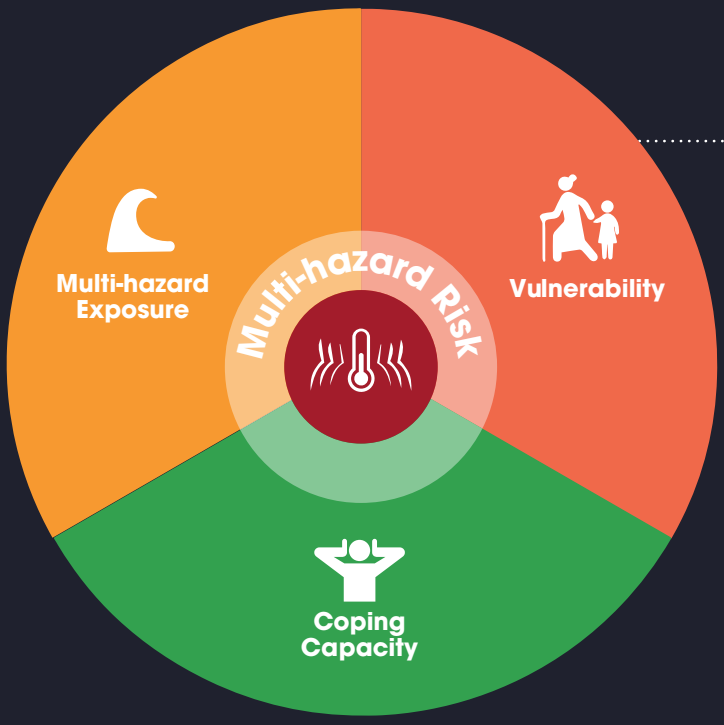
NDPBA

METHODOLOGY AND OBJECTIVES

OVERVIEW

MEASURING RISK

RVA METHODOLOGY | COMPONENTS OF RISK



SUBCOMPONENTS

- Population Pressures
- Gender Inequality
- Economic Constraints
- Information Access
- Clean Water Access
- Health Status
- Environmental Stress

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

OBJECTIVES

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

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

MEASURING RESILIENCE

RVA METHODOLOGY

RESILIENCE

HAZARD INDEPENDENT

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

OBJECTIVES

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

KEY CONCEPTS
RVA METHODOLOGY

EXAMPLES AND DEFINITIONS

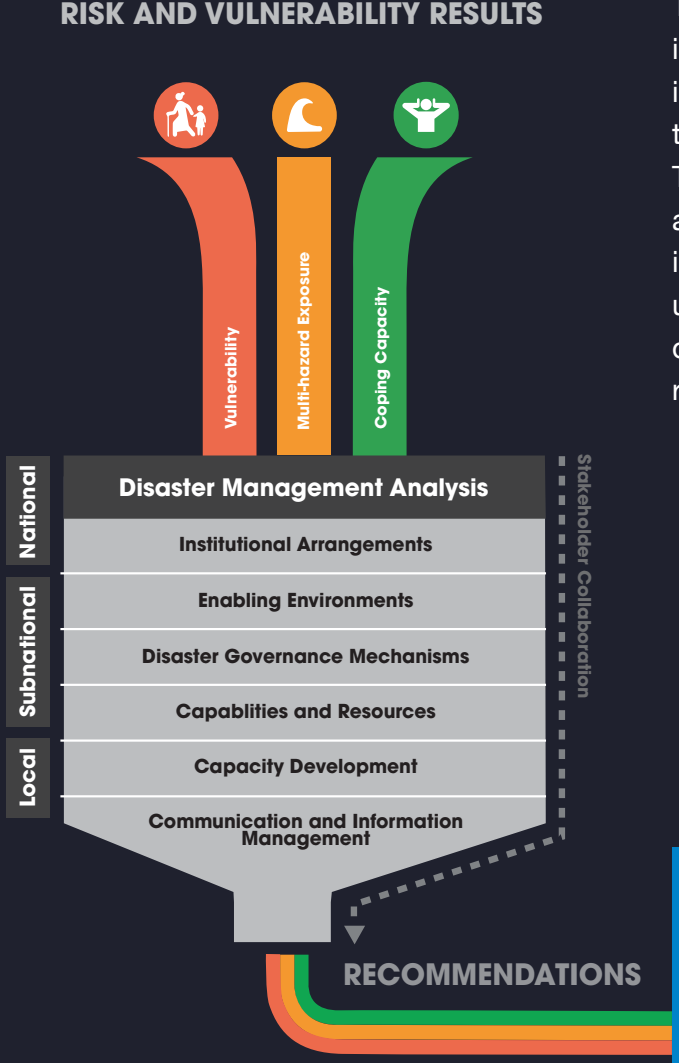
VULNERABILITY: Provides visibility into the underlying socioeconomic and societal factors that predispose areas to disasters. A vulnerability analysis measures the physical, environmental, social, and economic conditions and processes that increase the susceptibility of communities and systems to the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

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

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

DISASTER MANAGEMENT ANALYSIS

DMA METHODOLOGY



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

ANALYSIS OBJECTIVES

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

DISASTER MANAGEMENT THEMES

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

Institutional Arrangements

Enabling Environment

Disaster Governance Mechanisms

Capabilities and Resources

Capacity Development

Communication and Information Management

COUNTRY BACKGROUND AND OVERVIEW

GEOGRAPHY

GEOGRAPHY

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

22,966 km²
Total area: ~8,867 sq mile

542 KM
Land Boundaries (total)

276 km
México

6
Districts

386 KM
Coastline

266 km
Guatemala

Nearest Neighboring Country
Mexico and Guatemala

Belmopan
Capital City

Belize City
Largest city

GEOLOGY AND CLIMATE

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

Key climate change risks

Extreme Heat
113,883
(32%)
People exposed

Wildfires
226,891
(63.5%)
People exposed

Earthquake
48,315
(13.5%)
People exposed

Landslide
9,059
(2.5%)
People exposed

Floods
76,643
(21.4%)
People exposed

Storm Surge
55,978
(16%)
People exposed

Tropical Cyclone Winds
357,446
(100%)
People exposed

DEMOGRAPHICS

357,446
Total population (2021)

1.67 %
Avg. annual population growth

78
Global socioeconomic vulnerability ranking

10.4
Doctors per 10k people

20
Nurses per 10k people

75
Avg. life expectancy (2019)[4]

10
Hospital beds per 10k people

12.6
Infant deaths per 1k live births

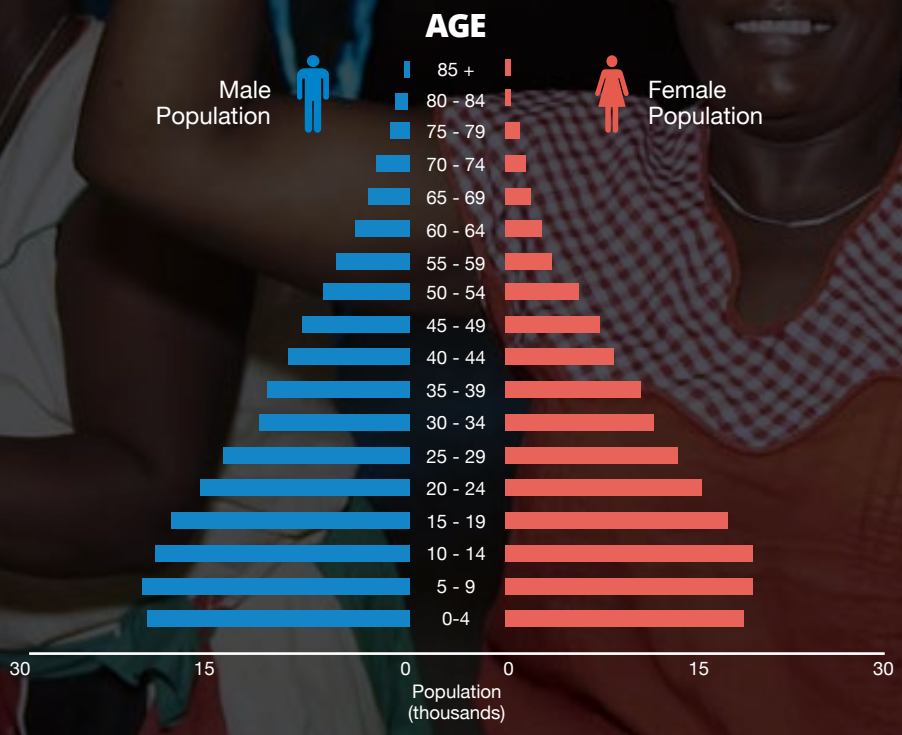
76.9%
Adult literacy

Languages

63% English
57% Spanish
45% Creole
11% Maya

Ethnic groups population

53% Mestizo
26% Creole
11% Maya



ECONOMY

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

GDP and Key Exports

$1.64 billion (USD) (-0.03%)
GDP (2020)

2.5
Avg. annual growth in GDP (2014-2018)

41%
People living below national poverty line (2013)

Garment production

Food processing

Tourism

Petroleum

Construction

Tourism

1.94 million (2019)
International visitor arrivals

29.2% (2019)
Tourism expenditures portion of GDP

KEY INFRASTRUCTURE

LOGISTICS

1
Large Airport

10
Medium Airports

22
Small Airports

33
Ports, Marinas and Harbors

91.8%
Access to electricity

97%
Access to improved water

93%
Access to improved drinking water

82%
Access to improved sanitation

Emergency Services

13
Hospitals

15
Fire Stations

40
Police Stations

290
Emergency Shelters

5
Emergency Operations Centers (EOCs)

5
Emergency Warehouses

DISASTER MANAGEMENT

Major capacity improvement milestones:

2000

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

2014

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

2020

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

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

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

Major Disaster Impacts (2010-2020)

- Toledo and Stann Creek Districts: Tropical Cyclone Matthew (2010)
  10,000 affected

- Belize City: Heavy Rains and Floods (2015)
  20,000 affected

- Belize and Cayo Districts: Tropical Cyclone Earl (2016)
  10,355 affected

- Cayo, Belize, Stann Creek, and Toledo Districts: Hurricane Eta (2020)
  60,000 affected

THE RVA

RISK AND VULNERABILITY ASSESSMENT RESULTS

RISK AND VULNERABILITY ASSESSMENT RESULTS

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

BELIZE DISTRICTS

BELIZE BACKGROUND

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

COMPONENTS OF RISK

Vulnerability

Coping Capacity

Multi-Hazard Exposure

THE RVA

MULTI-HAZARD EXPOSURE

MULTI-HAZARD EXPOSURE

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

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

Global Multi-Hazard Exposure rank (PDC Global RVA)

64 OUT OF 216 COUNTRIES / TERRITORIES ASSESSED

Multi-Hazard Exposure rank among other Central American countries

6 OUT OF 7 COUNTRIES/ TERRITORIES ASSESSED

BELIZE HAZARD ZONES

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

FLOOD

21.4%
Relative Population Exposure

77,000
Raw Population Exposure

$4.2 Billion
Raw Economic Exposure (USD)

WILDFIRE

63.5%
Relative Population Exposure

227,000
Raw Population Exposure

$11.5 Billion
Raw Economic Exposure (USD)

EARTHQUAKE

13.5%
Relative Population Exposure

48,000
Raw Population Exposure

$2.1 Billion
Raw Economic Exposure (USD)

LANDSLIDE

2.5%
Relative Population Exposure

9,000
Raw Population Exposure

$100 Million
Raw Economic Exposure (USD)

STORM SURGE

15.7%
Relative Population Exposure

56,000
Raw Population Exposure

$193 Million
Raw Economic Exposure (USD)

EXTREME HEAT

31.9%
Relative Population Exposure

114,000
Raw Population Exposure

$1.7 Billion
Raw Economic Exposure (USD)

TROPICAL CYCLONE WINDS

100%
Relative Population Exposure

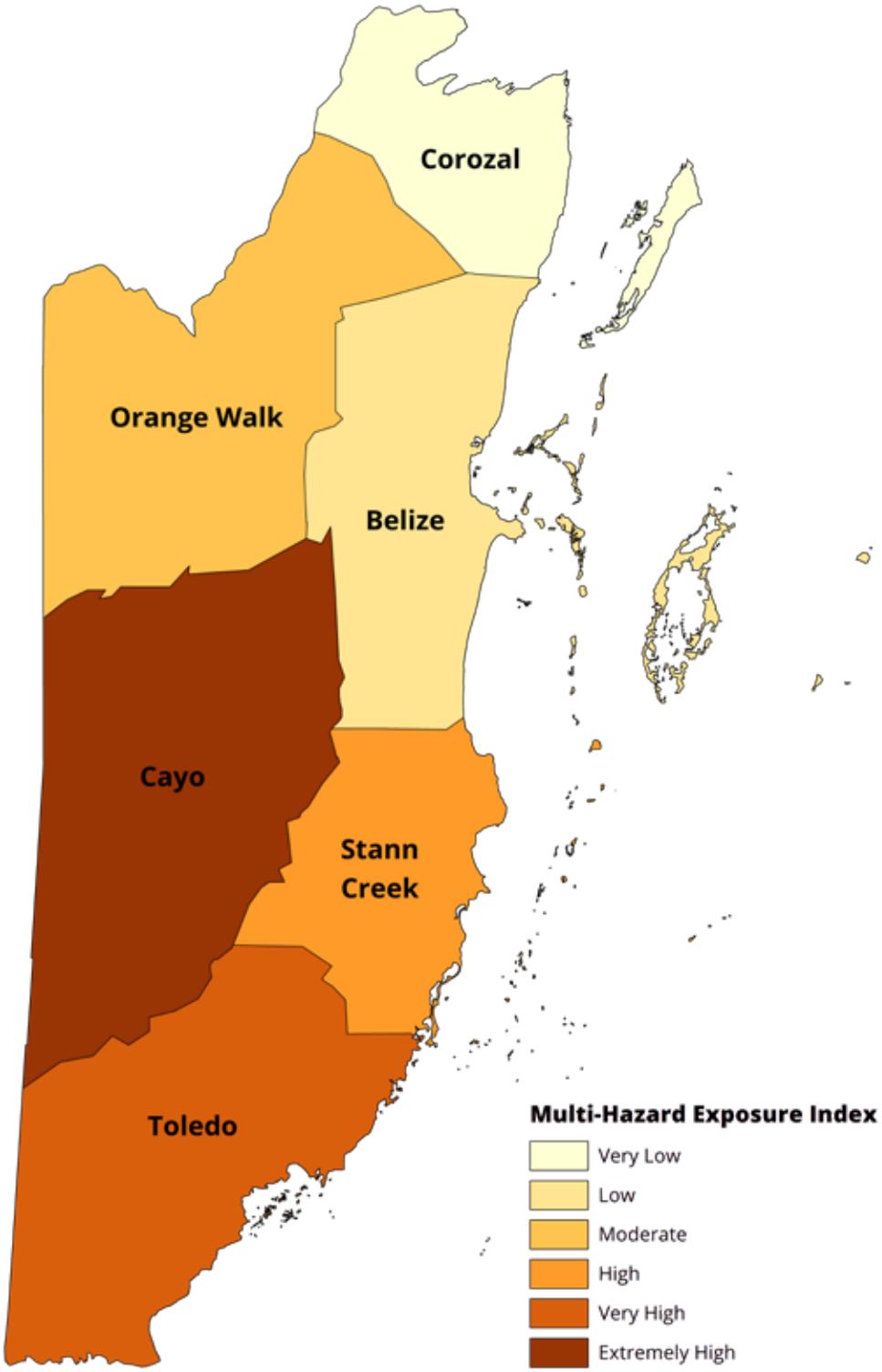
357,000
Raw Population Exposure

$13.6 Billion
Raw Economic Exposure (USD)

MULTI-HAZARD EXPOSURE BY DISTRICT

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

VERY LOW | LOW | MODERATE | HIGH | VERY HIGH | EXTREMELY HIGH


Corozal
Orange Walk
Belize
Cayo
Stann Creek
Toledo
Multi-Hazard Exposure Index
Very Low
Low
Moderate
High
Very High
Extremely High

THE RVA

VULNERABILITY

VULNERABILITY

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

Global Vulnerability rank (PDC Global RVA)

78 OUT OF 204 COUNTRIES / TERRITORIES ASSESSED

Vulnerability rank among other Central American countries

4 OUT OF 7 COUNTRIES/ TERRITORIES ASSESSED

VULNERABILITY SUBCOMPONENTS AND INDICATORS

Population Pressures
Average annual population change
Average annual urban population change
Prevalence of stunting

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

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

Vulnerable Health Status
New TB infections per 10,000 persons
Dengue Incidence per 100,000 persons
Malaria Incidence per 100,000 persons

Clean Water Access Vulnerability
Households without Improved water
Households without Improved sanitation

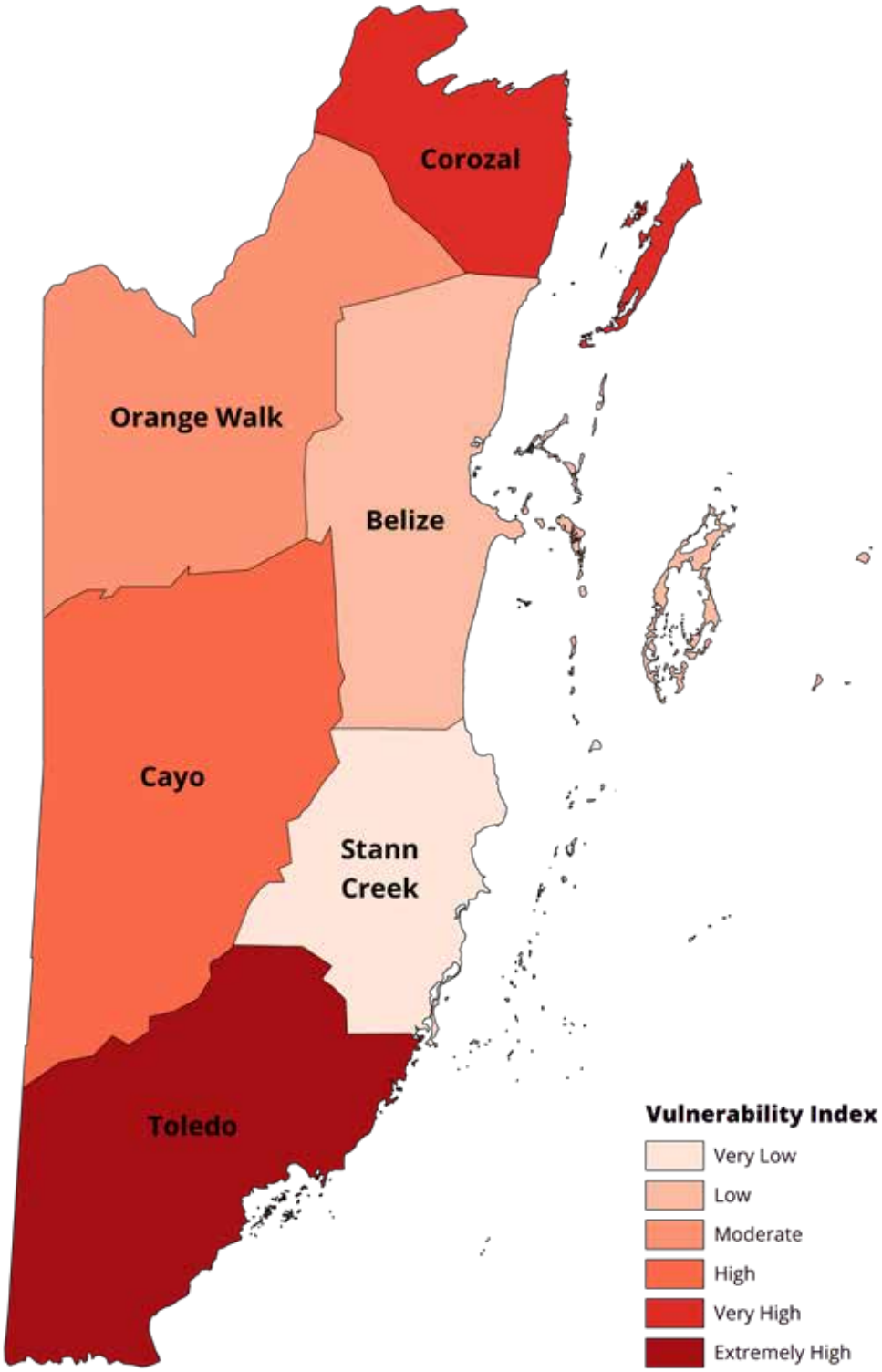
Economic Constrains
Economic dependency ratio
Poorest wealth quintile
Unemployment rate
Underemployment rate

Environmental Stress
Tree cover loss
Projected changes in annual precipitation
Declining land productivity

VULENRABILITY BY DISTRICT

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

VERY LOW | LOW | MODERATE | HIGH | VERY HIGH | EXTRA HIGH


Corozal
Orange Walk
Belize
Cayo
Stann Creek
Toledo
Vulnerability Index
Very Low
Low
Moderate
High
Very High
Extremely High

THE RVA

COPING CAPACITY

COPING CAPACITY

Coping Capacity describes the ability of people, organizations, and systems, using available skills and resources, to face and manage adverse conditions, emergencies, and disasters.
In coordination with stakeholders, the following indicators were selected to measure coping capacity subcomponents in Belize. Breaking down each coping capacity subcomponent to the indicator level allows users to identify the critical drivers of coping capacity to support risk reduction efforts and policy decisions.

Global Coping Capacity rank (PDC Global RVA)

83 OUT OF 198 COUNTRIES / TERRITORIES ASSESSED

Belize's Coping Capacity rank among other Central American countries

3 OUT OF 7 COUNTRIES/ TERRITORIES ASSESSED

COPING CAPACITY SUBCOMPONENTS AND INDICATORS

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

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

Environmental Capacity
Protected lands
Low variability in water supply

Communications Capacity
Fixed phone access
Mobile phone access
Average distance to cell tower

Transportation Capacity
Distance to port
Road density

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

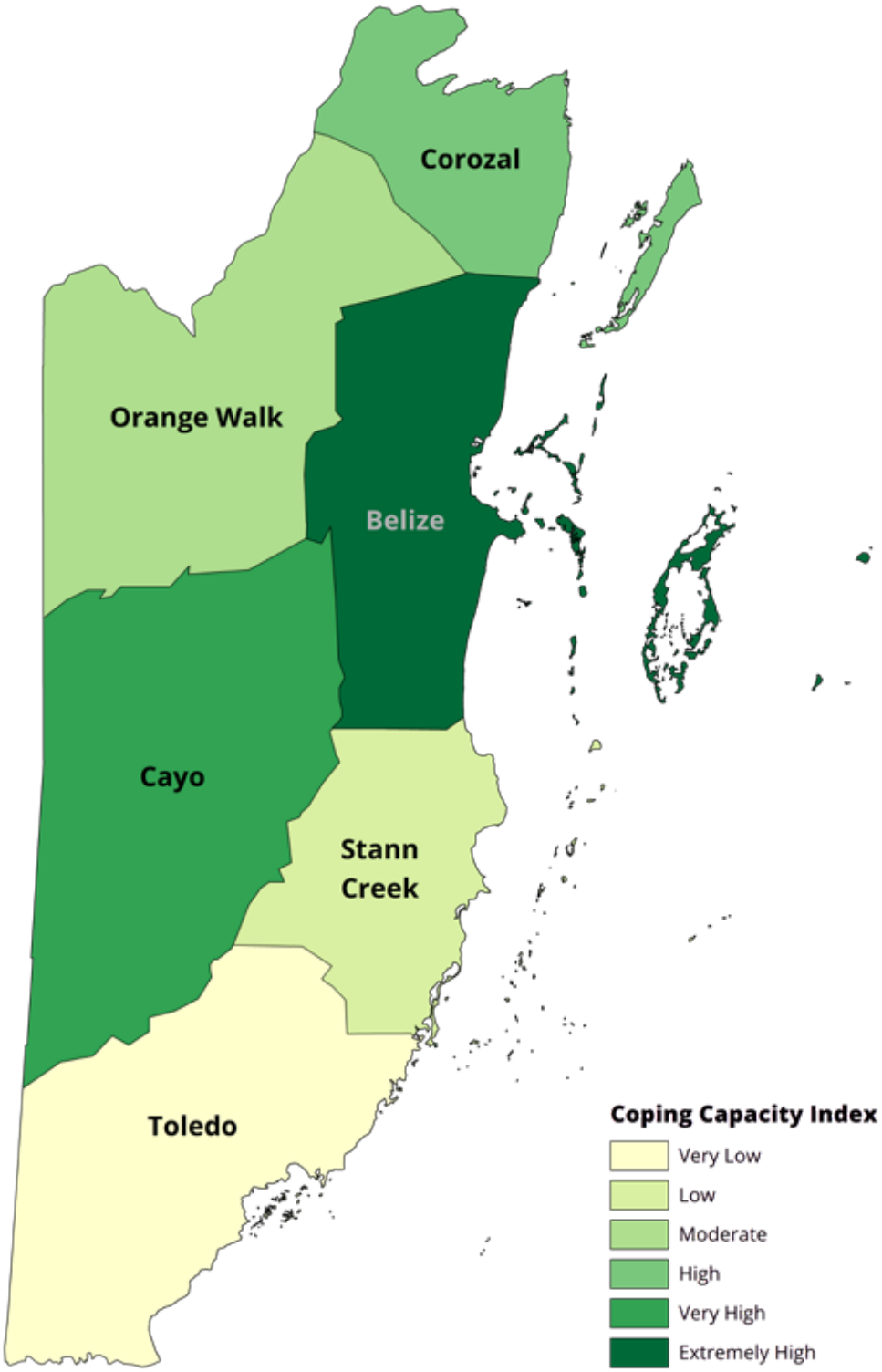
Energy Capacity
Households with electricity
Households with gas for cooking

Emergency Services Capacity
Distance to shelter
Shelter capacity per 10,000 persons
Distance to national warehouse
Distance to fire station
Distance to police station

COPING CAPACITY BY DISTRICT

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

VERY LOW | LOW | MODERATE | HIGH | VERY HIGH | EXTRA HIGH


Corozal
Orange Walk
Belize
Cayo
Stann Creek
Toledo
Coping Capacity Index
Very Low
Low
Moderate
High
Very High
Extremely High

THE RVA

RESILIENCE

RESILIENCE

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

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

Global Resilience rank (PDC Global RVA)

100 OUT OF 194 COUNTRIES / TERRITORIES ASSESSED

Belize's Resilience rank among other Central American countries

3 OUT OF 7 COUNTRIES/ TERRITORIES ASSESSED

APPLYING RESILIENCE DATA

Resilience data can be used to:

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

RESILIENCE COMPONENTS

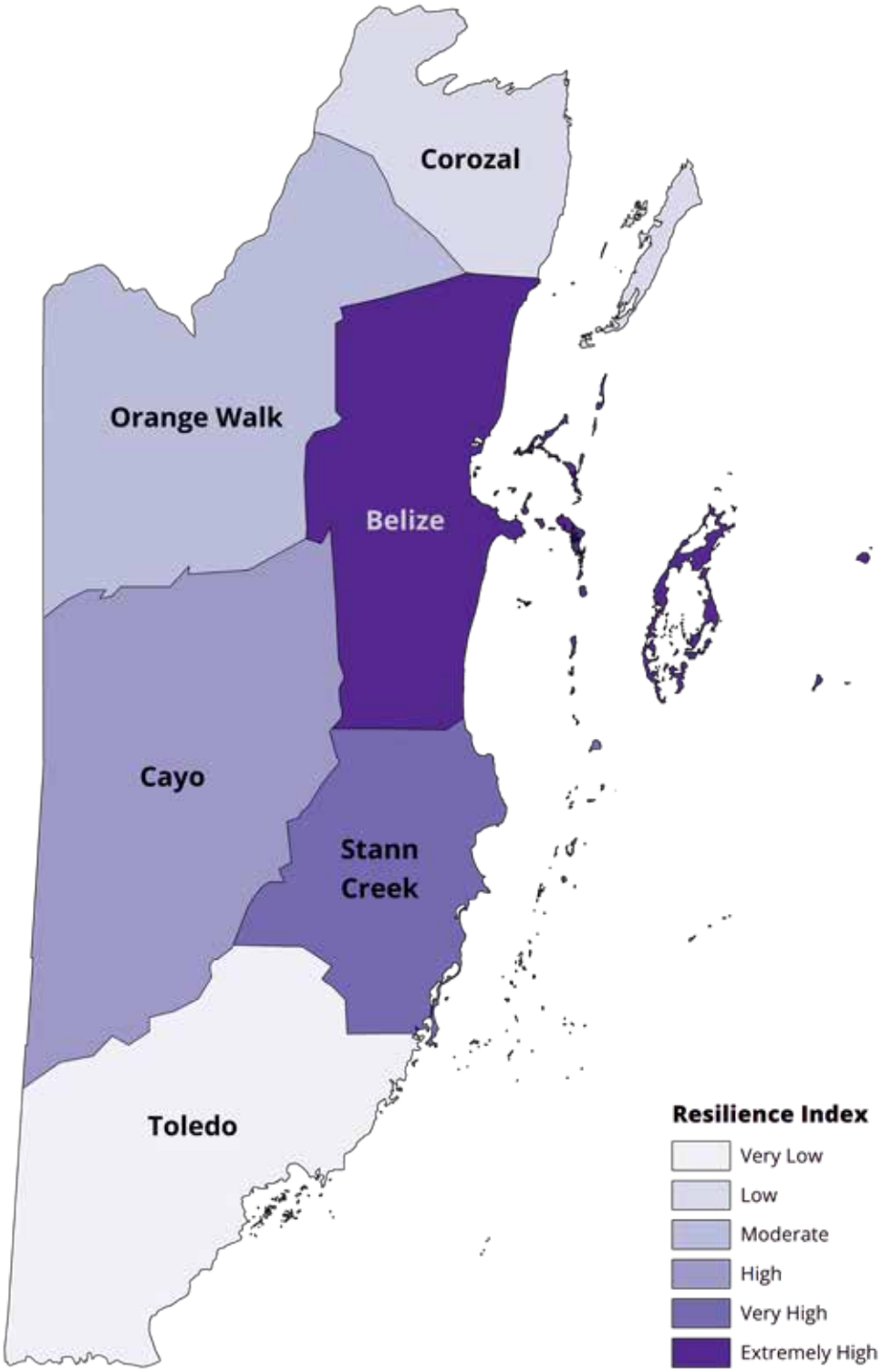
Vulnerability

Coping Capacity

RESILIENCE BY DISTRICT

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

VERY LOW | LOW | MODERATE | HIGH | VERY HIGH | EXTRA HIGH


Corozal
Orange Walk
Belize
Cayo
Stann Creek
Toledo
Resilience Index
Very Low
Low
Moderate
High
Very High
Extremely High

THE RVA

HAZARD-SPECIFIC RISK

HAZARD-SPECIFIC RISK

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

APPLYING HAZARD-SPECIFIC RISK DATA

Hazard-Specific Risk data can be used to:

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

HAZARD RISK COMPARED

Earthquake

Landslide

Flood

Storm Surge

Tropical Cyclone Winds

Wildfire

Extreme Heat

EARTHQUAKE RISK BY DISTRICT

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

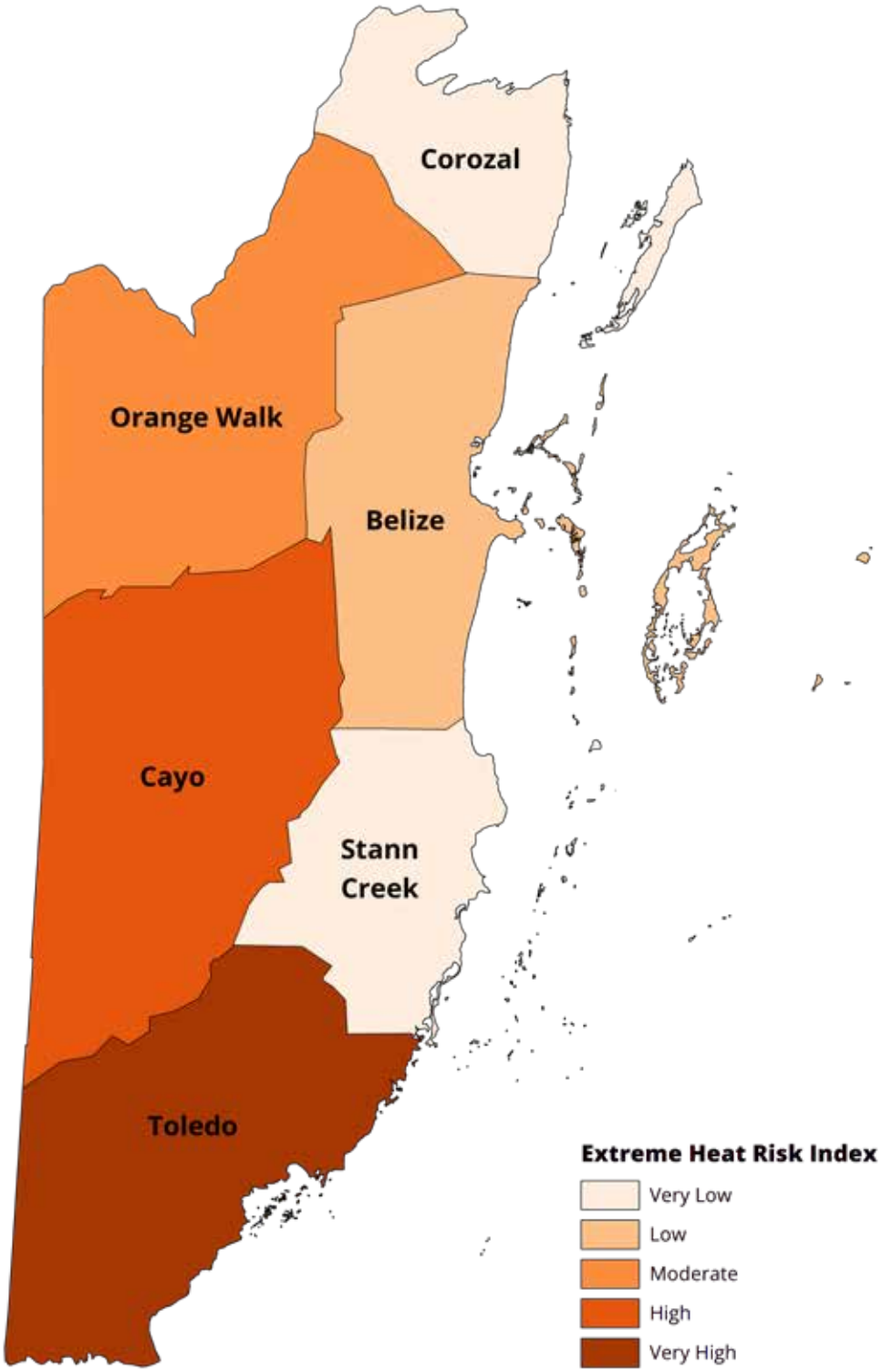
VERY LOW MODERATE HIGH


Corozal
Orange Walk
Belize
Cayo
Stann Creek
Toledo
Earthquake Risk Index
Very Low
Moderate
High

EXTREME HEAT RISK BY DISTRICT

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

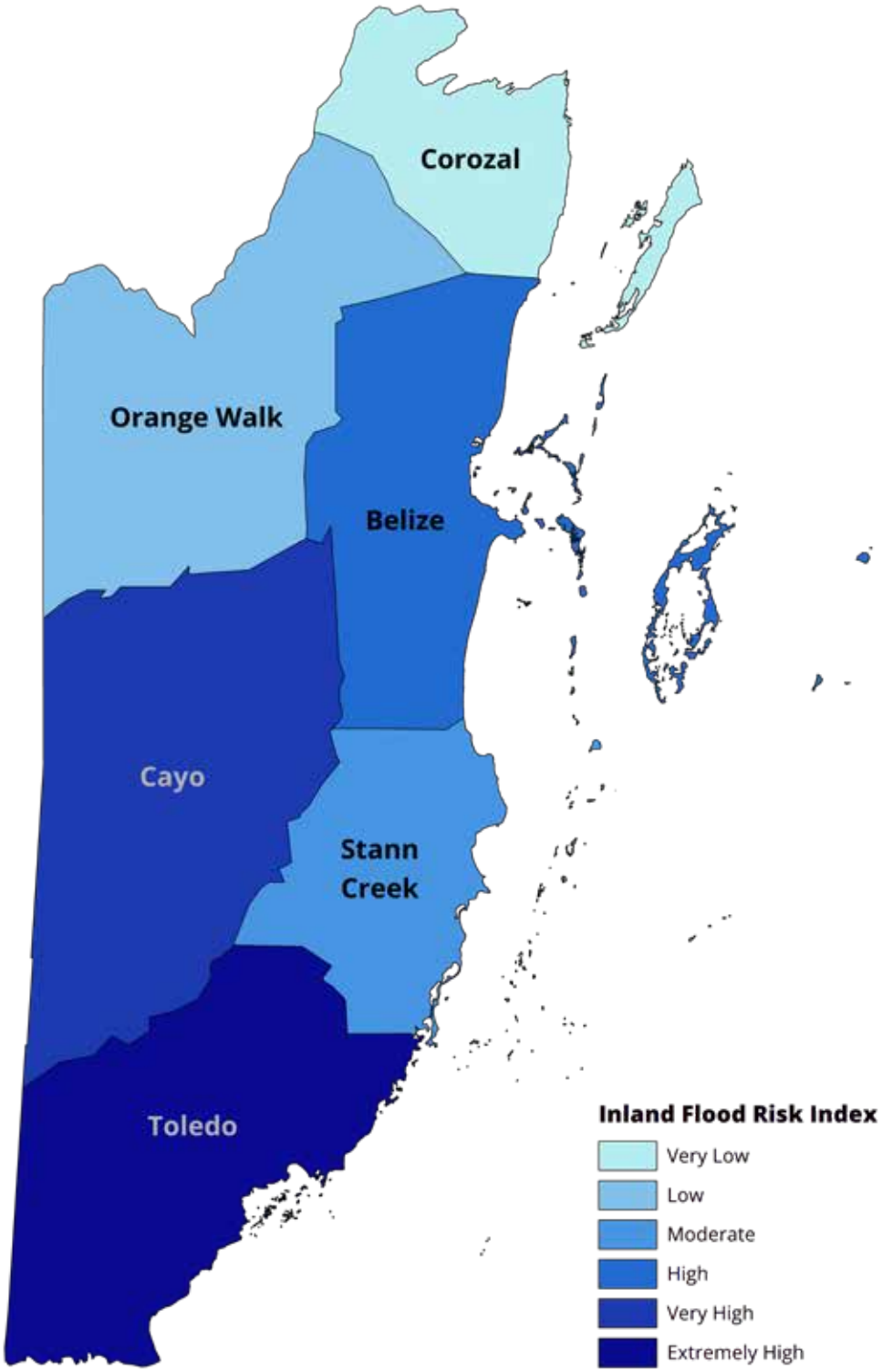
VERY LOW | LOW | MODERATE | HIGH | VERY HIGH


Corozal
Orange Walk
Belize
Cayo
Stann Creek
Toledo
Extreme Heat Risk Index
Very Low
Low
Moderate
High
Very High

INLAND FLOOD RISK BY DISTRICT

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

VERY LOW | LOW | MODERATE | HIGH | VERY HIGH | EXTRA HIGH


Corozal
Orange Walk
Belize
Cayo
Stann Creek
Toledo
Inland Flood Risk Index
Very Low
Low
Moderate
High
Very High
Extremely High

LANDSLIDE RISK BY DISTRICT

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

VERY LOW | LOW | MODERATE | HIGH | VERY HIGH | EXTRA HIGH


Corozal
Orange Walk
Belize
Cayo
Stann Creek
Toledo
Landslide Risk Index
Very Low
Low
Moderate
High
Very High
Extremely High

STORM SURGE RISK BY DISTRICT

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

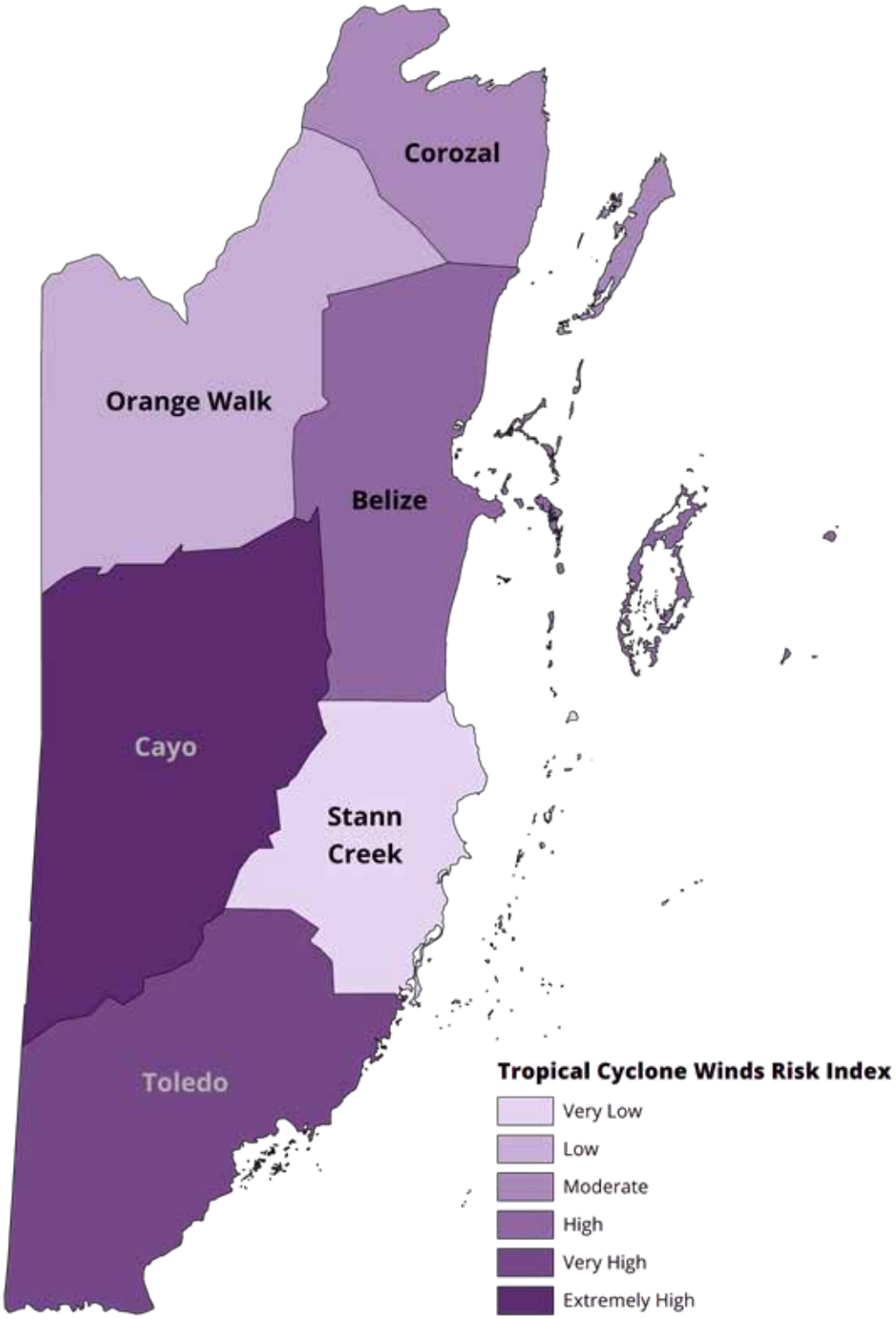
VERY LOW | LOW | MODERATE | HIGH | VERY HIGH


Corozal
Orange Walk
Belize
Cayo
Stann Creek
Toledo
Storm Surge Risk Index
Very Low
Low
Moderate
High
Very High

TROPICAL CYCLONE WINDS RISK BY DISTRICT

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

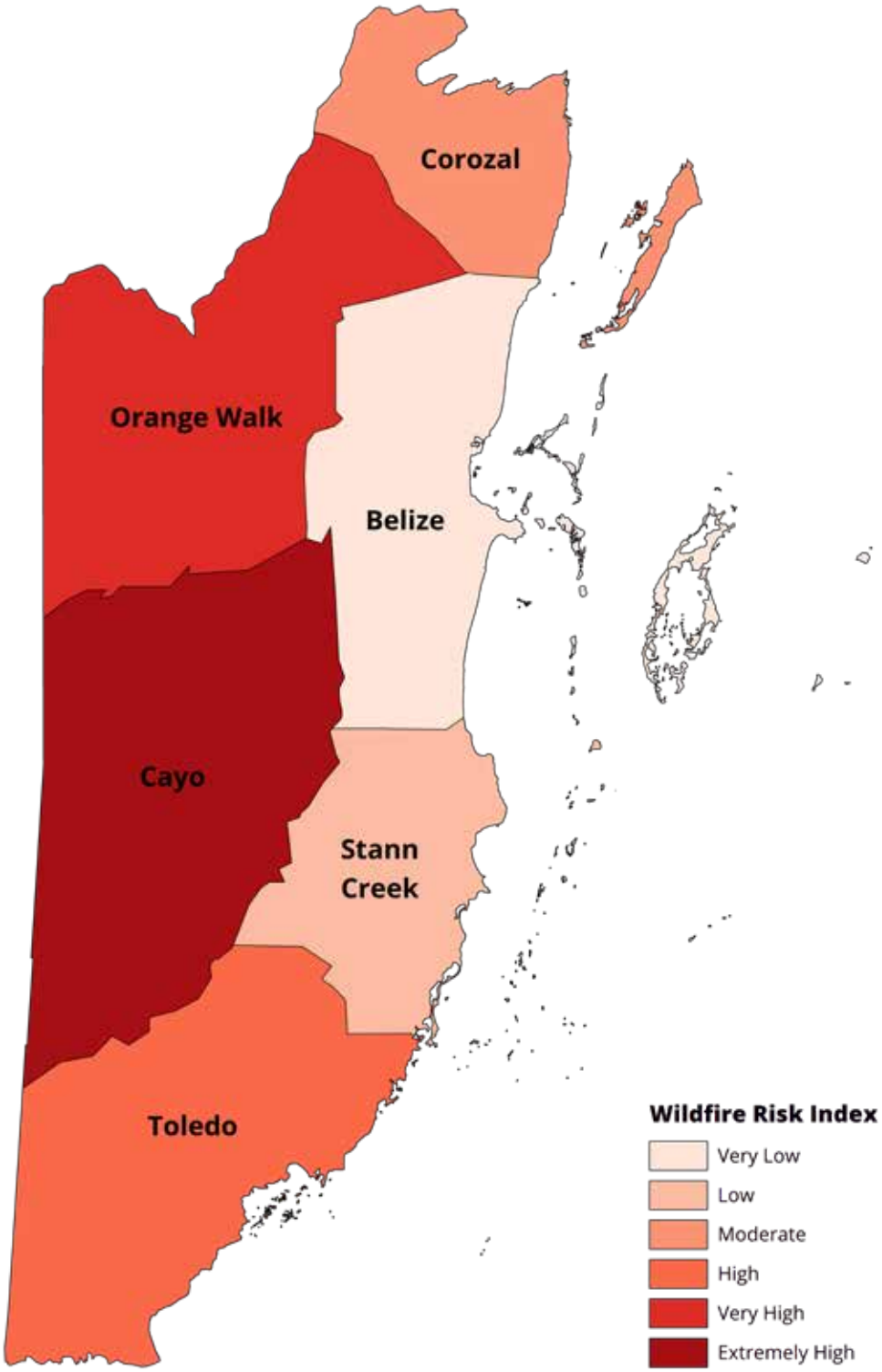
VERY LOW | LOW | MODERATE | HIGH | VERY HIGH | EXTRA HIGH


Corozal
Orange Walk
Belize
Cayo
Stann Creek
Toledo
Tropical Cyclone Winds Risk Index
Very Low
Low
Moderate
High
Very High
Extremely High

WILDFIRE RISK BY DISTRICT

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

VERY LOW | LOW | MODERATE | HIGH | VERY HIGH | EXTRA HIGH


Corozal
Orange Walk
Belize
Cayo
Stann Creek
Toledo
Wildfire Risk Index
Very Low
Low
Moderate
High
Very High
Extremely High

THE RVA

MULTI-HAZARD RISK

MULTI-HAZARD RISK

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

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

Global Multi-Hazard Risk rank (PDC Global RVA)

85 OUT OF 193 COUNTRIES / TERRITORIES ASSESSED

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

5 OUT OF 7 COUNTRIES/ TERRITORIES ASSESSED

MULTI-HAZARD RISK COMPONENTS

Vulnerability

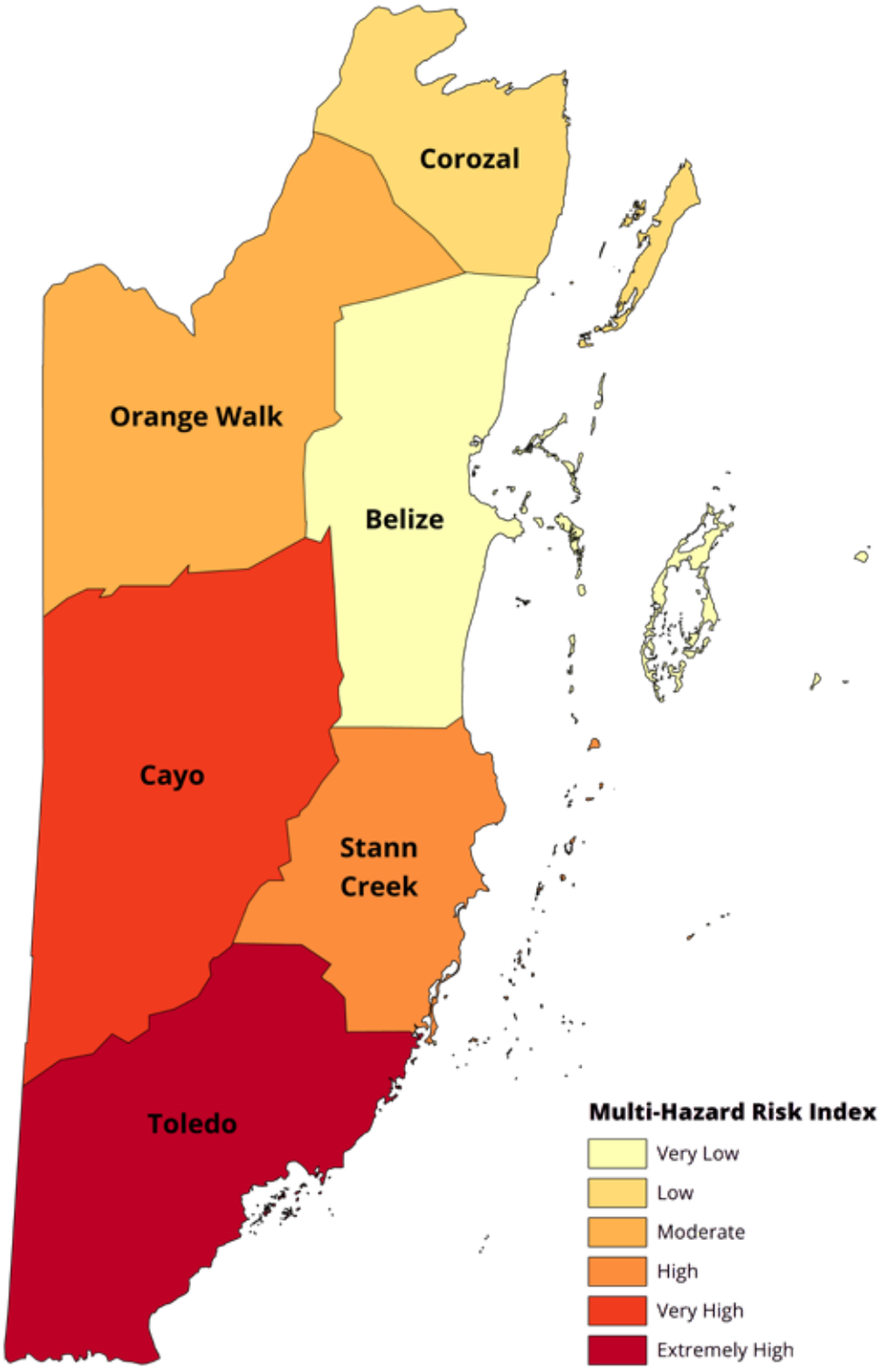
Coping Capacity

Multi-Hazard Exposure

MULTI-HAZARD RISK BY DISTRICT

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

VERY LOW | LOW | MEDIUM | HIGH | VERY HIGH | EXTREMELY HIGH


Corozal
Orange Walk
Belize
Cayo
Stann Creek
Toledo
Multi-Hazard Risk Index
Very Low
Low
Moderate
High
Very High
Extremely High

THE DMA

DISASTER MANAGEMENT ANALYSIS

SUMMARY OF FINDINGS

DISASTER MANAGEMENT ANALYSIS

FINDINGS & RECOMMENDATIONS

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

DISASTER MANAGEMENT ANALYSIS THEME AND SUBTHEMES

Institutional Arrangements
Organizational Structures
Leadership Arrangements
Mechanisms for Stakeholder Engagement

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

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

Disaster Governance Mechanisms
Plans, Processes, and Standard Operating Procedures
Emergency Operations Centers
Command, Control and Coordination Systems

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

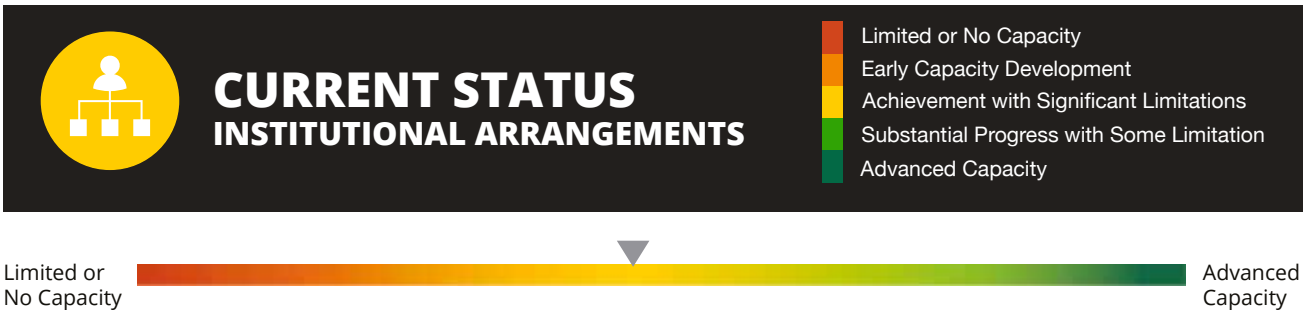
Capabilities and Resources
Dedicated Facilities and Equipment
Human Resources
Inventory of Commodities and Supplies
Targeted Functional Capabilities

THE DMA

INSTITUTIONAL ARRANGEMENTS

INSITUTIONAL ARRANGEMENTS

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



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

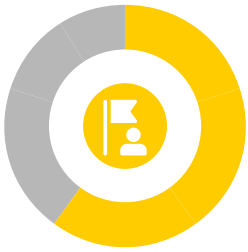
Some integration of disaster risk reduction (DRR), climate change adaptation (CCA) and sustainable development (SD) exists, but in an ad hoc manner. The newly established MSD/CC/DRR signals the Government of Belize's (GOB) intentions to formalize such integration. In summary, the documentation for institutional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

SUBTHEME STATUS
INSTITUTIONAL ARRANGEMENTS

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

Organizational Structures

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



Leadership Arrangements

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

Mechanisms for Stakeholder Engagement

- Nongovernmental stakeholders represented in governmental disaster management structure
- Public-private partnerships
- Inventory of NGO and private-sector disaster management capabilities
- Capacity of nongovernmental stakeholders engaged in disaster management
- Engagement of private sector entities in disaster management
- Organizational arrangements used by NGOs to support disaster management efforts
- Involvement of academia in disaster management efforts
- Relationship between national governments, regional entities, and global disaster management organizations

★ NEMO Committees: Foreign Assistance; Damage Assessment and Needs Analysis (DANA); Relief and Supplies Management; Education, Information, Communications, and Warning; Search and Rescue and Security; Transport and Evacuation; Housing and Shelter; Economic and Recovery; Medical Care and Public Health; Environmental and Solid Waste; Restoration and Utilities.

FINDINGS AND ACTIONS
TO REACH ADVANCED CAPACITY

ORGANIZATIONAL STRUCTURES AND LEADERSHIP ARRANGEMENTS

Findings

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

Actions to Reach Advanced Capacity

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

Findings

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

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

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

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

Actions to Reach Advanced Capacity

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

Findings

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

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

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

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

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

Actions to Reach Advanced Capacity

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

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

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

MECHANISMS FOR STAKEHOLDER ENGAGEMENT

Findings

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

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

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

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

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

Actions to Reach Advanced Capacity

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

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

THE DMA

ENABLING ENVIRONMENT

ENABLING ENVIRONMENT

CURRENT STATUS
ENABLING ENVIRONMENT

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

Limited or No Capacity — Advanced Capacity

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

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

DM and DRR capacity development (CD) efforts.

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

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

SUBTHEME STATUS
ENABLING ENVIRONMENT

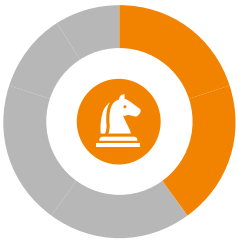
- Limited or No Capacity
- Early Capacity Development
- Achievement with Significant Limitations
- Substantial Progress with Some Limitation
- Advanced Capacity

Legal Instruments

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

Financial Resources

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

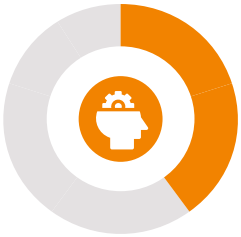


Strategies

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

Public Confidence and Political Support

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



Attitudes and Experience

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

FINDINGS AND ACTIONS
TO REACH ADVANCED CAPACITY

LEGAL INSTRUMENTS

Findings

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

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

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

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

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

Actions to Reach Advanced Capacity

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

FINANCIAL RESOURCES

Findings

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

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

Actions to Reach Advanced Capacity

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

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

STRATEGIES

Findings

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

Actions to Reach Advanced Capacity

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

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

Findings

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

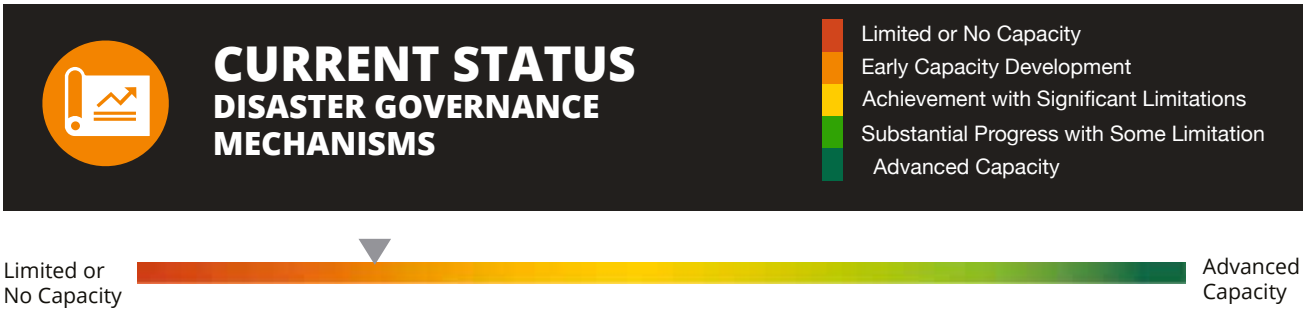
Actions to Reach Advanced Capacity

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

THE DMA

DISASTER GOVERNANCE MECHANISMS

DISASTER GOVERNANCE MECHANISMS

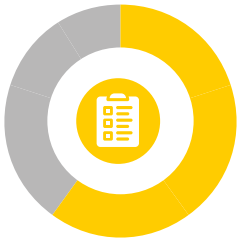


Existing plans are disparate and not current. The National Hazard Mitigation Plan (NHMP) is divided into several volumes and sub volumes pertaining to SOPs, specific hazards, phases, functionalities (i.e., evacuation, search and rescue), and district plans.[17] But only a few of the sub volumes appear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

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

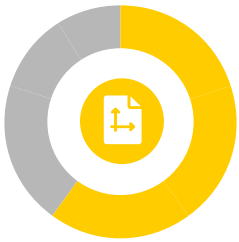
SUBTHEME STATUS
DISASTER GOVERNANCE MECHANISMS

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



Plans and Standard Operating Procedures

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



Command, Control, and Coordination Systems

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

Governance Infrastructure: Emergency Operations Centers

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

FINDINGS AND ACTIONS
TO REACH ADVANCED CAPACITY

PLANS, PROCESSES, AND STANDARD OPERATING PROCEDURES

Findings

Existing plans are disparate and not current.

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

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

Actions to Reach Advanced Capacity

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

COMMAND, CONTROL AND COORDINATION

Findings

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

Actions to Reach Advanced Capacity

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

GOVERNANCE INFRASTRUCTURE: EMERGENCY OPERATIONS CENTERS

Findings

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

Actions to Reach Advanced Capacity

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

THE DMA

CAPABILITIES AND RESOURCES

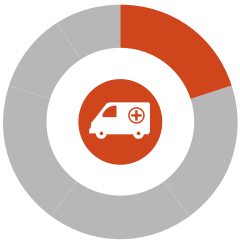
CAPABILITIES AND RESOURCES

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

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

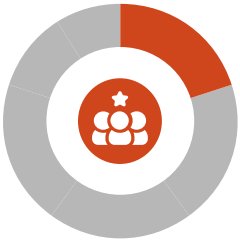
SUBTHEME STATUS
CAPABILITIES AND RESOURCES

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



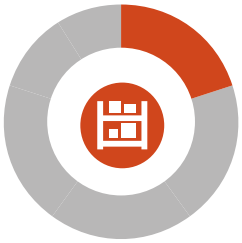
Dedicated Facilities and Equipment

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



Human Resources

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



Inventory of Commodities and Supplies

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

Targeted Functional Capabilities

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

FINDINGS AND ACTIONS
TO REACH ADVANCED CAPACITY

DEDICATED FACILITIES AND EQUIPMENT

Findings

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

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

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

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

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

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

MOH has a mutual aid agreement with the BRCS, who is an active partner in MOH's health and medical planning for disasters including the provisioning for water, sanitation, and hygiene (WASH) needs in cooperation with the IFRC46.

Actions to Reach Advanced Capacity

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

HUMAN RESOURCES

Findings

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

Actions to Reach Advanced Capacity

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

COMMODITY AND SUPPLY INVENTORY

Findings

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

FUNCTIONAL CAPABILITIES

Findings

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

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

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

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

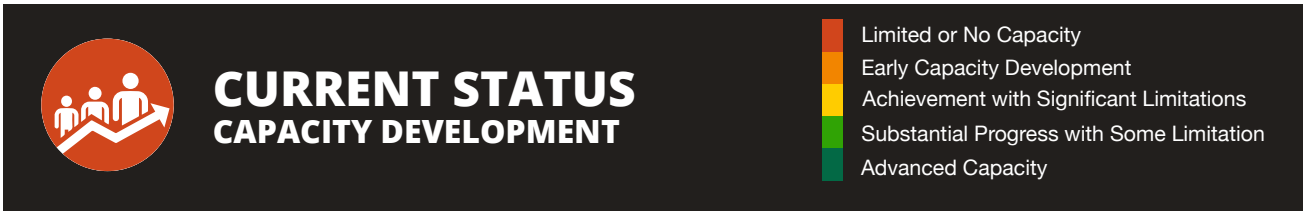
The Ministry of Energy, Science & Technology and Public Utilities' Strategic Plan does not address resiliency or recovery from disasters.[48]

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

THE DMA

CAPACITY DEVELOPMENT

CAPACITY DEVELOPMENT



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

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

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

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

SUBTHEME STATUS
CAPACITY DEVELOPMENT

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

Capacity Development Plans and Strategies

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

Training and Education Programs and Facilities

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

Monitoring and Evaluation Processes and Systems

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

FINDINGS AND ACTIONS
TO REACH ADVANCED CAPACITY

FORMALIZED CAPACITY DEVELOPMENT PLANS AND STRATEGIES

Findings

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

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

Actions to Reach Advanced Capacity

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

TRAINING AND EDUCATION PROGAMS AND FACILITIES

Findings

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

designated training facility.

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

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

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

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

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

The BRCS is engaged in the promotion of disaster awareness, preparedness, and training.[61–63]

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

Exercise evaluation standards do not exist.

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

The extent of the higher education community's involvement in DM professionalization is very limited in number and the scope of offerings;[52(pp. 21–23)] no degrees or certificates offered.

K-12 schools are provided with very little DM or DRR curricula.[53–56]

Actions to Reach Advanced Capacity

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

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

MONITORING AND EVALUATION PROCESSES AND SYSTEMS

Findings

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

THE DMA

COMMUNICATION AND INFORMATION MANAGEMENT

COMMUNICATION AND INFORMATION MANAGEMENT

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

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

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

SUBTHEME STATUS
COMMUNICATION AND INFORMATION MANAGEMENT

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

Hazard and Risk Analysis Systems

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

Monitoring and Notification

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

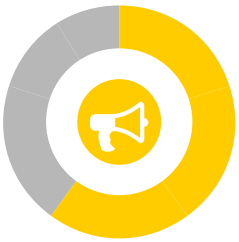
- Testing of early warning systems: No data
- Training and education for warning recipients
- Targeted early warning capabilities

Disaster Assessment

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

Information Collection, Management, and Distribution

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



Media and Public Affairs

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

FINDINGS AND ACTIONS
TO REACH ADVANCED CAPACITY

HAZARD AND RISK ANALYSIS SYSTEMS

Findings

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

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

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

Actions to Reach Advanced Capacity

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

MONITORING AND NOTIFICATIONS

Findings

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

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

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

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

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

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

Actions to Reach Advanced Capacity

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

DISASTER ASSESSMENT

Findings

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

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

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

Actions to Reach Advanced Capacity

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

INFORMATION COLLECTION, MANAGEMENT, AND DISTRIBUTION

Findings

Regarding information collection, management, and distribution, the NHMP dictates the establishment of an information management system. However, it has not happened yet.[64]

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

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

Actions to Reach Advanced Capacity

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

MEDIA AND PUBLIC AFFAIRS

Findings

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

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

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

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

Actions to Reach Advanced Capacity

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

NATIONAL RECOMMENDATIONS

NATIONAL RECOMMENDATIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

8 REVIEW DEDICATED FACILITIES AND EQUIPMENT.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

16 INCREASE PUBLIC CONFIDENCE AND ENGAGEMENT IN DISASTER MANAGEMENT EFFORTS

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

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

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

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

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

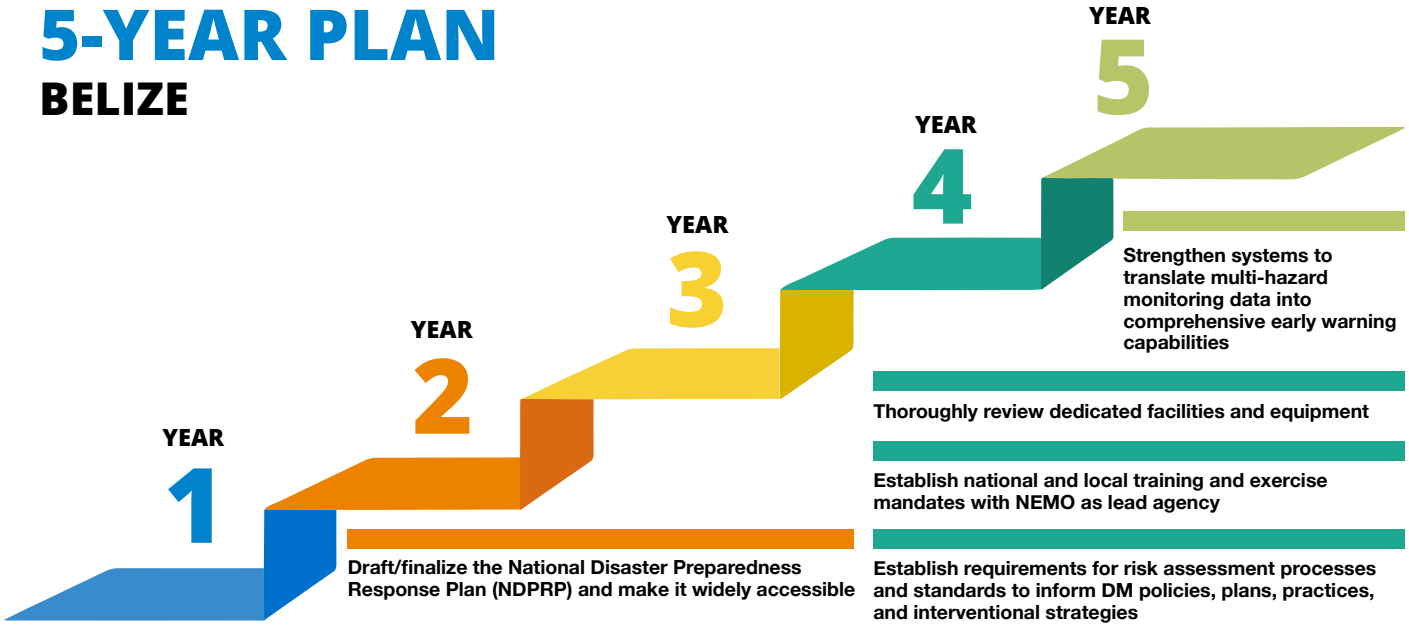
19 REDUCE MARGINALIZATION AND PROMOTE GENDER EQUALITY.

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

20 REASSESS PROGRESS MADE TOWARD DISASTER RISK REDUCTION AND RESILIENCE GOALS.

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

5-YEAR PLAN
BELIZE



YEAR 1

- Review and update legislation, especially DPR Act/2000, to secure durable mandates for roles and responsibilities for all DM actors, and to sufficiently address all phases of DM
- Legally establish a calamity fund, with minimum annual contributions, for use during disaster relief efforts
- Legally establish a revolving DM contingency fund with minimum annual contributions to facilitate DRR, capacity building, and other and DM/DRR efforts
- Thoroughly audit, update, and re-publish all existing DM plans

YEAR 2

- Draft/finalize the National Disaster Preparedness Response Plan (NDPRP) and make it widely accessible
- Draft and publish DM plans to fulfill the most critical missing volumes and annexes dictated by the National Hazard Management Plan and make them widely accessible
- Expand and train/professionalize the DM human resource pool
- Enhance resilience through efforts to reduce vulnerabilities and increase coping capacities

YEAR 3

- Enlist the Ministry of Sustainable Development, Climate Change & Disaster Risk Management, the National Climate Change Office, and NEMO to formally plan and coordinate the integration of DRR, Sendai, SDGs, SD/2030 Agenda and CCA across all policies, DM, and development plans
- Formalize the role of the University of Belize in DM through linking DM research and training needs to academic programs
- Increase public confidence and engagement in DM efforts
- Fully engage non-governmental stakeholders and non-traditional partners including the private sector into government DRM framework

YEAR 4

- Thoroughly review dedicated facilities and equipment
- Establish national and local training and exercise mandates with NEMO as lead agency
- Establish requirements for risk assessment processes and standards to inform DM policies, plans, practices, and interventional strategies
- Establish standardized, digitized, and centralized system for data collection, management, and sharing
- Reduce marginalization and promote gender equality
- Reassess progress made toward DRR and resilience goals

YEAR 5

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

DISTRICT RISK PROFILES

SUBNATIONAL ASSESSMENT RESULTS

Download District Risk pro iles: **https://www.pdc.org/wp-content/uploads/NDPBA-BLZ-Subnational-Profiles-English-Merged-vF.pdf**

DISTRICT RISK PROFILES

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

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

APPLYING RESULTS

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

NDPBA

APPENDIX A

RESOURCES

APPENDIX A
RVA METADATA

Multi-Hazard Exposure

Subcomponent: Raw Exposure

Indicator	Source(s)	Year	Description
Raw Multi-Hazard Population Exposure	Pacific Disaster Center	2021	Raw multi-hazard population exposure represents an estimation of the number of people exposed to one or more of seven hazards.

Notes

Calculated as: Exposed person units = [population exposed to inland flood hazard] + [population exposed to storm surge hazard] + [population exposed to landslide hazard] + [population exposed to wildfire hazard] + [population exposed to tropical cyclone wind hazard] + [population exposed to earthquake hazard]+ [population exposed to extreme heat hazard]. Raw values are shown here.

Population data (2021) from PDC's AIM 3.0.

Hazard exposure zones were calculated as follows:

Inland Flood: The Inland Flood Hazard zone includes all return period areas of both pluvial (rainfall) and fluvial (riverine) flood sources. Data source is the Caribbean Handbook on Risk Information Management (2016). All areas with any return period of flood hazard were used as inputs for exposure analysis.

Storm Surge: Coastal flooding as a result of storm surge data were provided by the Caribbean Handbook on Risk Information Management (CHARIM) (2016) (http://charim-geonode.net/layers/geonode:coastal_flood_category). All areas with flooding during any category (1-5) of storm were used as inputs for exposure analysis.

Extreme Heat: The Extreme Heat Hazard zone is classified based on an existing and widely accepted heat stress indicator, the Wet Bulb Globe Temperature (WBGT, in °C) – more specifically the daily maximum WGBT. The damaging intensity thresholds are applied following the definition of slight/low (<28°C), moderate/high (28-32°C) and severe/very high (>32°C) heat stress. The data source is World Bank (UNEP) (2017). Areas of Severe/Very High (>32°C) heat stress were used as inputs for exposure analysis.

Landslide: The Landslide Hazard zone shows the combination of The Global Landslide Hazard Map: Median Annual Rainfall-Triggered Landslide Hazard (1980-2018) and The Global Landslide Hazard Map: Earthquake-Triggered Landslide Hazard which has then been simplified to four categories, ranging from Very low to High landslide hazard, based on the existing system used by ThinkHazard! Data source is the Global Landslide Hazard Map from GFDRRLab (2020). Areas approximating the Medium and High hazard categories were used as inputs for exposure analysis.

Wildfire: The Wildfire Hazard zone is derived from the Biodiversity and Environmental Resource Data System of Belize (BERDS) Belize Fire Risk Map (2004) (http://www.biodiversity.bz/). Areas approximating Medium to Extreme wildfire hazard were used as inputs for exposure analysis.

Tropical Cyclone Winds: The Tropical Cyclone Winds Hazard zone is derived from the Munich Reinsurance Company's (Munich Re) World Map of Natural Hazards (2002). Areas approximating hurricane winds in Categories 1-3 were used as inputs for exposure analysis. No areas of Belize were predicted to experience categories 4 or 5 levels winds within that time, so those values are not included here.

Earthquake: The Earthquake Hazard zone represents areas with an estimated Modified Mercalli Intensity (MMI) of VII and above, based on 1.0 second Spectral Acceleration (SA) at a return period of 2475 years. The data source is Global Earthquake Model CAPRA RESIS-II Project (2010). Areas approximating MMI greater than or equal to VII were used as inputs for exposure analysis.

APPENDIX A
RVA METADATA

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

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

APPENDIX A
RVA METADATA

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

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

APPENDIX A
RVA METADATA

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

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

APPENDIX A
RVA METADATA

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

APPENDIX A
RVA METADATA

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

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

APPENDIX A
RVA METADATA

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

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

APPENDIX A
RVA METADATA

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

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

APPENDIX A
RVA METADATA

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

APPENDIX A
RVA METADATA

Coping Capacity				
Subcomponent: Environmental Capacity				
Indicator	**Source(s)**	**Year**	**Description**	
Protected Lands	Biodiversity & Environmental Resource Data System; Belize_Protected_ Areas_All_2015 Dataset	2017	The percentage of protected land area per district in Belize.	Note that marine protected areas were not included because it was not clear which district they should be "assigned" to for this measure.
Low Variability in Water Supply	Aqueduct; Online GDB	2014	Percentage of land area with low amounts of inter-annual variability in water supply in Belize, by district.	Inter-Annual Variability measures the average between year variability of available water supply, including both renewable surface and groundwater supplies. Higher values indicate wider variations in available supply from year to year.

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

APPENDIX A
RVA METADATA

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

APPENDIX A
RVA METADATA

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

APPENDIX A
RVA METADATA

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

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

WORKS CITED

1. Government of Belize. (2021). Ministry of Sustainable Development, Climate Change and Disaster Risk Managemnent. https://www.belize.gov.bz/Ministry/Ministry of Sustainable Development, Climate Change & Disaster Risk Management

2. Caribbean Disaster Emergency Response Agency; Caribbean Development Bank. (2006). Belize National Hazard Mitigation Plan. http://docplayer.net/79767415-Belize-national-hazard-mitigation-plan.html

3. Inter-American Development Bank (IADB), Lacambra, S., Suárez, G., Tsuneki, H., & Jaimes, I. (2020). Index of Governance and Public Policy in Disaster Risk Management (iGOPP): National Report Belize. https://publications.iadb.org/publications/english/document/Index-of-Governance-and-Public-Policy-in-Disaster-Risk-Management-iGOPP-National-Report-Belize.pdf

4. National Emergency Management Organization (NEMO). (n.d.). About Us. Retrieved March 20, 2021, from http://site.nemo.org.bz/about-us/

5. National Emergency Management Organization (NEMO). (n.d.). Foreign Assistance Committee Hazard Response Plan. http://site.nemo.org.bz/wp-content/publications/Foreign_Assistance_Plan.pdf

6. Government of Belize Ministry of Foreign Affairs. (2019). Ministry of Foreign Affairs Website. https://mfa.gov.bz/regional-organizations-2/

7. PreventionWeb. (2021). Belize Sendai Framework. https://www.preventionweb.net/english/countries/americas/blz/

8. United Nations Office for Disaster Risk Reduction (UNDRR). (2020). Belize Sendai Monitor. https://sendaimonitor.undrr.org/analytics/country-global-target/16/8?countries=18

9. United Nations Belize Office. (2019). Belize 2019 Country Implementation Plan. https://belize.un.org/sites/default/files/2019-11/2019 Country Implementation Plan.pdf

10. Government of Belize National Climate Change Office. (2020). National Climate Change Adaptation Plan and Vulnerability and Adaptation Assessment. https://ncco.gov.bz/archiving-and-documentation/#

11. Belize National Climate Change Office. (2021). Belize National Climate Change Office Local Committees. https://ncco.gov.bz/localcommit/

12. Statutory Instrument No. 59 of 2014, Public Service Regulations., Belize Constitution (Public Service) 106 (2014). https://www.oas.org/juridico/PDFs/mesicic5_blz_resp_annex7.pdf

13. Government of Belize and United Nations Development Programme (UNDP). (2017). Fourth National Communication and First Biennial Update Report to the UNFCCC. https://info.undp.org/docs/pdc/Documents/BLZ/5939_4NC+BUR_Belize_ProDoc 26 Apr 2017_FINAL.pdf

14. National Emergency Management Organization (NEMO). (2018). Plan of Action for the Damage Assessment and Needs Analysis (DANA) Committee.

15. National Emergency Management Organization (NEMO), R. and S. M. C. (n.d.). Relief and Supplies Management Committee Operational Plan. http://site.nemo.org.bz/wp-content/publications/Relief_and_Supplies_Management_Plan.pdf

16. National Medical Care and Public Health Committee (NMCPHC), M. of H. and the E. (2004). Hurricane Disaster Plan. http://site.nemo.org.bz/wp-content/publications/Medical_Care_and_Public_Health.pdf

17. National Emergency Management Organization (NEMO). (2003). Belize National Hazard Management Plan, Volume 5A, Evacuation.

18. United Nations Development Programme (UNDP). (2009). Strengthening of Disaster Preparedness and Emergency Response Capacity in Belize. https://info.undp.org/docs/pdc/Documents/BLZ/00056493_14C-PRODOC-Strengthening-of-Disaster-Preparedness-BCPR.pdf

19. Belize Red Cross Society. (n.d.). Belize Red Cross Society Official Website. Retrieved July 27, 2021, from https://www.ifrc.org/en/what-we-do/where-we-work/americas/belize-red-cross-society/

20. Organization of American States (OAS), Trust for the Americas, Henry, R. I., Audrey, W., Quimey, R., Rio, D., Creativity, Z., Ortega, M. A., Cover, V., & Ortega Vega, M. A. (2019). Promoting an Open Government Ecosystem in Belize. https://www.thetrustfortheamericas.org/media/projects/attachments/en/Belize_Open_Government_Subgrantees_English.pdf

21. Belize Network of NGOs. (n.d.). Belize Network of NGO Inventory of Organizations. Retrieved March 19, 2021, from http://belizengos.org/ngo-resources/

22. University of Belize. (n.d.). Annual Report 2017-2018. https://www.ub.edu.bz/wp-content/uploads/2019/12/AR-2017-2018.pdf

23. Disaster Preparedness and Response Act (2000)., Government Printer, No. 1 Power Lane, Belmopan. (2000). http://site.nemo.org.bz/wp-content/publications/Belize_Disaster_Preparedness_and_Response_Act.pdf

24. Ministry of Finance (2020). (n.d.). Approved Estimates of Revenue and Expenditure for Fiscal Year 2020/2021.

25. Ministry of Finance. Approved Estimates of Revenue and for Fiscal Year 2019/2020. (n.d.). http://caribbeanelections.com/eDocs/budget/bz_budget/bz_approved_estimates_2019_2020.pdf

26. Ministry of Finance. Approved Estimates of Revenue and Expenditure for Fiscal Year 2018/2019. (n.d.). https://www.mof.gov.bz/uploads/files/0nmnmacu.pdf

27. Ministry of Finance. Approved Estimates of Revenue and Expenditure for Fiscal Year 2017/2018. (n.d.). https://www.mof.gov.bz/uploads/files/s3zoijqw.pdf

28. Ministry of Finance. (2017). Ministry of Finance. Approved Estimates of Revenue and Expenditure for Fiscal Year 2017/2018. https://www.mof.gov.bz/uploads/files/s3zoijqw.pdf

29. Ministry of Finance. (2020). Approved Estimates of Revenue and Expenditure for Fiscal Year 2020/2021. https://www.mof.gov.bz/

30. Organization of AmericanCELP PROFILE Belize States. (2010). Caribbean Emergency Legislation Project (CELP)-CELP Profile Belize. https://www.oas.org/en/sedi/dsd/ELPG/pastProjects/Documents/BelizeFINAL.pdf

31. Ministry of Finance. (2019). Approved Estimates of Revenue and for Fiscal Year 2019/2020. http://caribbeanelections.com/eDocs/budget/bz_budget/bz_approved_estimates_2019_2020.pdf

32. Belize Social Investment Fund. (2020). Financial Statement 2019/2020. https://sifbelize.org/wp-content/uploads/2020/10/SIF-FS-Audit-2020.pdf

33. World Bank, T., Africa Caribbean Pacific (ACP) – European Union (EU) (ACP-EU). The African, C. and P. G., European Union, & GFDRR. (2018). Advancing Disaster Risk Finance in Belize. https://openknowledge.worldbank.org/handle/10986/33088

34. Government of Belize (2020). Micro, Small, and Medium Enterprises (MSME) Support Programme. (n.d.). https://www.covid19.bz/belizemsp/

35. National Bank of Belize (NBB) COVID-19 Preparedness. (n.d.). Retrieved March 19, 2021, from https://www.nbbl.bz/coronavirus-covid-19-preparedness/

36. National Women's Commission, The. (Updated Version 2013). Part 2: The Revised National Gender Policy. (n.d.).

37. National Women's Commission, The. (2013). Part 2: The Revised National Gender Policy (Updated Version). https://oig.cepal.org/sites/default/files/belize_2013national_gender_policy.pdf

38. The Caribbean Disaster Emergency Response Agency and The Caribbean Development Bank. Belize National Hazard Mitigation Plan. (2006).

39. Disaster Preparedness and Response Act (2000)., Government Printer, No. 1 Power Lane, Belmopan. (2000). http://site.nemo.org.bz/wp-content/publications/Belize_Disaster_Preparedness_and_Response_Act.pdf

40. National Medical Care and Public Health Committee (NMCPHC), M. of H. and the Environment. (2004). Hurricane Disaster Plan (Revised).

41. International Federation of Red Cross and Red Crescent Societies (IFRC) (2020). (n.d.). Emergency Plan of Action (EPoA)Belize: HurricaneEta. https://www.ifrc.org/en/what-we-do/where-we-work/americas/belize-red-cross-society/

42. Constitution of Belize (1981) (rev 2011). (n.d.). https://constituteproject.org/constitution/Belize_2011?lang=en

43. National Emergency Management Organization (NEMO). (n.d.). National Shelter List 2020. Retrieved March 14, 2021, from http://site.nemo.org.bz/national-shelter-list/

44. National Emergency Management Organization (NEMO). (n.d.). NEMO Official Website. Retrieved July 27, 2021, from http://site.nemo.org.bz/

45. Solid Waste Management Authority. (2000). Act Chapter 224 Revised Edition. http://extwprlegs1.fao.org/docs/pdf/blz33194.pdf

46. Government of Belize (GOB). (2012). Ministry of Energy, Science & Technology and Public Utilities Strategic Plan 2012-2017. https://www.publicservice.gov.bz/index.php/content_page/item/26-ministry-of-energy-science-technology-and-public-utilities-strategic-plan-2012-2017

47. Belize Electric Company Limited (BECOL). (n.d.). Dam Safety Emergency Preparedness Plan. http://site.nemo.org.bz/wp-content/publications/BECOL_Emergency_Preparedness_Plan.pdf

48. Belize Constitution Act Chapter 4 Revised Edition Showing the Subsidiary Laws as at 31ST October, 2003. https://web.oas.org/mla/en/Countries_Intro/bel_intro_fund2_en.pdf

49. University of Belize Enviromental Research Institute. Annual Report 2015-2016. (n.d.).

50. Government of Belize, M. of E. Q. A. and D. S. E. C. E. D. Center. (n.d.). Preschool Curriculum Level 2 (4-5 Years). In Preschool Curriculum Level 2 (4-5 Years). www.moe.gov.bz

51. Ministry of Education, Youth, S. and C. N. (2020). Curriculum for Primary Schools Adaptation for 2020-2021. https://www.moe.gov.bz/?s=curriculum

52. Government of Belize, & Ministry of Education, Y. S. and C. (n.d.). National Curriculum for Primary Schools Adaptation for 2020-2021. https://www.moe.gov.bz/?s=curriculum

53. Government of Belize, & Ministry of Education. (n.d.). Quality Assurance and Development Services, Early Childhood Education Development Center. Preschool Curriculum Level 2 (4-5 Years). Retrieved March 15, 2021, from www.moe.gov.bz

54. Breaking Belize News. (2020). Community Disaster Response Teams become certified. https://www.breakingbelizenews.com/2020/07/03/community-disaster-response-teams-become-certified/

55. Green, Rebecca; Mahung, Giselle; Peluso, S. (2019). An Investigation of Disaster Preparedness through Community Perceptions in Hopkins, Belize. https://aag.secure-abstracts.com/AAG Annual Meeting 2019/abstracts-gallery/19975

56. Caribbean News Service. (2019, May 21). Reducing forest fire risks in Northern and Southern Belize — Communities take charge. https://caribbeannewsservice.com/reducing-forest-fire-risks-in-northern-and-southern-belize-communities-take-charge/

57. Caribbean Development Bank. (2019). Regional Community Development Practitioners disaster response boosted through vulnerability training; Livelihood Assessment Training. https://www.caribank.org/newsroom/news-and-events/regional-community-development-practitioners-disaster-response-boosted-through-vulnerability

58. National Emergency Management Organization (NEMO). (2019). Belize Red Cross Trains and Donates Equipment to Nemo. http://site.nemo.org.bz/belize-red-cross-trains-donates-equipment-to-nemo/

59. Belize Red Cross. (n.d.). Belize Red Cross. Annual Report 2019.

60. Belize Red Cross; Annual Report. (2018).

61. Caribbean Disaster Emergency Management Agency (CDEMA). (n.d.). Regional Training Centre. Retrieved March 19, 2021, from https://www.cdema.org/rtc#training-programmes

62. National Emergency Management Organization (NEMO). (2003). Belize National Hazard Management Plan. In Belize National Hazard Management Plan,Volume 5A, Evacuation. http://site.nemo.org.bz/wp-content/publications/Search_Rescue_and_Evacuation_Plan.pdf

63. Hendy, Tennielle; Ministry of Natural Resources. (2019). In Personal interview.

64. National Emergency Management Organization (NEMO). (2019). Ogaldez, Reniece Personal interview.

65. Hunter, F. (2019). Personal interview.

66. Scott, Dwayne, National Meteorological Service of Belize. (2019). Personal Interview.

67. National Meteorological Service of Belize. (n.d.). Mission Statement and Purpose of The National Meteorological Service. Retrieved March 19, 2021, from http://nms.gov.bz/about/purpose/

68. Gordon, R. (2019). National Meteorological Service of Belize Personal interview.

69. Singh, M. C. T. O. and P. M. A. for B. (2019). Personal interview.

BIBLIOGRAPHY

1. 7NewsBelize. (2020). CEMO Gets An Early Start On Hurricane Season. http://7newsbelize.com/sstory.php?nid=51708
2. Act No. 4 of 2019 General Revenue Appropriation. Government of Belize, An Act to appropriate certain sums of money forthe use of the Public Service of Belize. https://www.nationalassembly.gov.bz/wp-content/uploads/2019/04/Act-No.-4-of-2019-General-Revenue-Appropriation-2019-2020.pdf
3. Amandala. (2010). NEMO creates early warning system for tsunamis. https://amandala.com.bz/news/nemo-creates-early-warning-system-for-tsunamis/
4. Barnett, C., Catzim-Sanchez, A., & Humes, D. (2011). Final Report: Preparing Horizon 2030 – Long Term National Development Framework for Belize. Barnett & Company Ltd. https://med.gov.bz/wp-content/uploads/2020/09/Horizon2030executivesummary.pdf
5. Belize Defence Force. (n.d.). Belize Defence Force Official Website. Retrieved July 26, 2021, from http://www.bdf.mil.bz/
6. Belize Economic Development Council. (n.d.-a). Belize Economic Development Council Official Website. Retrieved July 27, 2021, from https://edc.gov.bz/edc/
7. Belize Economic Development Council. (n.d.-b). Belize Economic Development Council Public-Private Dialogue Policies. Retrieved July 27, 2021, from https://edc.gov.bz/public-private-dialogue/
8. Belize Electric Company Limited (BECOL). (n.d.). Dam Safety Emergency Preparedness Plan. http://site.nemo.org.bz/wp-content/publications/BECOL_Emergency_Preparedness_Plan.pdf
9. Belize Emergency Response. (n.d.). ArcGIS. Retrieved March 19, 2021, from https://www.arcgis.com/home/webmap/viewer.html?url=https%3A%2F%2Fgocerebrum.com%2Fserver%2Frest%2Fservices%2FHosted%2FBelize_Emergency_Response_SFGMA%2FFeatureServer%2F0&source=sd
10. Belize Emergency Response Team (BERT). (n.d.). Belize Emergency Response Team Official Website. Retrieved March 19, 2021, from http://www.bertbelize.org/
11. Belize Mininstry of Economic Develoment. (2011). National Develoment Framework for Belize: 2010-2030. https://med.gov.bz/wp-content/uploads/2020/09/Horizon2030PreparationandImplementationProcess.pdf
12. Belize Ministry of Economic Development. (2011). Final Report: Preparing Horizon 2030-Long Term National Development Framework for Belize. https://med.gov.bz/wp-content/uploads/2020/09/H2030finalversion.pdf
13. Belize National Climate Change Office. (2020a). Fourth National Communication Steering Committee. https://ncco.gov.bz/localcommit/
14. Belize National Climate Change Office. (2020b). National Cliamte Change Office Website. https://ncco.gov.bz/
15. Belize National Climate Change Office. (2021). Belize National Climate Change Office Local Committees. https://ncco.gov.bz/localcommit/
16. Belize Network of NGOs. (n.d.). Belize Network of NGO Inventory of Organizations. Retrieved March 19, 2021, from http://belizengos.org/ngo-resources/
17. Belize Network of NGOs (BNN). (n.d.). Belize Network of NGOs Official Website. Retrieved July 28, 2021, from http://www.belizengos.org/
18. Belize Network of NGOs (BNN). (2020). National Recovery Strategy.
19. Belize Red Cross; Annual Report. (2018).
20. Belize Red Cross. Annual Report 2019. (n.d.).
21. Belize Red Cross Society. (n.d.). Belize Red Cross Society Official Website. Retrieved July 27, 2021, from https://www.ifrc.org/en/what-we-do/where-we-work/americas/belize-red-cross-society/
22. Belize Social Investment Fund. (n.d.). Financial Statement 2019/2020. https://sifbelize.org/wp-content/

uploads/2020/10/SIF-FS-Audit-2020.pdf

23. Belize Social Investment Fund (2017). Annual Report. (n.d.).
24. Belize Social Investment Fund (BSIF). (n.d.). Belize Climate Resilient Infrastructure Project (BCRIP)Contingent Emergency Response Component (CERC) Environment and Social Management Framework (ESMF). Retrieved March 19, 2021, from https://sifbelize.org/belize-climate-resilient-infrastructure-project-bcrip-p127338-contingent-emergency-response-component-cerc-environment-and-social-management-framework-esmf/#_Toc43288019
25. Belize Social Investment Fund (BSIF). Annual Report. (2017). https://sifbelize.org/wp-content/uploads/2018/11/BSIF_2017_Annual_Report.pdf
26. Belize Social Investment Fund (BSIF), & Belize Climate Resilient Infrastructure Project (BCRIP). (n.d.). Contingent Emergency Response Component (CERC) Environment and Social Management Framework (ESMF). Retrieved March 19, 2021, from https://sifbelize.org/belize-climate-resilient-infrastructure-project-bcrip-p127338-contingent-emergency-response-component-cerc-environment-and-social-management-framework-esmf/#_Toc43288019
27. Belize Social Investment Fund Financial Statement 2019/2020. (2020). https://sifbelize.org/wp-content/uploads/2020/10/SIF-FS-Audit-2020.pdf
28. Belize Social Investment Fund(SIF) (nd). (n.d.). Who We Are. Retrieved March 19, 2021, from https://sifbelize.org/about-us/#
29. Breaking Belize News. (n.d.). Community Disaster Response Teams become certified. Retrieved March 19, 2021, from https://www.breakingbelizenews.com/2020/07/03/community-disaster-response-teams-become-certified/
30. Breaking Belize News. (2020). Community Disaster Response Teams become certified. https://www.breakingbelizenews.com/2020/07/03/community-disaster-response-teams-become-certified/
31. Breaking Belize News. (2020a). Prime Minister: Investigation commenced in ministries where public monies and trust were 'ravaged.' https://www.breakingbelizenews.com/2020/12/09/prime-minister-investigation-commenced-in-ministries-where-public-monies-and-trust-were-ravaged/
32. Breaking Belize News. (2020b, July 3). Community Disaster Response Teams become certified. https://www.breakingbelizenews.com/2020/07/03/community-disaster-response-teams-become-certified/
33. Breaking Belize News (BBN). (2020). Government to roll out emergency countrywide food assistance program. https://www.breakingbelizenews.com/2020/04/16/government-to-roll-out-emergency-countrywide-food-assistance-program/
34. Breaking Belize News (BBN) (April 16, 2020). Government to roll out emergency countrywide food assistance program. (n.d.). https://www.breakingbelizenews.com/2020/04/16/government-to-roll-out-emergency-countrywide-food-assistance-program/
35. Breaking Belize News (BBN). Government to roll out emergency countrywide food assistance program. (2020). https://www.breakingbelizenews.com/2020/04/16/government-to-roll-out-emergency-countrywide-food-assistance-program/
36. Breaking Belize News (BBN). Government to roll out emergency countrywide food assistance program. (2020, April 16). https://www.breakingbelizenews.com/2020/04/16/government-to-roll-out-emergency-countrywide-food-assistance-program/
37. Cain, Dr. D., & Caribbean Community Climate Change Center. (n.d.). Personal interview.
38. Caribbean Community Cliamte Change Centre (CCCC). (n.d.). Caribbean Community Climate Change Centre Official Website. Retrieved July 28, 2021, from https://www.caribbeanclimate.bz/
39. Caribbean Community Climate Change Centre. (2014). A National Climate Change Policy, Strategy and Action Plan to Address Climate Change in Belize. http://extwprlegs1.fao.org/docs/pdf/blz169290.pdf
40. Caribbean Community Climate Change Centre (CCCCC). (2019). 4th National Communication Workshop. https://www.caribbeanclimate.bz/blog/2019/03/19/training-workshops-conducted-in-belize-through-partnership-with-ncco-ccccc-insmet-and-undp/
41. Caribbean Community Climate Change Centre (CCCCC). (2019). 4th National Communication Workshop Belize.
42. Caribbean Community Climate Change Centre (CCCCC), G. of B. (2014). Belize Marine Conservation and Climate

Adaptation Initiative. In A National Climate Change Policy, Strategy and ActionPlan to Address Climate Change in Belize. http://extwprlegs1.fao.org/docs/pdf/blz169290.pdf

43. Caribbean Development Bank. (2019). Regional Community Development Practitioners disaster response boosted through vulnerability training. Regional Community Development Practitioners Disaster Response Boosted through Vulnerability Training. https://www.caribank.org/newsroom/news-and-events/regional-community-development-practitioners-disaster-response-boosted-through-vulnerability
44. Caribbean Development Bank (CDB). (2017). Caribbean Development Bank (CDB). Partnering to Enhance Climate Risk Management and Improve Resilience in Belize. https://www.caribank.org/newsroom/news-and-events/partnering-enhance-climate-risk-management-and-improve-resilience-belize
45. Caribbean Development Bank (CDB) (Nov 7, 2017). (n.d.). Partnering to Enhance Climate Risk Management and Improve Resilience in Belize.
46. Caribbean Disaster Emergency Management Agency. (2013). In Regional Response Mechanism (RRM). https://www.cdema.org/RRM_Booklet_Final_PDF_version.pdf
47. Caribbean Disaster Emergency Management Agency (CDEMA). (n.d.-a). Regional Training Centre. Retrieved March 19, 2021, from https://www.cdema.org/rtc#training-programmes
48. Caribbean Disaster Emergency Management Agency (CDEMA). (n.d.-b). Regional CDM Strategy and Results Framework 2014 – 2024. https://www.cdema.org/CDM_Strategy_2014-2024.pdf
49. Caribbean Disaster Emergency Management Agency (CDEMA). (2017). Canada Caribbean Disaster Risk Management Fund Country: Snapshot Belize. https://www.cdema.org/ccdrmf/CCDRMF_Country_Snapshot_Belize_July_2017.pdf
50. Caribbean Disaster Emergency Management Agency (CDEMA) (07/01/2017). (n.d.). Canada Caribbean Disaster Risk Management Fund Country: Snapshot Belize.
51. Caribbean Disaster Emergency Management Agency (CDEMA), (2008). Agreement Establishing the Caribbean Disaster Emergency Management Agency (CDEMA). (n.d.).
52. Caribbean Disaster Emergency Management Agency (CDEMA) (nd). (n.d.). About Us. Retrieved March 19, 2021, from https://www.cdema.org/about-us
53. Caribbean Disaster Emergency Response Agency; Caribbean Development Bank. (2006). Belize National Hazard Mitigation Plan. http://docplayer.net/79767415-Belize-national-hazard-mitigation-plan.html
54. Caribbean Institute for Meteorology and Hydrology (CIMH). (n.d.). Webpage. Retrieved March 19, 2021, from http://www.cimh.edu.bb/?p=home
55. Caribbean News Service. (2019, May 21). Reducing forest fire risks in Northern and Southern Belize — Communities take charge. https://caribbeannewsservice.com/reducing-forest-fire-risks-in-northern-and-southern-belize-communities-take-charge/
56. CARICOM. (n.d.). Country Profile Belize. Retrieved March 19, 2021, from https://caricom.org/country_profiles/belize/
57. Castillo-Trejo, D., & Statistical Institute of Belize. (2019). Personal interview.
58. (CDEMA), C. D. E. M. A. (2008). Agreement Establishing the Caribbean Disaster Emergency Management Agency (CDEMA). https://www.cdema.org/cdema_agreement.pdf
59. Channel 5 Belize; Emergency Assistance to Farmers Impacted by Drought. (2019). https://edition.channel5belize.com/archives/191372
60. Channel 5 Belize (Sep 19, 2019). Emergency Assistance to Farmers Impacted by Drought. (n.d.).
61. Chica, Dr. Santos University of Belize. (2019). In Personal interview.
62. Commonwealth Network. (n.d.). Association of National Development Agencies (ANDA). Retrieved July 28, 2021, from https://www.commonwealthofnations.org/organisations/association_of_national_development_agencies/
63. Constitution of Belize (1981) (rev 2011). (n.d.). https://constituteproject.org/constitution/Belize_2011?lang=en
64. Department of the Environment Belize (DoE). (2014). National environmental policy and strategy (2014-2024). 69. https://doe.gov.bz/download/2014-2024-national-environmental-policy-and-strategy/

65. Disaster Preparedness and Response Act. Revised Edition, Subsidiary laws, Government of Belize (2003). http://www.oas.org/dsd/EnvironmentLaw/CaribbeanLegislationProject/Disaster&StateEmergency/Belize/Disaster Preparedness and Response Act - Subsidiary Legislation.pdf

66. Disaster Preparedness and Response Act. Revised Edition, Subsidiary laws (2003). (n.d.). Government Printer, No. 1 Power Lane, Belmopan, by the Authority of the Government of Belize.

67. General Revenue Appropriation (2020/2021) Act No. 9 of 2020. (n.d.). An Act to Appropriate Certain Sums of Money for the Use of the Public Service of Belize.

68. General Revenue Appropriation Act No. 9 of 2020, An Act to appropriate certain sums of money for the use of the Public Service of Belize. https://www.nationalassembly.gov.bz/wp-content/uploads/2020/03/Act-No.-9-of-2020-General-Revenue-Appropriation-2020-2021.pdf

69. Global Facility for Disaster Reduction and Recovery (GFDRR) - The World Bank. (2017). Belize: Hazard and Risk Assessment Framework - Prioritization of an Investment Plan. ACP-EU Natural Disaster Risk Reduction Program. https://www.gfdrr.org/en/belize-hazard-and-risk-assessment-framework-prioritization-investment-plan

70. Global Facility for Disaster Reduction and Recovery (GFDRR). Disaster risk management in Latin America and the Caribbean region: GFDRR country notes (Belize). (2010). http://documents1.worldbank.org/curated/en/619291468010260096/pdf/701080ESW0P1150y0Notes0Bolivia02010.pdf

71. Gordon, R. (2019). National Meteorological Service of Belize Personal interview.

72. Government of Belize. (n.d.-a). General Revenue Appropriation Act No. 4 of 2019. In An Act to appropriate certain sums of money forthe use of the Public Service of Belize. https://www.nationalassembly.gov.bz/wp-content/uploads/2019/04/Act-No.-4-of-2019-General-Revenue-Appropriation-2019-2020.pdf

73. Government of Belize. (n.d.-b). Government of Belize Official Website. Retrieved July 27, 2021, from https://www.belize.gov.bz/

74. Disaster Preparedness and Response Act (2000)., Government Printer, No. 1 Power Lane, Belmopan. (2000). http://site.nemo.org.bz/wp-content/publications/Belize_Disaster_Preparedness_and_Response_Act.pdf

75. Government of Belize. (2000a). Environmental Protection Act (EPA), Chapter 328 of the Laws of Belize. https://doe.gov.bz/wp-content/uploads/2019/03/Environmental-Protection-Act-Chapter-328-of-the-Laws-of-Belize.pdf

76. Government of Belize. (2000b). Forest Fire Protection Act, Chapter 212 of the Laws of Belize. http://extwprlegs1.fao.org/docs/pdf/blz2740.pdf

77. Government of Belize. (2000c). Housing and Town Planning Act, Chapter 182 of the Laws of Belize. https://elaw.org/sites/default/files/content_type_law_attachment/Housing and Town Planning Act 2000.pdf

78. Government of Belize. (2000d). Land Utilization Act (LUAct), Chapter 188 of the Laws of Belize. http://www.belizelaw.org/web/lawadmin/PDF files/cap188.pdf

79. Government of Belize. (2000e). Town Councils Act Chapter 87 Revised Edition. http://www.belizelaw.org/web/lawadmin/PDF files/cap087.pdf

80. Government of Belize. (2003). National Lands Act (Revised edition). http://www.iacseaturtle.org/docs/marco/belize/Belize - National Lands Act.pdf

81. Government of Belize. (2011). Public Health Act (Revised edition), Chapter 40 of the Laws of Belize. http://extwprlegs1.fao.org/docs/pdf/blz33246.pdf

82. Government of Belize. (2017). Belize's Voluntary National Review for the Sustainable Development Goals 2017. https://sustainabledevelopment.un.org/content/documents/16389Belize.pdf

83. Government of Belize. (2020a). Statutory Instrument No. 46 of 2020. Belize Constitution (Emergency Powers) Regulations. https://www.belizetourismboard.org/wp-content/uploads/2020/04/Belize-Constitution-Emergency-Powers-Regulations-2020.pdf

84. Government of Belize. (2020b). Statutory Instrument No. 47 of 2020. Belize Constitution (Emergency Powers) Regulations. http://www.belize.org/wp-content/uploads/SI-No-47-of-2020-Belize-Constitution-Emergency-Powers-Amended.pdf

85. Government of Belize. (2021). Ministry of Sustainable Development, Climate Change and Disaster Risk

Managemnent. https://www.belize.gov.bz/Ministry/Ministry of Sustainable Development, Climate Change & Disaster Risk Management

86. Government of Belize (2020). Micro, Small, and Medium Enterprises (MSME) Support Programme. (n.d.). https://www.covid19.bz/belizemsp/
87. Government of Belize and United Nations Development Programme (UNDP). (2017). Fourth National Communication and First Biennial Update Report to the UNFCCC. https://info.undp.org/docs/pdc/Documents/BLZ/5939_4NC+BUR_Belize_ProDoc 26 Apr 2017_FINAL.pdf
88. Government of Belize, & Department of the Environment. (2014). National Environmental Strategy and Action Plan 2014-2024. https://doe.gov.bz/download/2014-2024-national-environmental-policy-and-strategy/
89. Belize Constitution Act Chapter 4 Revised Edition Showing the Subsidiary Laws as at 31ST October, 2003. https://web.oas.org/mla/en/Countries_Intro/bel_intro_fund2_en.pdf
90. Government of Belize (GOB). (n.d.). Belize Legal Information Network. Retrieved March 19, 2021, from www.belizelaw.org/web/lawadmin
91. Government of Belize (GOB). (2012). Ministry of Energy, Science & Technology and Public Utilities Strategic Plan 2012-2017. https://www.publicservice.gov.bz/index.php/content_page/item/26-ministry-of-energy-science-technology-and-public-utilities-strategic-plan-2012-2017
92. Government of Belize (GOB). (2017). In Belize's Voluntary National Review for the Sustainable Development Goals. https://sustainabledevelopment.un.org/content/documents/16389Belize.pdf
93. Government of Belize (GOB). (2020). Nationally Determined Contribution (NDC) pursuant to decision 1 CP/21 of the Paris Agreement. https://ncco.gov.bz/wp-content/uploads/2020/05/Belize-Nationally-Determined-Contributions.pdf
94. Government of Belize (GOB). Belize Legal Information Network. (n.d.). www.belizelaw.org/web/lawadmin
95. Government of Belize (GOB) National Climate Change Office. (2018). Technology Action Plan for Climate Change Adaptation and Mitigation. https://tech-action.unepdtu.org/wp-content/uploads/sites/2/2019/03/tap-belize-final-draft-updated.pdf
96. Government of Belize, M. of E. Q. A. and D. S. E. C. E. D. Center. (n.d.). Preschool Curriculum Level 2 (4-5 Years). In Preschool Curriculum Level 2 (4-5 Years). www.moe.gov.bz
97. Government of Belize, M. of N. S. (2019). Belize Coast Guard and SOUTHCOM Share Solid Partnership. https://mns.gov.bz/belize-mns-news/belize-coast-guard-and-southcom-share-solid-partnership/
98. Government of Belize, & Ministry of Education. (n.d.-a). Quality Assurance and Development Services, Early Childhood Education Development Center. Preschool Curriculum Level 2 (4-5 Years). Retrieved March 15, 2021, from www.moe.gov.bz
99. Government of Belize, & Ministry of Education, Y. S. and C. (n.d.-b). National Curriculum for Primary Schools Adaptation for 2020-2021. https://www.moe.gov.bz/?s=curriculum
100. Government of Belize Ministry of Finance. (n.d.). Ministry of Economic Development National Plans. Retrieved July 27, 2021, from https://med.gov.bz/national-plans/
101. Government of Belize Ministry of Foreign Affairs. (2019). Ministry of Foreign Affairs Website. https://mfa.gov.bz/regional-organizations-2/
102. Statutory Instrument No. 59 of 2014, Public Service Regulations., Belize Constitution (Public Service) 106 (2014). https://www.oas.org/juridico/PDFs/mesicic5_blz_resp_annex7.pdf
103. Government of Belize Ministry of Public Works. (2011). Belize's Disaster Risk Management Structure. https://www.eird.org/plataforma-2011/pdf/exposicion-de-pais/Exposicion-de-pais-BELIZE.pdf
104. Government of Belize National Climate Change Office. (2020). National Climate Change Adaptation Plan and Vulnerability and Adaptation Assessment. https://ncco.gov.bz/archiving-and-documentation/#
105. Government of the UK. (2019). Tropical Alliance: responding to an environmental and mass casualty disaster in Belize. https://insidedio.blog.gov.uk/2019/09/03/tropical-alliance-responding-to-an-environmental-and-mass-casualty-disaster-in-belize/
106. Government of the US, State Department (October 29, 2018). (n.d.). Integrated Country Strategy Belize.

107. Green, Rebecca; Mahung, Giselle; Peluso, S. (2019). An Investigation of Disaster Preparedness through Community Perceptions in Hopkins, Belize. https://aag.secure-abstracts.com/AAG Annual Meeting 2019/abstracts-gallery/19975

108. Hendy, Tennielle; Ministry of Natural Resources. (2019). In Personal interview.

109. Humana People to People Belize. (n.d.). Humana People to People Belize-Project: Strengthen Emergency and Disaster Response in Vulnerable Commmunities by Building Capacities and Improving Collaboration and Service Delivery in Southern Belize. Retrieved March 19, 2021, from https://www.humana-belize.org/project-profiles/18-20-us-response/

110. Humana People to People Belize (HPPB). (n.d.). Humana People to People Belize Official Website. Retrieved July 28, 2021, from https://www.humana-belize.org/

111. Hunter, F. (2019). Personal interview.

112. Insurance Act Revised Edition 2000, Government of Belize, (2000). http://www.belizelaw.org/web/lawadmin/PDF files/cap251.pdf

113. Inter-American Development Bank (IADB). Grau, Javier; Navia, Maria del Rosario; Rihm, Alfredo. (2013). Water and sanitation in Belize. https://publications.iadb.org/en/water-and-sanitation-belize

114. Inter-American Development Bank (IADB), Lacambra, S., Suárez, G., Tsuneki, H., & Jaimes, I. (2020). Index of Governance and Public Policy in Disaster Risk Management (iGOPP): National Report Belize. https://publications.iadb.org/publications/english/document/Index-of-Governance-and-Public-Policy-in-Disaster-Risk-Management-iGOPP-National-Report-Belize.pdf

115. International Bank of Reconstruction and Development. (n.d.). Belize Marine Conservation and Climate Adaptation Initiative (BMCCAI). https://www.adaptation-fund.org/project/belize-marine-conservation-and-climate-adaptation-project/

116. International Federation of Red Cross and Red Crescent Societies (IFRC). (2017). Capacity Building for Disaster Preparedness and Response in Caribbean National Societies: A Performance Baseline Report on Disaster Preparedness and Response Capacity in The Bahamas, Barbados, Belize, and Dominica. https://www.urban-response.org/help-library/capacity-building-for-disaster-preparedness-and-response-in-caribbean-national

117. International Federation of Red Cross and Red Crescent Societies (IFRC) (2020). (n.d.). Emergency Plan of Action (EPoA)Belize: HurricaneEta. https://www.ifrc.org/en/what-we-do/where-we-work/americas/belize-red-cross-society/

118. King, I. C., & United Nations Development Programme. (2019). Personal interview.

119. LoveFM. (2019). RedCross helps NEMO with Technology and Training. https://lovefm.com/redcross-helps-nemo-technology-training/

120. Ministry of Economic Development. (2011). Final Report: Preparing Horizon 2030-Long Term National Development Framework for Belize. https://med.gov.bz/wp-content/uploads/2020/09/Horizon2030executivesummary.pdf

121. Ministry of Economic Development and National Human Development Advisory Committee. (2009a). In National Poverty Elimination Strategy and Action Plan (NPESAP)2009-2013. https://med.gov.bz/wp-content/uploads/2020/09/FinalNPESAP2009-2013.pdf

122. Ministry of Economic Development and National Human Development Advisory Committee. (2009b). National Poverty Elimination Strategy and Action Plan (NPESAP)2009-2013. https://med.gov.bz/wp-content/uploads/2020/09/FinalNPESAP2009-2013.pdf

123. Ministry of Education, Youth, S. and C. N. (2020). Curriculum for Primary Schools Adaptation for 2020-2021. https://www.moe.gov.bz/?s=curriculum

124. Ministry of Finance. (2017). Approved Estimates of Revenue and Expenditure for Fiscal Year 2017/2018. https://www.mof.gov.bz/uploads/files/s3zoijqw.pdf

125. Ministry of Finance. (2018). Approved Estimates of Revenue and Expenditure for Fiscal Year 2018/2019. https://www.mof.gov.bz/uploads/files/0nmnmacu.pdf

126. Ministry of Finance. (2019). Approved Estimates of Revenue and for Fiscal Year 2019/2020. http://caribbeanelections.com/eDocs/budget/bz_budget/bz_approved_estimates_2019_2020.pdf

127. Ministry of Finance. (2020). Approved Estimates of Revenue and Expenditure for Fiscal Year 2020/2021. https://

www.mof.gov.bz/

128. Ministry of Foreign Affairs website. (n.d.). Retrieved March 19, 2021, from https://mfa.gov.bz/regional-organizations-2/

129. Ministry of Forestry, Fisheries, and Sustainable Development, B., (UNDESA), U. N. D. of S. and E. A., & (UNDP), U. N. D. P. (2018). Belize National Sustainable Development Report. https://sustainabledevelopment.un.org/memberstates/belize#:~:text=Belize has made significant strides,Millennium Development Goals in 2015.&text=The strategic priorities for Belize,a healthy citizenry and environment.

130. Ministry of Health (MOH), Belize. Belize Announces New Measures in Response to COVID-19. (2020). https://www.pressoffice.gov.bz/belize-announces-new-measures-in-response-to-covid-19/

131. Ministry of Health (MOH), Belize (March 2020). Belize Announces New Measures in Response to COVID-19. (n.d.).

132. National Bank of Belize (NBB) COVID-19 Preparedness. (n.d.). Retrieved March 19, 2021, from https://www.nbbl.bz/coronavirus-covid-19-preparedness/

133. National Emergency Management Organization (NEMO). (n.d.-a). Dam Break Early Warning. Retrieved April 24, 2021, from http://site.nemo.org.bz/wp-content/uploads/2021/01/Dam-Break-Early-Warning-Notice-1.pdf

134. National Emergency Management Organization (NEMO). (n.d.-b). District Organizations. Retrieved March 19, 2021, from http://site.nemo.org.bz/district-organizations/

135. National Emergency Management Organization (NEMO). (n.d.-a). Earthquake and Tsunami Safety Guidelines. Retrieved April 24, 2021, from http://site.nemo.org.bz/wp-content/uploads/2020/06/Safety-Guidelines.pdf

136. National Emergency Management Organization (NEMO). (n.d.-c). Foreign Assistance Committee Hazard Response Plan. http://site.nemo.org.bz/wp-content/publications/Foreign_Assistance_Plan.pdf

137. National Emergency Management Organization (NEMO). (n.d.-d). National Shelter List 2020. Retrieved March 14, 2021, from http://site.nemo.org.bz/national-shelter-list/

138. National Emergency Management Organization (NEMO). (n.d.-e). NEMO Brochure. This Is NEMO Brochure. Retrieved March 19, 2021, from http://site.nemo.org.bz/wp-content/publications/This_is_NEMO_Brochure_2008.pdf

139. National Emergency Management Organization (NEMO). (n.d.-f). NEMO Conducts Training in Partnership with United Nation's Emergency Task Team. Retrieved March 15, 2021, from http://site.nemo.org.bz/nemo-conducts-training-in-partnership-with-united-nations-emergency-task-team/

140. National Emergency Management Organization (NEMO). (n.d.-g). NEMO Official Website. Retrieved July 27, 2021, from http://site.nemo.org.bz/

141. National Emergency Management Organization (NEMO). (n.d.-h). Relief and Supplies Management Committee. National Relief and Supplies Management Plan.

142. National Emergency Management Organization (NEMO). (n.d.-b). Relief and Supplies Management Committee. National Relief and Supplies Management Plan. http://site.nemo.org.bz/wp-content/publications/Relief_and_Supplies_Management_Plan.pdf

143. National Emergency Management Organization (NEMO). (2003a). Belize National Hazard Management Plan. In Belize National Hazard Management Plan,Volume 5A, Evacuation. http://site.nemo.org.bz/wp-content/publications/Search_Rescue_and_Evacuation_Plan.pdf

144. National Emergency Management Organization (NEMO). (2003b). Belize National Hazard Management Plan, Volume 5A, Evacuation.

145. National Emergency Management Organization (NEMO). (2018a). NEMO Holds Final Pre-Season Planning Meetings in Preparation for the 2018 Hurricane Season. http://site.nemo.org.bz/nemo-holds-final-pre-season-planning-meetings-in-preapration-for-the-2018-hurricane-season/

146. National Emergency Management Organization (NEMO). (2018b). Plan of Action for the Damage Assessment and Needs Analysis (DANA) Committee.

147. National Emergency Management Organization (NEMO). (2018c). Plan of Action for the Damage Assessment and Needs Analysis (DANA) Committee.

148. National Emergency Management Organization (NEMO). (2019a). Belize Red Cross Trains and Donates Equipment to

Nemo. http://site.nemo.org.bz/belize-red-cross-trains-donates-equipment-to-nemo/

149. National Emergency Management Organization (NEMO). (2019b). Damage Assessment & Needs Analysis Training for Belmopan & Surrounding Communities. http://site.nemo.org.bz/damage-assessment-needs-analysis-training-for-belmopan-surrounding-communities/

150. National Emergency Management Organization (NEMO). (2019c). Ogaldez, Reniece Personal interview.

151. National Emergency Management Organization (NEMO), & Caribbean Disaster Emergency Response Agency (CDEMA). (2004). National Policy Development Committee. Belize National Hazard Mitigation Policy. http://site.nemo.org.bz/wp-content/publications/National_Hazard_Mitigation_Policy-Final_Draft.pdf

152. National Emergency Management Organization (NEMO), R. and S. M. C. (n.d.-i). National Relief and Supplies Management Plan. http://site.nemo.org.bz/wp-content/publications/Relief_and_Supplies_Management_Plan.pdf

153. National Medic. (n.d.).

154. National Medical Care and Public Health Committee (NMCPHC), M. of H. and the E. (2004a). Hurricane Disaster Plan.

155. National Medical Care and Public Health Committee (NMCPHC), M. of H. and the Environment. (2004b). Hurricane Disaster Plan (Revised).

156. National Meteorological Service of Belize. (n.d.). Mission Statement and Purpose of The National Meteorological Service. Retrieved March 19, 2021, from http://nms.gov.bz/about/purpose/

157. National Women's Commission, The. (2013). Part 2: The Revised National Gender Policy (Updated Version). https://oig.cepal.org/sites/default/files/belize_2013national_gender_policy.pdf

158. National Women's Commission, The. (Updated Version 2013). Part 2: The Revised National Gender Policy. (n.d.).

159. Noralez, S., & Statistical Institute of Belize. (2019). Personal interview.

160. Office of Supervisor of Insurance & Private Pensions (OSIPP), Ministry of Finance. (n.d.). Retrieved March 19, 2021, from https://osipp.gov.bz/

161. Organization of American States (OAS). (n.d.). Caribbean Emergency Legislation Project (CELP). Retrieved March 15, 2021, from http://www.oas.org/dsd/EnvironmentLaw/CaribbeanLegislationProject/Profiles/BelizeFINAL.pdf

162. Organization of American States (OAS). (2016). OAS Belize Office Supports Community Preparedness and Resilience Project. https://www.oas.org/en/about/offices_events.asp?sCode=BEL

163. Organization of American States (OAS). (2021). Building the Resilience of the Small Tourism Enterprises in the Caribbean to Disasters. https://www.oas.org/en/about/offices_events.asp?sCode=BEL

164. Organization of American States (OAS) (2021). (n.d.). Building the Resilience of the Small Tourism Enterprises in the Caribbean to Disasters.

165. Organization of American States (OAS) (nd). (n.d.). About Us. http://www.oas.org/en/about/who_we_are.asp

166. Organization of American States (OAS), Trust for the Americas, Henry, R. I., Audrey, W., Quimey, R., Rio, D., Creativity, Z., Ortega, M. A., Cover, V., & Ortega Vega, M. A. (2019). Promoting an Open Government Ecosystem in Belize. https://www.thetrustfortheamericas.org/media/projects/attachments/en/Belize_Open_Government_Subgrantees_English.pdf

167. Organization of AmericanCELP PROFILE Belize States. (2010). Caribbean Emergency Legislation Project (CELP)-CELP Profile Belize. https://www.oas.org/en/sedi/dsd/ELPG/pastProjects/Documents/BelizeFINAL.pdf

168. Perriott, Dr. Leopold Director-General, Statistical Institute of Belize. (2019). In Personal interview.

169. PreventionWeb. (2021). Belize Sendai Framework. https://www.preventionweb.net/english/countries/americas/blz/

170. Salvation Army Belize. (n.d.). Salvation Army Belize Page. Retrieved July 28, 2021, from https://www.facebook.com/The-Salvation-Army-Belize-District-Headquarters-107199630662965/

171. San Pedro Sun, T. (2020a). Anti-Corruption UNCAC agreement yet to be fully implemented in Belize. https://www.sanpedrosun.com/government/2020/01/09/anti-corruption-uncac-agreement-yet-to-be-fully-implemented-in-belize/

172. San Pedro Sun, T. (2020b). Anti-Corruption UNCAC agreement yet to be fully implemented in Belize. https://www.

sanpedrosun.com/government/2020/01/09/anti-corruption-uncac-agreement-yet-to-be-fully-implemented-in-belize/

173. Scott, Dwayne, National Meteorological Service of Belize. (2019). Personal Interview.

174. Singh, M. C. T. O. and P. M. A. for B. (2019). Personal interview.

175. Solid Waste Management Authority. (2000). Act Chapter 224 Revised Edition. http://extwprlegs1.fao.org/docs/pdf/blz33194.pdf

176. Statistical Institute of Belize. (n.d.). Belize National Statistical System Portal. Retrieved July 28, 2021, from http://bnss.sib.org.bz:8080/apex/f?p=134:1:962225392908:::::#

177. Statutory Instrument No. 46 of 2020. Belize Constitution (Emergency Powers) Regulations, 2020. (n.d.).

178. Statutory Instrument No. 65 of 2020. Belize Constitution (Emergency Powers) Regulations. https://d1zo6mdbutg8ag.cloudfront.net/wp-content/uploads/2020/05/SI-No-65-of-2020-Belize-Constitution-1.pdf%0A%0A

179. Statutory Instrument No. 65 of 2020. Belize Constitution (Emergency Powers) Regulations, 2020. (n.d.).

180. Statutory Instrument No. 78 of 2020. Belize Constitution (Emergency Powers) (Amendment). (n.d.). Substantive Laws of Belize, Revised Edition 2011. https://www.pressoffice.gov.bz/wp-content/uploads/2019/12/SI-No-78-of-2020-Belize-Constitution-Emergency-Powers-2020.pdf?fbclid=IwAR0Is7MSDeJWRW0dtRr52IPZzqtAM2OF5iH9I0-m2m1FLUbWGpkTsl_Y4bs

181. Taiwan Technical Mission in Belize, Ministry of Agriculture, F. F. the E. and S. D. (Belize), & San Ignacio/Santa Elena Town Council. (n.d.). Belize Urban Resilience and Disaster Prevention Project. Retrieved March 15, 2021, from https://www.icdf.org.tw/ct.asp?xItem=55438&ctNode=30465&mp=moben

182. Team, C., Barnett, C., Catzim, A., & Barnett, D. H. (2011). REVISED Second Progress Report : Preparing Horizon 2030 - Long Term National Development Framework for Belize. 160. http://med.gov.bz/wp-content/uploads/2020/09/Horizon2030executivesummary.pdf

183. The Caribbean Disaster Emergency Response Agency and The Caribbean Development Bank. Belize National Hazard Mitigation Plan. (2006a).

184. The Caribbean Disaster Emergency Response Agency and The Caribbean Development Bank. Belize National Hazard Mitigation Plan. (2006b).

185. Tillett-Moir, L., & Ministry of Health. (2019). Personal interview.

186. Tobin, S. (2017). A Global Outlook on Disaster Science. https://www.elsevier.com/__data/assets/pdf_file/0008/538091/ElsevierDisasterScienceReport-PDF.pdf

187. Trotz, Dr. Ulric Trotz (November 2019). Personal Interview. (n.d.). Caribbean Community Climate Change Center.

188. UN Belize. (2019). Country Implementation Plan. https://belize.un.org/sites/default/files/2019-11/2019 Country Implementation Plan.pdf

189. UN Convention against Corruption (UNCAC). (2016). Breaking the Corruption Chain in Belize: The Campaign for Good Governance and UNCAC Accession. https://uncaccoalition.org/breaking-the-corruption-chain-in-belize-the-campaign-for-good-governance-and-uncac-accession/

190. UN Convention against Corruption (UNCAC) (December 2016). (n.d.). Breaking the Corruption Chain in Belize: The Campaign for Good Governance and UNCAC Accession.

191. UNICEF. (2018). Strengthening Preparedness for Emergency Response with the Government in Belize. https://www.unicef.org/belize/media/1811/file/Good-Practice-Emergency-Preparedness-Belize-Preparedness-with-Government.pdf

192. United Nations. (n.d.-a). High-Level Political Forum on Sustainable Development 2017. Retrieved June 22, 2021, from https://sustainabledevelopment.un.org/memberstates/belize

193. United Nations. (n.d.-b). Multi-Country Sustainable Development Framework in the Caribbean 2017 - 2021. https://belize.un.org/sites/default/files/2019-09/UN-MSDF-2017-5.pdf

194. United Nations Belize Office. (2019). Belize 2019 Country Implementation Plan. https://belize.un.org/sites/default/files/2019-11/2019 Country Implementation Plan.pdf

195. United Nations Development Programme (2012). Belize Common Country Assessment. (n.d.).

196. United Nations Development Programme (UNDP). (2009a). Enhancing Gender Visibility in Disaster Risk Management and Climate Change in the Caribbean Country Assessment Report for Belize. http://www.undp.org/content/dam/rblac/docs/Research and Publications/Crisis Prevention and Recovery/UNDP_RBLAC_GenderVisibilityDRRBelize.pdf

197. United Nations Development Programme (UNDP). (2009b). Strengthening of Disaster Preparedness and Emergency Response Capacity in Belize. https://info.undp.org/docs/pdc/Documents/BLZ/00056493_14C-PRODOC-Strengthening-of-Disaster-Preparedness-BCPR.pdf

198. United Nations Development Programme (UNDP) Belize. (90 C.E.). United Nations Development Programme Belize Common Country Assessment. In 2012. http://www.undp.org/content/dam/belize/docs/UNDP BZ Publications/Common Country Assessment 2012, Belize.pdf

199. United Nations Multi-Country Sustainable Development Framework in the Caribbean 2017 - 2021. (n.d.).

200. United Nations Office for Disaster Risk Reduction (UNDRR). (2020). Belize Sendai Monitor. https://sendaimonitor.undrr.org/analytics/country-global-target/16/8?countries=18

201. United Nations Platform for Sustainable Development Goals. (2018). High-level Political Forum on Sustainable Development. https://sustainabledevelopment.un.org/hlpf

202. University of Belize. (n.d.). Annual Report 2017-2018. https://www.ub.edu.bz/wp-content/uploads/2019/12/AR-2017-2018.pdf

203. University of Belize Enviromental Research Institute. (n.d.). Annual Report 2015-2016. https://639d9e34-5a75-481e-83c6-1ae99aaa0298.filesusr.com/ugd/c09ab2_bd18a4a2b2064aada609be6496fb3aaf.pdf

204. University of Belize Enviromental Research Institute. Annual Report 2015-2016. (n.d.).

205. U.S. Southern Command. (n.d.). Area of Responsibility. Retrieved March 19, 2021, from https://www.southcom.mil/About/Area-of-Responsibility/

206. US State Department. (2018). Integrated Country Strategy Belize. https://www.state.gov/wp-content/uploads/2019/01/ICS-Belize_UNCLASS_508.pdf

207. Wade-Moore, Diane; United Nations Development Programme. (2019). In Personal interview.

208. World Bank, Global Facility for Disaster Reduction and Recovery (GFDRR), A. C. P. (ACP) – E. U. (EU) (ACP-E. C. (n.d.). Caribbean Handbook on Risk Information Management. Retrieved March 19, 2021, from http://www.charim.net/belize/organizations

209. World Bank, The; Africa Caribbean Pacific (ACP) – European Union (EU) (ACP-EU). The African, Caribbean, and P. G. E. U. G. (2018). Advancing Disaster Risk Finance in Belize. https://openknowledge.worldbank.org/bitstream/handle/10986/33088/Advancing-Disaster-Risk-Finance-in-Belize.pdf?sequence=1&isAllowed=y%0A%0A

210. World Bank, The; Africa Caribbean Pacific (ACP) – European Union (EU) (ACP-EU). The African, Caribbean, and Pacific Group; European Union; GFDRR (2018). Advancing Disaster Risk Finance in Belize. (n.d.).

PDC | GLOBAL

Better solutions.
Fewer disasters.

Safer world.

1305 N Holopono Street | P: (808) 891-0525
Suite 2, Kihei, HI 96753 | F: (808) 891-0526

@PDC_Global /PDCGlobal www.pdc.org ndpba@pdc.org

Development Finance Corporation (DFC) Residential Loans Product

I Introduction

WHO WE ARE

The Development Finance Corporation, was incorporated on September 27, 1963 and is Belize's only Development Bank. Our purpose is to support the strengthening and expansion of Belize's economy by providing developmental financing on an economically sustainable and environmentally acceptable basis to individuals, businesses, and organizations. DFC is a non-deposit financial institution. The Corporation accesses financing from larger regional and international lending institutions at attractive rates for on-lending to Belizean nationals, residents, locally registered companies, cooperatives and other bodies with a Belizean majority share interest.

Mission: The DFC's mission is to provide innovative development financial solutions which contribute to the resilient and equitable growth of Belize.

Vision: A leading development finance institution built around a robust and modern digital infrastructure that leverages strategic alliances, empowers our team members, and exceeds our clients' expectations.

The DFC's Mission and Vision are aligned with the corporation's strategic focus areas which are 1) Build Strategic Alliances; 2) Broaden Impact; 3) Climate Resiliency and Gender Mainstreaming, and 4) Digital Transformation. These strategic thrusts in turn guide the Corporation's strategic objectives which include 1) Strengthen International Collaboration; 2) Strengthen Local Collaboration; 3) Innovative Product Development; 4) Implementation of MEALS (Monitoring, Evaluation, Accountability, and Learning Strategy); 5) Climate Financing; and 6) Transition to a Digital First Organization. To achieve its vision, the DFC offers financial solutions in various sectors.

II Residential Sector Growth

The residential portfolio demonstrates remarkable resilience and growth potential. From its lowest point in 2019 ($23.14 million) to its peak in 2023 ($41.61 million), the portfolio nearly doubled in value - an impressive 80% increase over four years. The 11-year journey shows a net growth from $27.84 million to $41.59 million, representing a 49% overall increase.

Year	Portfolio
2014	$27,841,513
2015	$27,084,370
2016	$26,161,058
2017	$25,594,550
2018	$24,039,406
2019	$23,136,906
2020	$23,976,009
2021	$31,314,000
2022	$39,292,358
2023	$41,606,010
2024	$41,590,370

III Product Features:

1. Purpose of the Loan

i. Loans may be granted for the following activities based on a sound assessment of the client:

a. Construction of new houses

b. Purchase of Land for construction of new houses

c. Home improvement / repairs/ retrofitting and expansion for owner occupied buildings

d. Purchase and retrofit newly constructed houses (less than one year) or buildings, if the building does not meet climate-resilient specifications. The economic useful life of the building must be at least five years in excess of the loan term.

e. For securing dwelling including construction of fences, security systems, and burglar bars

f. Equipping dwellings with energy-efficient technology or alternative energy technology aimed at reducing reliance on fossil fuel energy

2. Income Limits

Priority will be given to persons who fall within the low to the upper middle-income category who are first-time home owners. Gross household income limits will apply only where specified by the funding agency program.

3. Loan Term

Loan Purpose	Maximum Loan Tenure
New Construction (concrete)	Not to exceed 25 years from the date of the first principal payment

Loan Purpose	Maximum Loan Tenure
New Construction (other)	Not to exceed 15 years from the date of the first principal payment
Home Improvement/Expansion	Not to exceed 15 years from the date of the first principal payment
Home Security/Alternative Energy	Not to exceed 10 years from the date of the first principal payment
Purchase of Existing Residential Properties	Five years less than the economic useful life of the property but not to exceed 20 years
Residential Properties purchased under Foreclosure	Consistent with the economic useful life of the building, but not exceeding 25 years from the date of the first principal payment
Land acquisition for the construction of new homes	Up to seven (7) years repayment

4. Grace Period

i. Grace period for new construction will be in accordance with the project implementation plan and should not exceed 8 months.

ii. Grace period for home improvement/expansion and installation of renewable/efficient energy technology (RE/EE) should not exceed 4 months

iii. Grace period for purchase of building should not exceed one-month from the date of disbursement

iv. Grace period for activities related to home security (burglar bars and fences) should not exceed one-month from the date of first disbursement

v. Grace period for properties procured under foreclosure will be dependent on the amount of remedial works required but shall not exceed 4-months from the date of first disbursement.

5. Interest Rate

Based on the risk profile of the applicant/s, the suggested *interest rate is as follows, and is based on two scenarios:

Option I: Utilizing Adaptation Funds Only

RISK 1: up to 1.49	RISK 2: 1.50 - 2.49	RISK 3: 2.50 - 3.49	RISK 4: 3.50 - 4.49	RISK 5: 4.5 - 5
RISK 1	**RISK 2**	**RISK 3**	**RISK 4**	**RISK 5**
SUPERIOR	**DESIRABLE**	**ACCEPTABLE**	**NEEDS ATTENTION**	**WATCH-LISTED**
Suggested Interest Rate				
4%	**4.5%**	**5.0%**	**5.5%**	**6%**

Option II: Blended Funds – Adaptation Funds (50%) and DFC (50%)

- With Adaptation Funds starting at 4%
- With DFC Funds starting at 8%
- Weighted Average Interest Rate of 6%

RISK 1: up to 1.49	RISK 2: 1.50 - 2.49	RISK 3: 2.50 - 3.49	RISK 4: 3.50 - 4.49	RISK 5: 4.5 - 5
RISK 1	**RISK 2**	**RISK 3**	**RISK 4**	**RISK 5**
SUPERIOR	**DESIRABLE**	**ACCEPTABLE**	**NEEDS ATTENTION**	**WATCH-LISTED**
Suggested Interest Rate				
6%	**6.5%**	**7.0%**	**7.5%**	**8%**

* Based on our experience, most of our clients fall between Risk 1 and Risk 3

6. Borrower's Contribution

i. Borrower's contribution to the project will not be less than 10% of the total project cost and will include the value of land and existing developments, loan closing costs, cash for new investment, and contribution in kind. For land acquisition for home construction the equity required is 5%.

7. Collateral

i. Collateral should be in the form of a First Legal Mortgage /Legal Charge on the project site preferably.

ii. Where collateral is a Leasehold interest, permission to mortgage must be submitted from the Ministry of Natural Resources.

iii. Property value upon completion of the investment must be equal to or exceed 100 % of the loan size "and the loan to value ratio must be no more than 75%". Under special circumstances DFC may authorize the acceptance of lower levels of collateral.

8. Repayment Capacity

i. Aggregate monthly debt servicing not to exceed 40% of gross income for salaried persons and 35% for self-employed persons. On a case-by-case basis, a maximum of 42% can be considered.

ii. Evidence of income must be submitted by the client. In case of self-employed persons, this should take the form of Income/ Expense statements and for salaried persons, a letter from the employer and payslips.

iii. Preferably, the mode of repayment should be through Salary or Bank Deduction Orders

iv. Prospective clients must show evidence of employment for at least six (6) consecutive months

9. Loan Fees

All clients shall pay loan fees in accordance with the fee structure. In deserving cases, the DFC may finance 100% of the loan fees subject to the equity requirements of the project.

Currently the loan fees schedule is as follows:

Loan Type	From Value	To Value	Preparation	Processing	Total
Residential	$2,500	$20,000	1%	1%	2%
	Above $20,000		1.25%	1.25%	2.5%

10. Other

i. Mortgage Cancellation and building insurance must be enforced under the DFC's group scheme for the duration of the loan and all associated expenses will be the responsibility of the client.

ii. In special circumstances, the DFC may accept the assignment of an existing building insurance policy if the insurable amount is consistent with DFC's valuation of the property.

iii. All building plans must be approved by the CBA or its authorized agent and construction must be in accordance with the approved building codes for the respective areas

iv. Loans funds will be disbursed in accordance with the approved project implementation plan

v. All insurance and loan cancellation fees will be the responsibility of the client.

IV Application Process

1. **What You Need To Apply:**

- **Photo ID** (Social Security, Passport)
- **Employment Letter and Payslips** or;
- **Certified Income Statement** (If self-employed)
- **Land Documents** – Title OR Lease
- **Updated Property taxes**
- **Building Plans** *(Approved by your city/town council (local building authority) or by the Central Building Authority (CBA) in Belize City*
- **Bill of Quantities** *(Labor & Material Costs)*

2. **Time to Approval:** up to Four (4) weeks