

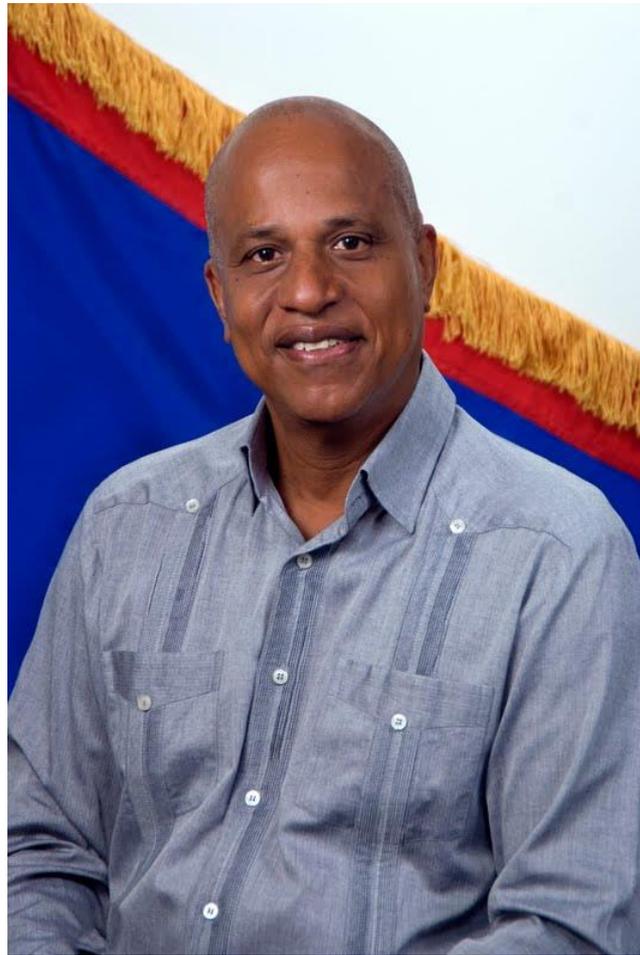


National Climate Resilience Investment Plan [NCRIP]

Government of Belize

OCTOBER 2013

Foreword



After a year of rigorous planning, and months of consultations and technical analysis, we now have a National Climate Resilience Investment Plan (NCRIP) for Belize. The preparation involved a national effort of which we are proud: the Government, private sector, NGO community and civil society all participated and can proudly take ownership of the outcome. All the consultations were very well attended and we attribute that to the understanding on the part of all involved of the importance of building our country's resilience to the anticipated impacts of climate change.

Belize expresses its gratitude to the European Union who financed the preparation of the NCRIP through the Global Facility for Disaster Reduction and Recovery (GFDRR) under the EU/ACP program and the World Bank who provided technical assistance to the preparation process. I would also like to thank Mrs. Yvonne Hyde, CEO in the Ministry of Finance and Economic Development for the stellar leadership provided throughout the process.

The NCRIP embodies a transformational process; one that seeks to fully integrate climate change adaptation, climate variability and comprehensive disaster management into national development planning processes and actions. It acknowledges the efforts made over the last decade and seeks to

build on those using knowledge and lessons learnt from the Climate Investment Funds (CIF), through its Pilot Program for Climate Resilience (PPCR) and from the pilot countries currently in the PPCR.

NCRIP charges the Ministry of Finance and Economic Development with leading this transformational effort, with strong support from technical ministries. NCRIP will help to articulate and reform the national planning framework and contribute to the pursuit of Vision 2030 and the sustainable development of Belize. Through NCRIP we will try to complete the task of more tightly integrating the budget preparation processes with the Public Sector Investment Programme (PSIP) as part of a wider planning reform.

We recognize that Belize is susceptible to weather hazard events and the impacts of climate change. We also know that we can be proactive and take action to build the resilience of the women and men, and the economy and ecosystems of Belize to those potential impacts. NCRIP is not a magic bullet; rather it charts a course of action that helps Belize to pursue its development agenda. We anticipate that the partnerships that led to the formulation of NCRIP will continue through implementation, and that the outcome will be a climate resilient Belize where the development options for its women and men are expanded multi-fold, as we strive toward Vision 2030!

Hon. Dean O. Barrow
Prime Minister of Belize
Minister of Finance and Economic Development



RESILIENCE

'the capacity to recover quickly from difficulties'

- Oxford English Dictionary



GFDRR
Global Facility for Disaster Reduction and Recovery

ACP-EU Natural Disaster Risk Reduction Program

An initiative of the African, Caribbean and Pacific Group, funded by the European Union and managed by GFDRR

Cover Images (Clockwise from Top-Right): Preparations for Independence Day Celebrations in Belmopan; A sign marking a flood-prone area in Belize City; Fishers setting-out for the day in Belize City; A family sets-out a Mangoes sale at the front of its homestead along the Western Highway; Housing along *Haulover Creek* in *Belize City*; Low bridge leading to St. Ignacio, Cayo District. All images are from 2013.

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ABOUT THE NCRIP

INTEGRATING *CLIMATE RESILIENCE* INTO DEVELOPMENT PLANNING

Led by the Ministry of Finance and Economic Development (MoFED), a series of technical sub-projects, national stakeholder consultations and workshops were conducted over several months with private and public sectors, as well as civil society and non-governmental organizations (NGOs), to develop an investment plan that addresses the impacts of climate change on social and economic development. With significant support from the Ministry of Natural Resources and Agriculture (NMRA); the Ministry of Forestry, Fisheries and Sustainable Development (MoFFSD); the Ministry of Works and Transport (MoWT); and the National Emergency Management Organization (NEMO), MoFED have embarked on a *transformational process* to integrate climate change, climate variability and disaster risk reduction considerations into national development planning by identifying and progressing strategic interventions aimed at increasing the resilience of the women and men and economy of Belize. In doing so, MoFED will build upon their remit of budgeting and fiscal management on the one hand, and development policy formulation and planning on the other.

LEARNING BY DOING: THE PPCR PROCESS AND CLIMATE RESILIENCE IN BELIZE

The NCRIP emerges from a rigorous process undertaken by the Government of Belize (GoB) that is inspired by and builds upon the PPCR methodology and south-south knowledge transfer with PPCR pilot countries. Belize now feels ready embark upon timely investments in the continuing climate resilience of its women, men, economy, ecosystems and public services. The process thus far has taken us through a significant ‘learning curve’ and we are pleased to share some of the outcomes that are transforming Belize as we chart the resilience landscape further in the coming years:

- As a country, we remain keen to build upon the PPCR approach to better direct and co-ordinate climate resilience investments. Belize is keen to build upon the PPCR approach to better co-ordinate and mainstream the climate resilience investments. While Belize is raising substantial resources in the improvement of its Public Services, a *substantial financial gap* has been identified to carry out tasks that are essential to build climate resilience in ongoing and future investment. The costs of capital works and services in the region are substantial and so the Government on one hand has to raise new resources to fill the financing gap whilst on the other hand devise ways in which costs can be reduced without compromising on quality.
- This process has catalysed a **transformational approach** in Belize, one where climate variability, climate change and disaster management need to be co-ordinated and mainstreamed into all development and fiscal planning. Ministry of Finance and Economic Development (MoFED) has the mandate for development and fiscal planning and it has lead the NCRIP process with close support from ministries responsible for climate change and disaster management and will continue to do so.
- NCRIP will be a **living document**. One that builds upon the first tranche of investments into climate resilience and thereafter may be reviewed to build upon those foundations. We recognise the value of monitoring impact and channelling resources where they will make the best possible impact and in particular for the most vulnerable women, men and economic sectors in Belize.

There will be new lessons for Belize as the Government progresses with the implementation of the NCRIP. In this the Government of Belize (GoB) will continue to find the feedback from other PPCR countries very useful, in particular in enhancing its co-ordination of a complex set of interventions. GoB is thankful to CIF for sharing lessons and showing a clear process that has been followed in the development of NCRIP thus far. Lastly, but not least, we are grateful to GFDRR/ EU-ACP supported technical assistance in developing the NCRIP and the technical sub-projects described later in this document. The technical analysis and rigour that underpins the NCRIP is reassuring in pointing the right direction.

The NCRIP (National Climate Resilience Investment Plan) identifies both physical and non-physical intervention areas that take into account current and future risks posed by existing and future climate variability. The intervention areas identified within the NCRIP will complement the portfolio of investment being implemented under the *Public Service Investment Programme* (PSIP)¹ to strengthen infrastructure, social protection, economic services and public administration services. The PSIP also reports on projects and financing from multi-lateral sources including loans and grants from MDBs and Development Partners working with the Government of Belize². The intervention areas have been identified with a view to lay the foundations for further more complex resilience measures to be undertaken in future and compliment any ongoing projects listed within the PSIP as well as in the private and NGO sector. A Multi-Criteria evaluation (MCE) was used to prioritize critical infrastructure investments, specifically in the transportation sector, that takes into account the most important criteria, including social and environmental impacts, to identify key investments. The NCRIP is expected to be integrated by the Government of Belize into its medium-term development strategy (MTDS 2014-2017), and is congruent with the Vision 2030 for the country.

In early November 2013, the GoB is presenting the NCRIP to the Pilot Program for Climate Resilience (PPCR) Sub-committee meeting in Washington D.C. The feedback from this meeting will assist Belize with strengthening its approach along the lines used by PPCR pilot countries and steering the continued enhancement of the NCRIP programme. The GoB is receiving technical assistance to develop the NCRIP from the World Bank and financial support from the European Union in the framework of the Africa, Caribbean and Pacific – European Union (ACP-EU) Natural Disaster Risk Reduction Program, managed by the Global Facility for Disaster Reduction and Recovery (GFDRR).

NATIONAL FOCAL AGENCY AND CONTACT POINT

The National Focal Agency for overseeing the development and implementation of the NCRIP is the Belize Ministry of Finance and Economic Development (MoFED). The Contact Point is:

Ms Yvonne Hyde

Chief Executive Officer

Ministry of Finance and Economic Development,

Belmopan,

BELIZE



¹ <http://www.belize.gov.bz/index.php/useful-links/publications/finish/26-ministry-of-finance/138-public-service-investment-report>

² Including CCCCC, CABEL, CDB, EU, IADB, UNDP, WB.

Acronyms

ACP	African Caribbean and Pacific
AMO	Atlantic Multi-decadal Oscillation
BBB	Belize Business Bureau
BCCI	Belize Chamber of Commerce and Industry
BBR	Belize Barrier Reef
BEST	Belize Enterprise for Sustainable Development
CABEI	Central American Bank for Economic Integration
CARICOM	Caribbean Community
CBA	Cost Benefit Analysis
CBA	Central Building Authority
CCCCC (5Cs)	Caribbean Community Climate Change Centre
CDB	Caribbean Development Bank
CDM	Comprehensive Disaster Management
CEO	Chief Executive Officer
CFE	The Federal Electricity Commission of Mexico
CIF	Climate Investment Funds
CZMAI	Coastal Zone Management Authority and Institute
DFID	UK Department for International Development
DRM	Disaster Risk Management
ENSO	El Niño Southern Oscillation
GCM	Global Circulation Model / Global Climate Model
GDP	Gross Domestic Product
GFDRR	Global Facility for Disaster Reduction and Recovery
ECLAC	Economic Commission for Latin America and the Caribbean
EDC	Economic Development Council
EOC	Emergency Operation Centre
EU	European Union
GDP	Gross Domestic Product
GHG	Green House Gas
GIS	Geographic Information System
GoB	Government of Belize
HIV	Human Immunodeficiency Virus
IADB/IDB	Inter-American Development Bank
IPCC	Inter-governmental Panel for Climate Change
LIC	Land Information Centre, Ministry of Natural Resources and Agriculture
MCE	Multi-Criteria Analysis
MCE	Multi-Criteria Evaluation
MDB	Multilateral Development Bank
MHDST	Ministry of Human Development and Social Transformation
MoFED	Ministry of Finance and Economic Development
NAD 27	North American Datum of 1927
NCCO	National Climate Change Office

NCRIP	National Climate Resilient Investment Plan
NEMO	National Emergency Management Organization
NMS	National Meteorological Service
NRI	Natural Resource Institute of the United Kingdom
NSDI	National Spatial Data Infrastructure
PPCR	Pilot Program for Climate Resilience
PRECIS	Providing Regional Climates for Impacts Studies
PSIP	Public Service Investment Programme
SPCR	Strategic Programme for climate Resilience
RCM	Regional Climate Model
RH	Relative Humidity
SIB	Statistical Institute of Belize
SICA	Central American Integration System
SST	Sea Surface Temperature
TRDP	Toledo Research and Development Project
USD	United States Dollar
UWI	University of the West Indies
WB	World Bank

NATIONAL CLIMATE RESILIENCE INVESTMENT PLAN (NCRIP)

1 Country/ Region	Belize/ Latin America & Caribbean
2 Financing requirement	Estimated 112.5 million USD
3 National Implementing agency	Ministry of Finance and Economic Development (MoFED)
4 National contact point	Ms Yvonne Hyde, CEO, MOFED
5 Involved MDB(s) & Development Partners	CDB EU IDB World Bank
6 MDB(s) focal point and project/ program task leader	World Bank: Yoonhee Kim/ Justin Locke IDB: Gerard P Alleng

7 Rationale of NCRIP

i) Climate change projections and climate vulnerability in Belize

- Climate change impacts specific to Belize are forecast as warmer temperatures, increased drought risk, increased flood risk (intense rainfall and storm surge), increased storm risk (more intense rains and stronger winds), higher sea levels.
- The economy is small and main sectors of Belize economy are highly reliant on natural resources and sensitive to climate change: tourism, agriculture, utilities/ services.
- In Belize poverty reduction remains a major challenge and population and major economic zones are in highly vulnerable locations.
- Critical infrastructure (bridges, roads, drainage, public buildings) is unable to cope with weather impacts and variability. Requires substantial investments towards weather resilience.
- Development assistance is having a limited benefit due to high costs, low capacity and limited application of planning tools for a climate conscious development.
- Disaster risk management analysis and actions have not yet incorporated gender dimensions.

ii) Technical work underpinning NCRIP: NCRIP has developed from extensive national consultation in line with sector strategies and a package of technical sub-projects. The technical sub-projects toolkit comprises of a quantitative and participatory multi-criteria evaluation (MCE) process involving technical officers and CEOs from all government ministries and other participants from the private sector and civil society. The MCE also draws upon a strong baseline study of geo-spatially mapped infrastructure surveys, hazard conditions and related socio-economic data. These are complemented by a set of projects in the areas of training and capacity building for improved disaster risk management (DRM), land use planning, GIS infrastructure development and data sharing platform/open source data management.

iii) Expected development outcomes:

- Integrate climate change, climate variability and disaster management into development planning
- Reduced cost of operations and increased capacity in public and private sector.
- Resilience to weather impacts for key sectors in Belize economy.
- Institutional leadership and collaboration on climate change.
- Critical infrastructure strengthened and reduces vulnerability of poor/remote communities from weather impacts.

- Increased awareness and preparedness to climate changes amongst population and economic sectors.
- Gender specific climate related planning, in data collection, policy-making, physical and non-physical investments.

8. Project and program concepts under the NCRIP

Investment components and rationale Climate resilience interventions in Belize will be applied under various sectors and habitats. For simplicity these have been clustered and described under five components (below). The EU-ACP/GFDRR supported technical sub-projects used a Multi-Criteria Evaluation Process alongside improved spatial hazard/ exposure data to inform decision-making and prioritise ‘critical assets’ that are in poor condition and at risk from weather impacts. This process also informed any capacity gaps to be filled. The components and interventions areas are:

(1) Technical Data and knowledge transfer: Interventions related to improved hydro-meteorological, topographical and bathymetric information as well as statistical/ spatial data on weather to improve evidence based decision-making when prioritising investments and developing detailed sub-projects. This data will be added to the National Spatial Data Infrastructure (NSDI)

(2) Physical infrastructure: Interventions related to exemplar improvements in critical assets and asset management (Drainage, roads, public buildings) prioritised using Multi-Criteria Evaluation and GIS analysis; land-use and infrastructure plan; feasibility studies for coastal logistics: ports and coastal air-strips; options assessment for reliable and affordable electricity and water; enhancing capacity for built-environment modelling, specification and quality control; improved health infrastructure in districts; options assessment for prevention of coastal erosion.

(3) Non-physical: Interventions are in highly weather sensitive area of the economy – improving agricultural and forestry practices; diversifying income for fisher households; mainstreaming climate resilience into transport and tourism master plans; enhancing emergency preparedness capacity.

(4) Policy and Regulatory: Interventions related to providing an enabling environment such as green building measures for water and energy efficiency; marine regulation and multi-criteria evaluation based decision-making in selection of projects within the Government’s Public Service Investment Project (PSIP).

(5) Co-ordination, monitoring and evaluation: This component is necessary for the delivery of the NCRIP itself dealing with the co-ordination, management, monitoring and evaluation tasks over the duration of its implementation.

Gender issues will be given key consideration in the elaboration and implementation of the NCRIP - it will be especially vital to incorporate the following in the design and thinking on interventions:

- Responsibilities, activities, interests and priorities of women and men, and how their experience of problems may reflect in the design and implementation of interventions.
- Define “families”, “households”, “culture” or “people” in line with the Belize context in the way the interventions are formulated.
- Collect gender-disaggregated data or information to allow the experiences and situation of both women and men to be highlighted.
- Seek the inputs and views of women as well as men about decisions [There are often significant differences between different members of the household according to their specific roles and priorities. For example, in

a post-disaster situation men/women may place immediate priority on clean water and shelter while men/women may prioritize the re-establishment of economic activities. This is not to say that one priority should be privileged over another, but that both perspectives should be acknowledged in order to adequately inform policy and ensure its relevance to different members of Belizean society.]

-Proactively ensure women and men are informed in a culturally appropriate way of project activities in order to heighten their chances of meaningfully participating in them

-In any policy options and decision-making, identify means of ensuring directions that support an equitable distribution of benefits and opportunities. Ensure perspectives of both men and women are taken into account whilst prioritising investments and planning projects.

9. Expected key results from the implementation of the investment strategy

R1: Increased resilience of women and men, economy and environment in Belize to climate variability and climate change.

R2: Adaptation to climate change, and climate variability, and comprehensive disaster risk management are integrated into development planning.

R3: The relevant agencies are collecting, analysing, and disseminating data and information to support smart decisions that increase the resilience of the women and men and economy of Belize to the vagaries of climate change, climate variability and weather related hazards.

R4: Belize's critical infrastructure assets (roads, airports, sea ports, coastal defences, and building/facilities) are withstanding the impacts of climate change, climate variability and natural hazards, by continuing to operate and serve their designed purpose.

R5: Livelihood activities, markets and value chains are resilient to the impacts of natural hazards

R6: Building resilience to the effects of climate change, climate variability and weather related hazards, and implementation of comprehensive disaster risk management, are fully integrated into national development planning and action, along with poverty reduction, in the pursuit of sustainable development of the women and men and economy and the environment of Belize.

10. Investment Plan

The Belize Public Service Investment Programme (PSIP) 2013 reports 120+ development projects in progress totalling 348 million USD that are improving infrastructure, social protection, economic services, and public administrative services. These include loans and development assistance grants to the Government of Belize from MDBs and Development Partners including but not limited to CCCCC, CABEL, CDB, EU, IADB, and WB. The NCRIP team reviewed ongoing investments within PSIP and also took into account any forthcoming (pipeline) investments (loans or grants being approved to improve infrastructure, social protection, economic services or administrative services) and identified an additional requirement of 112.5 m USD to build climate resilience within the five intervention areas identified above. This financing will complement (not duplicate) and co-ordinate ongoing efforts in Disaster Management/ Climate Change adaptation or mitigation, lay the foundation for climate resilience to be mainstreamed within development planning and national budgeting, and for complex climate resilience projects to be undertaken in the future, for instance, including but not limited to all-weather infrastructure, spatial planning, robustness of key economic sectors and risk financing and insurance.

Consultative steps in estimating financing requirement for NCRIP:

- Invited interventions from stakeholders at national workshops and other consultations. One to one technical discussions on critical gaps in ongoing programmes w.r.t. utilities, logistics, economic sectors. Consider

critical activities that have multiple benefits.

- Referred to PSIP (A), PSIP pipeline (B) and additional consultation (C) with MDBs, Private Sector, Development Partners to capture other ongoing/ planned investment and rule out duplication.
- Finalised list and scope of NCRIP resilience interventions with a view to fill gaps, develop exemplar practice, enhance collaboration and derive efficiencies from ongoing investments.
- Estimated Cost list of NCRIP interventions (D): Review and refine initial costing received from stakeholders to include both time (operational and technical) and materials.

Component	Financing committed in PSIP (and PSIP pipe-line) [A-B] (USDm)	Relevant financing from other sources [C] (USDm)	Gap- Financing required under NCRIP [D] (USDm - years)
1 Technical Data and Knowledge Transfer	0.6 m	0.4	8.6 m (up to 5 yrs)
2 Physical interventions	304.4 m	29.3	94.4 m (over 10 yrs) ³
3 Non-physical interventions	64.3	0.5	4.5 m (over 5 yrs)
4 Regulatory and Policy	6.8 m		2.5 m (over 3 yrs)
5 NCRIP Co-ordination, monitoring and evaluation	-	1.9	2.5 m (over 10 yrs)
TOTAL	376.1 m	32.1 m	112.5 m (10 yrs)

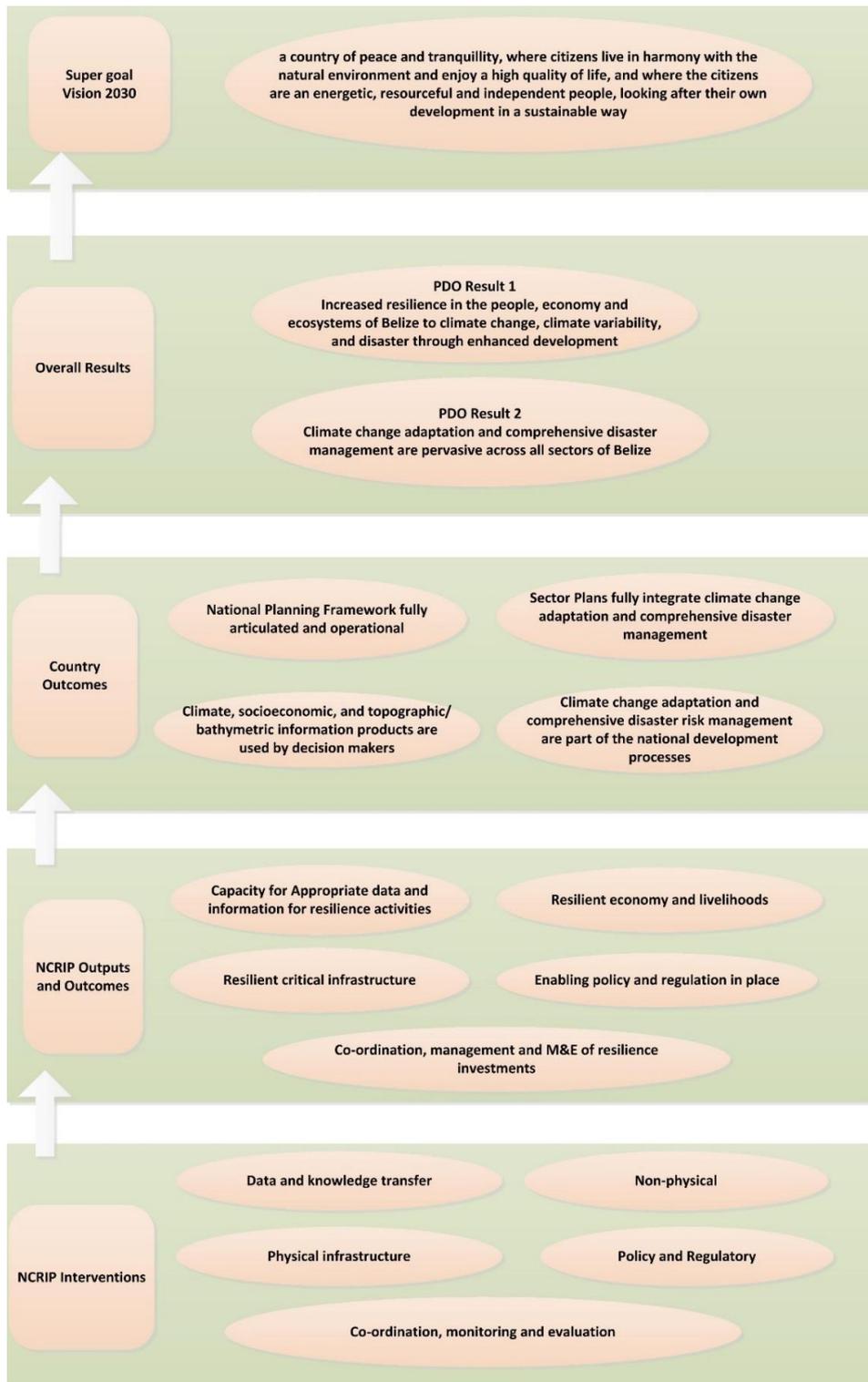
11. Time-frame: 1-10 years implementation from approval date.

12. Key national stakeholders involved in NCRIP:

-Ministry of Finance and Economic Development; Office of the Prime Minister; Ministry of Trade, Investment Promotion, Private Sector Development and Consumer Protection; Ministry of Fisheries, Forestry and Sustainable Development; Ministry of Works and Transport; Ministry of Tourism and Culture; Ministry of Energy, science, technology and public utilities; Ministry of Natural Resources and Agriculture; Ministry of Health; Ministry of National Security; Ministry of Education, youth and sports; Ministry of Public services, elections and boundaries; Ministry of Labour, local government, rural development, NEMO, immigration and nationality; Ministry of human development, social transformation and poverty alleviation; Ministry of housing and urban development; Ministry of Foreign Affairs; Belize Water Services; Belize Electricity Limited; Belize Meteorological Office; Belize Ports Authority; Belize Audubon Society; Belize Chamber of Commerce; NGOs; Belize Red Cross; University of Belize.

13 Other partners involved in NCRIP: CCCCC – Caribbean Community Climate Change Centre, UNDP - United Nations Development Program, UWI - University of the West Indies, DFID

³ Actual requirements are much greater. This indicates the most critical and priority requirements in this area to lay the foundations for future, more complex work.



Logical Framework (Above) Diagram showing the process from NCRIP interventions to Development Outcomes, making Belize Climate Resilient and meeting the development goals set out in its Vision 2030. This effort is considered transformative because it will mainstream the discussion about climate resilience into the national planning framework.

PART A: BACKGROUND

A001_Introduction

The purpose of this section is to provide general background information about Belize. It discusses the general location of Belize, its population, and its economy.

THE PHYSIOGRAPHY

Belize, formerly British Honduras, has long been described as the *heart-beat* of the Caribbean in Central America. This is a testament of Belize being both Central American and Caribbean. Belize is bordered by Mexico in the North, Guatemala on the West and South and the Caribbean Sea on its East. Belize has a very long coastline relative to the width of the country, estimated at nearly 400 Kilometres. The Northern half of the country is mainly flat and comprises the Northern and Central Coastal Plains. The Coastal Plain in the South is much narrower rising very quickly into the southern foothills of the Maya Mountains. [Figure 1]

Figure 1: The Physiography, Boundaries and main towns of Belize



Belize has a barrier reef which runs along the entire coast. It is the longest barrier reef in the Western Hemisphere and the second longest in the world. To the east of the barrier reef are three globally significant atolls. At the Northern end of the country the reef practically starts on the shores of Ambergris Caye moving further away from the mainland. Flying south, one can see the reef as an unbroken chain of white surf running along the whole length of the country; from Ambergris Caye to the Ranguana and Sapodilla Cayes. The Belize Barrier Reef is an important tourist attraction, and a natural protection for Belize's coastline.

POPULATION

Belize has a very small population, estimated at 310,000 based on the 2010 census. Of these, about 51% are rural dwellers and 49% live in the towns and cities (SIB 2013). About 70% of the population lives on the coast, on cayes, and along major rivers. While small, the Belizean population is very diverse. There are more than 10 ethnic groups within the Belizean population. The largest of these are the *Mestizos* who make up about 51%. The next four largest groups are the *Creoles, Maya, Garifuna and Mennonites*. Other ethnic groups include *East Indians, Chinese, Caucasians, and Lebanese* among others. The country's population is almost equally divided between men and women.

Table 1 shows the urban and rural population of the six districts based on the 2000 and 2010 censuses. The 2010 census shows Belize having a total population of about 310,000 people, and a population density of about 14 people per km², or 36 people per square mile; an increase of about 3 people per km² or 8 people per square mile. The most populated is Belize District followed by the Cayo district. The district with the lowest population is Toledo. It is also the district with the highest proportion of people below the poverty line.

Table 1: Population Distribution in 2000 and in 2010 [See Figure 1 for District Locations]

Source: Statistical Institute of Belize: Major Findings for 2000 and 2010

District	2000			2010		
	Urban	Rural	TOTAL	Urban	Rural	TOTAL
Corozal	7,888	16,003	32,708	9,901	30,453	40,354
Orange Walk	13,483	25,407	22,870	13,400	32,019	45,419
Belize	53,549	14,648	68,197	65,042	24,205	89,247
Cayo	26,086	26,478	52,564	36,152	36,747	72,899
Stann Creek	8,814	15,734	24,548	9,096	23,070	32,166
Toledo	4,329	18,968	23,297	5,205	25,333	30,538
TOTAL	114,149	117,238	224,184	138,796	171,827	310,614

Average household size varies from 3 to 5 persons per household. All districts had an average of four persons per household with the exception of the Belize District whose average is three, and the Toledo District, whose average is five persons per household. [See Figure 1 for District Locations]

In every district, the number of male headed households outnumbers the female-headed households. The highest proportion of female-headed households was in the Belize District where almost 40% of all households were headed by women. In almost all other districts the female headed households make up less than 20% of all households in the district.

In terms of education, about 88,000 persons were enrolled in school at the 2010 Census; 63,700 at the primary level, 17,200 secondary and 7,400 tertiary. Boys slightly outnumbered girls at the primary education level. Women outnumber men by a ratio of two to one at the university level. In terms of highest level of education completed, women outnumber men from secondary to university level.

The age structure of the population has changed since 1980. The most dramatic change has been the decrease in the proportion of children aged less than 15 years, from more than 40% in 2000 to 34%. Although there has been little change in the 15-44 years age groups, the proportion of over-45s has increased from 14% to 21% of the population. Furthermore, the elderly (defined as over 60 in Belize) now constitute over 8% of the population, compared with less than 6% in 2000. The population is thus ageing, as is corroborated by the increase in the mean age of the population from 22 years to 27 years while the median moved from 19.1 to 21 years.

Table 2 shows the population in the urban centres in 2000 and 2010 as documented in the respective census.

Table 2: Population of the Towns and Cities in Belize, 2000 and 2010⁴

Source: Statistical Institute of Belize

District	Urban Centres	Urban Centre Population	
		2000	2010
Corozal District	Corozal Town	7,888	9,901
Orange Walk District	Orange Walk Town	13,483	13,400
Belize District	Belize City	49,050	53,532
	San Pedro	4,499	11,510
Cayo District	Belmopan	8,130	13,351
	San Ignacio and Santa Elena	13,260	16,977
	Benque Viejo del Carmen	5,088	5,824
Stann Creek District	Dangriga	8,814	9,096
Toledo District	Punta Gorda	4,329	5,205

The Belize District, which includes Belize City, is the most populated of the six districts. It has the largest urban population, but a lower rural population than most of the other districts. The only district with a lower rural population than the Belize District at the 2010 Census was the Stann Creek District. At the 2000 Census Belize District had the lowest rural population of all six districts. Toledo District has the smallest urban population. Of the nine urban centers five are on the coast while four are inland. The coastal urban centers are Corozal Town, Belize City, San Pedro, Dangriga and Punta Gorda. Together, they make up more than 92,000 of the almost 142,000 urban residents. The inland towns and city which are home to just under 50,000 urban residents also show some vulnerability since they lie on or near the banks of major rivers.

⁴ Source: Statistical Institute of Belize: Major Findings for 2000 and 2010

LABOUR FORCE

At the Labour Force Survey of April 2012 the labour force stood at an estimated 148,100. Of these, 126,700 were employed, giving a national unemployment rate of 14.4%. *Table 3* shows the national unemployment rate and the rate for selected groups in the country. The District with the highest unemployment rate was Cayo, and the one with the lowest was the Belize District. The unemployment rates for the other districts are as follows: **14.5%** Corozal, **12.6%** Orange Walk, **15.3%** Stann Creek, and **13.9%** Toledo.

Table 3: Unemployment rate for Selected Groups April 2012

Source: Statistical Institute of Belize

Unemployment Rate	Percentage
National	14.40%
Cayo District (high)	18.20%
Belize District (low)	12.10%
Urban	14.90%
Rural	14.00%
Men	9.10%
Women	22.30%
Maya (high)	18.60%
Mestizo (low)	13.60%

As can be seen from Table 3, there is a small difference in unemployment rate between the urban and rural population. However, there is a marked difference between the rates for men and women; 9.10% for men, and 22.30% for women.

One of the challenges that Belize faces is that even though girls/women make up 50% of the population they are under-represented in the labor force, and they have a much higher unemployment rate. Men outnumber women in the overall labour force and in each district. The lowest female participation rate is in the Toledo District.

Table 4 shows the male and female participation rate in the labour force while Figure 2 shows participation rate at both the national and district levels. There is a disparity in participation rates across the country with the smallest disparity being in the Belize District. NCRIP will need to identify ways to support the creation of good quality jobs for women and men alike.

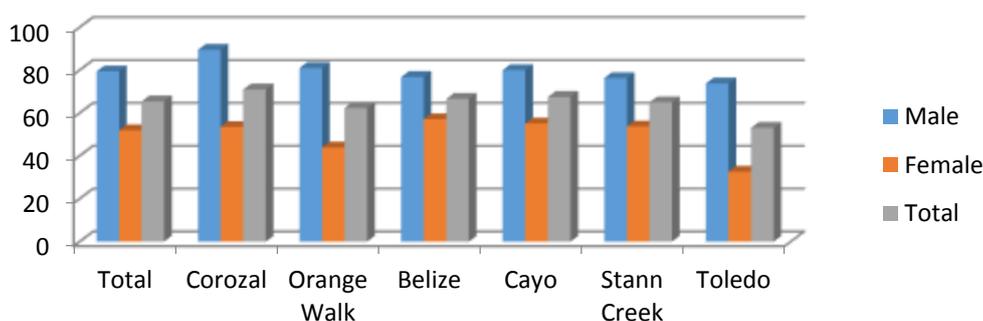
Table 4: Male and female population and labour force statistics

Source: Statistical Institute of Belize

	Male (%)	Female (%)
Proportion of the population	50%	50%
Proportion of the labor force	59.4	40.6
Unemployment Rate	11.9%	22.4%

Figure 2: Labour Force Participation Rate by Sex and District

Source: SIB Labour Force Survey 2012



This is something that the country needs to address, since women have a higher participation rate in educational programs than men. Table 5 presents statistics of school enrolment for men and women.

Table 5: Education participation rates in primary, secondary and tertiary education programs

Source: Statistical Institute of Belize

	Male (%)	Female (%)
Primary Education Participation Rate	97	97
Secondary Education Participation Rate	62	68
Tertiary Education Participation Rate	8	15

From an ethnic perspective, the Maya have an unemployment rate of 18.6%, which is slightly higher than the rates of the Garinagu (17.4%) and the Creole (16.2%). However, while the Mestizo recorded the lowest unemployment rate (13.6%) among the five major ethnic groups, they accounted for almost one-half (49.0%) of the unemployed population. The high unemployment rate, particularly for women, will need to be reduced as part of the resilience building efforts and to make progress toward the 2030 vision.

The Belize labour force has low formal education with almost three quarters having a primary or less education (no education 45.9% and primary education 28.8%). Using the criterion that a person 14 years or older with a standard 5 or better education is literate, at least 45.9% of the labour force is not literate.

About 20% of the employed persons are youth 14 to 24 years old. Employed men in this age group outnumbered employed women of the same age group two to one (17,868 men and 9,171 women). The majority of the employed persons (67.9%) are 25 to 54 years old. The majority of the employed women are in the 25 to 44 age group. Understanding the dynamics of the labour force is essential to building long term resilience among the people (men and women) and within the economy.

THE ECONOMY

Ecologically, Belize is remarkably diverse with substantial natural capital along its coast, represented by the largest coral reef and associated ecosystem in the Americas, as well as significant areas of mangroves, tropical forest and inland wetlands (World Bank, 2011). It has a small, highly open, natural resource and services-based, export economy, currently dependent on petroleum, agriculture and tourism services and overburdened with external debt. The state or public sector in Belize represents about one third of the economy while the private sector accounts for two-thirds (Metzgen 2012 Pg.5).

The economy of Belize is highly sensitive to weather. Tourism, agricultural production, and even oil extraction are all natural resource based and sensitive to the vagaries of weather, climate change and climate variability. In 2010, Belize's agricultural, petroleum, and tourism exports registered 36 percent of GDP and 60 percent of exports of goods and services. Although Belize has the second highest per capita income in Central America, the average income figure masks a huge income disparity between rich and poor. The 2010 Poverty Assessment shows that more than 4 out of 10 people live in poverty. The sizable trade deficit and heavy foreign debt burden continue to be major concerns (Index Mundi 2012).

Two basic factors shape investment and the approaches to development in Belize. First is the small population. Belize has the lowest population density and the smallest population in Central America. The second basic factor is that it is land abundant and has always had a comparative advantage based on natural resource exploitation.

The economy is small. Belize's GDP (purchasing power parity) was recorded at \$2.534 billion Belize Dollars in 2009, slightly lower than the 2008 level of \$2.572 billion. Belize's per capita GDP was Belize Dollars, \$8,200 in 2009. The size of the domestic market both in terms of per capita income and total population, limits the potential economies of scale and the level of diversification of production of goods and services.

Belize's economy depends strongly on world trade, both as a market for its domestic produce and as a source of the wide range of products that would be costly or impossible to produce domestically. Any strategy to promote private sector development has to recognize that growth in Belize will continue to be export-led (Roland, Durante, and Martin, 2010 p 5), so production for export is a requirement for new private sector investments if they are to contribute to growth.

In light of Belize's natural endowments and small population, labor and capital are relatively scarce and expensive. The cost of capital and labor, the small size of the domestic market, limited economies of scale, and lack of industrial tradition have ensured that the manufacturing sector is limited to agricultural processing and basic import substitution activities.

The economy is primarily agro-based, as Belize's exports are dominated by agricultural products, with sugar, citrus and bananas being the highlight of the export segment for a long time, particularly when preferential markets made those commodities relatively competitive (ibid p. 5). Table 6 below shows the principal exports between 2006 and 2010. Crude oil has become increasingly important since 2006, but unless there are new finds in the near future its contribution to exports will begin to decline.

Table 6: Major Domestic Exports 2006 to 2010 (Million Belize dollars)

Source: Statistical Institute of Belize

r = Revised; p = Provisional

Domestic Exports (Mn. BZ\$)	2006	2007	2008^r	2009^p	2010^p
Sugar	100.1	88.1	71.4	89.1	58.7
Bananas	50.6	41.5	65.7	66.7	80.1
Citrus Concentrate	109	117.4	112.6	98.8	82.2
Marine Products	86	42.2	44.3	49.4	60.7
Papayas	31	26.1	22.4	21.8	25.9
Crude Oil	88.6	142.6	230.9	120.6	201.3

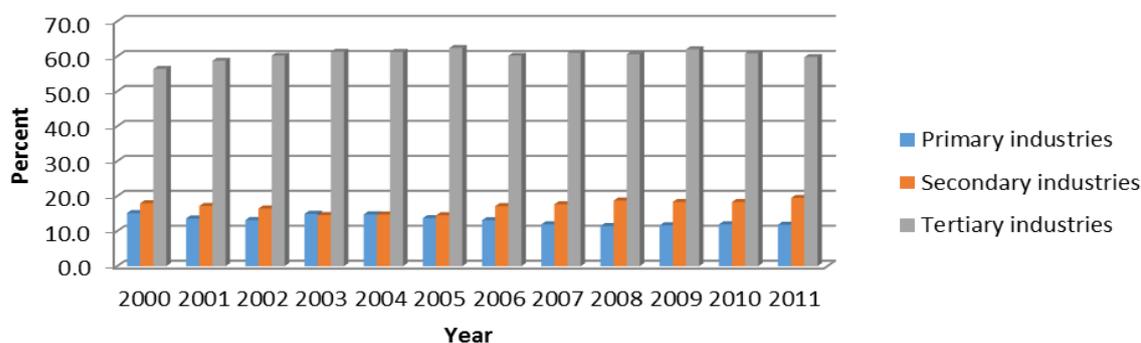
At the beginning of the nineties the contribution of agricultural commodities to GDP was about 15%. At the time, preferential markets for sugar, banana, and citrus were secure. Over the years the preferential status has declined and in the late 2000 agriculture's contribution to GDP was in the region of 9%.

In the last twenty years tourism, (marine and terrestrial), has become an increasingly important foreign exchange earner. At present, tourism contributes more to foreign exchange than Belize's trade. In 2011 Tourism contributed just over 30% to GDP. Notwithstanding its significant contribution to GDP, tourism remains vulnerable to the vagaries of the global economies, and to the impacts of natural hazard events and extreme weather events, (World Bank 2011), particularly flooding and hurricanes, just like agriculture. This is because most of Belize's tourism products are natural resource based; ecotourism and soft adventure.

The services sector (mainly Tourism) grew in importance during the 1990s and has been by far the largest contributor to GDP. As shown in Figure 3, the primary sector's contributions to GDP from 2000 to 2011 has been less than 20% over the period while the service sector has been over 50%. Nonetheless, the agricultural sector remains important, since it accounts for around 10 percent of GDP and over 50 percent of total exports as well as vital for the food security within Belize.

Figure 3: Sector Contribution to GDP 2000 - 2011 (Percentage Contribution)

Source: Statistical Institute of Belize



Since 2007 petroleum exports has bolstered the economy. One exploration company has been successful so far in finding oil in Spanish Lookout and near Belmopan. Both fields are in the Cayo District. However, unless there are new finds soon, production has peaked and export volumes are beginning to decline.

Belize's natural resources are critical to the health of the economy and the well-being of its women and men, since Belize's growth prospect and main economic activities, including tourism, agriculture, and fishing, is strongly linked to the country's environment and natural resource base, the source of the country's key inherent comparative advantages. In particular, the barrier reef provides critical economic and environmental services (fisheries, tourism, and coastal protection), is habitat for many unique species, is possibly an important carbon sink, and contains a large genetic resources pool. The same can be said for the ancient Mayan temples, the pristine forests, and the expansive cave networks. At the same time, the poorest women /men and communities in Belize are predominantly rural and their livelihoods depend largely on access to land and natural resources. It is therefore important to support effective and improved management of the environment and natural resources for sustainable livelihoods and economic growth in Belize, that bring benefits to men and women, and that enable the development of boys and girls. The government will need to consciously find ways to protect the environment while providing opportunities for livelihood activities that take into consideration the livelihood systems of the rural communities. The economy needs to be grown in a way that the menu of livelihood options that are sustainable and lead to a good quality of life for Belizeans expands. Good livelihood options will help to make families more robust and resilient to the vagaries of weather impacts and other shocks.

Belize's developmental challenges are rooted in its high vulnerability to external shocks including terms of trade, natural hazard events and impacts of climate change (World Bank 2011). The country's natural resource base, which holds the key to its developmental prospects in terms of sustainable growth and poverty reduction, is particularly vulnerable to these shocks, and faces additional pressures from unsustainable development practices (Rogers 2010). The country was affected by multiple exogenous shocks including severe flooding in 2008, and food and oil price increases, the global financial crisis, and Hurricane Richard in October 2010. These shocks manifested themselves in an economic slowdown with negative impacts on

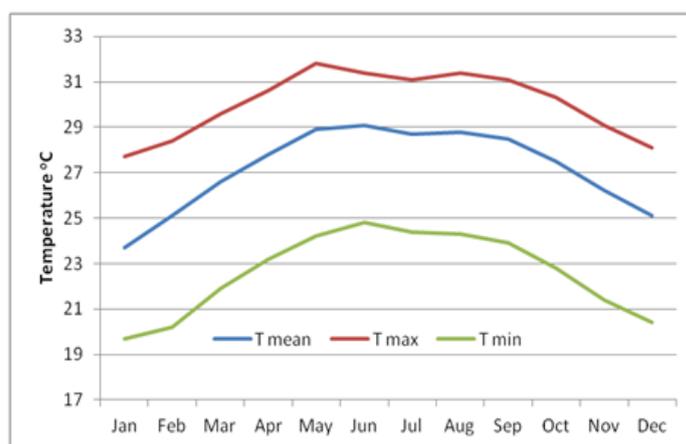
growth and employment, and a resulting dramatic increase in poverty levels (41 percent estimated by the National poverty Assessment); and a surge in crime and violence (World Bank 2011). Furthermore the country's size and low population density pose significant challenges for the provision of infrastructure necessary to underpin economic activity in areas such as tourism and agriculture, and services to support human capital development (p. 79 Alonzo, 2010). The government's ability to confront these challenges is limited due to fiscal constraints, owing to a high debt burden, accumulated during the 2000s (World Bank 2011). The lack of economies of scale increasing the per capita cost of infrastructure exacerbates the situation (Alonzo 2010).

CLIMATE PROFILE

Though Belize lies in the tropical to subtropical belt its climate is classified as being tropical to extra-tropical. This is attributable to the intrusion of cooler continental air from the north during northern hemispheric winter months. Temperature and rainfall variations primarily define the climate profile of the country.

Figure 4: Temperature climatology Philip S. W. Goldson International Airport, Belize. 32 year base period.

Source: Belize National Meteorological Service.



TEMPERATURES

The mean annual variation of temperature is plotted for the airport station in Figure 4. The plot captures the general pattern for the country i.e. with coolest temperatures occurring between December and February and warmest temperatures occurring between May through September. Temperatures peak in May/June and there is a mean annual range of 6-7 degrees between coolest and warmest month.

There is some spatial variation of temperatures across the country, with the proximity to the coast and elevation primarily accounting for differences seen. For example, mean temperatures range from 16/17°C (December-February) to 24/25°C (March-September) in the South where the highland plateaus such as Mountain Pine Ridge dominate the inland landscape; and from 23-26°C (December through February) to 28-31°C (March through September) in the flatter North. Temperatures are also slightly higher inland than on the coast where sea breezes moderate, except for the southern highland plateaus which are noticeably cooler year round.

RAINFALL

Belize has distinct wet and dry seasons. Approximately 60% of the annual rainfall occurs in the rainy season which has its onset in the south in mid-May and in the north by mid-June.⁵ Rainfall during the wet season primarily results from the convective activity associated with easterly waves or their derivatives (tropical depressions, storms and hurricanes) which track westward through the warm Caribbean Sea from June through November. The southward incursion of North American frontal systems also brings rain in October and throughout the early months of the dry season. The dry season begins in November and lasts through April/May with the driest month being April.

There is significant spatial variability in rainfall amounts (Figure 5). Whereas northern Belize receives on average about 60 inches of rainfall annually, rainfall rises to 150 inches in the south mainly due to the orographic effect of warm moist tropical air moving in from the east and rising over the Maya Mountains. The wet season in the south has only one maximum in July while central and north regions exhibit primary and secondary maxima in June and September with an intervening drier period in August known as the “Mauga” season.

Tropical storms and hurricanes also impact Belize mainly during September and October, though impact in other hurricane season months is possible. The annual mean humidity of Belize is 81.1%.

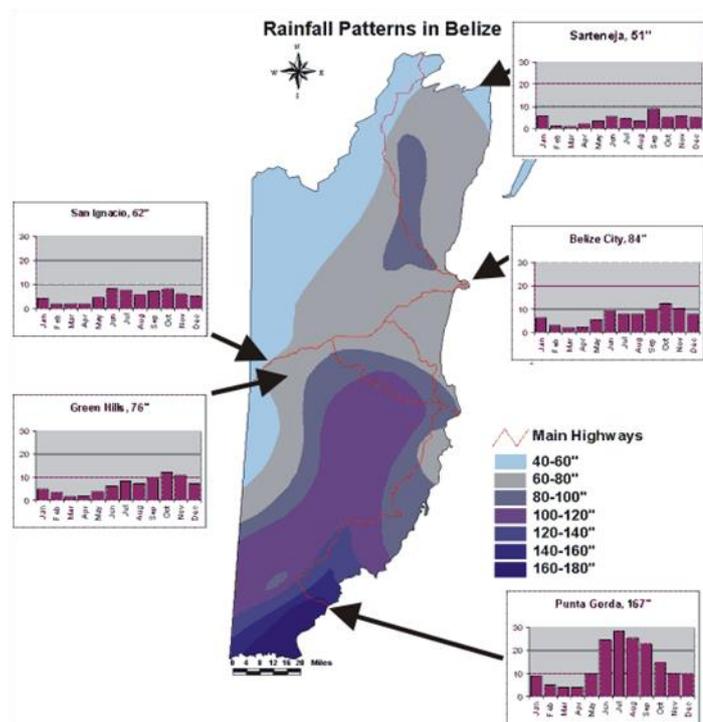


Figure 5: Rainfall patterns for Belize. Adapted from Goldson (1973). Source: biological-diversity.info.

⁵ National Meteorological Service

A002_Climate Risk and Vulnerability

The United Nations Framework Convention on Climate Change (UNFCCC) recognizes Belize as one of the most vulnerable countries to the adverse impacts of climate change due to its geographical and meteorological predisposition.

Most of Belize's coastline is at or near sea level and more than 50% of the country's population and most of the business centres are sited on or near the coast. Belize City, the largest population centre in the country is on the coast at sea level and between two major rivers - The Belize River and the Sibun River. The city is highly susceptible to flood risk from Atlantic hurricanes and from intense rainfall events which cause the rivers to break their banks.

The Belizean economy is highly sensitive to climate variability due to its dependence on natural resources. Tourism, agricultural production and export, and oil extraction are important pillars in Belize's economy which are natural resource based. Between 2008 and present, the country suffered losses in the agricultural and tourism sectors, sustained major impacts on the road networks, and had entire communities displaced for weeks at a time due to climatic events.

Belize also possesses fragile but globally important ecosystems e.g. the second-longest barrier reef in the world and 7,276 km² of forest cover, which are very susceptible to natural disasters and climate changes (Ramirez et al. 2013). The biodiversity of tropical regions are among the most vulnerable to climate shifts as would occur under climate change (Mora et al. 2013).

Box 1 – Belize's Climate-Sensitive Economy

In speaking about weather effects and the economy, the Prime Minister, Hon. Dean Barrow, in the 2013-2014 budget speech notes:

'The surge in domestic electricity generation that occurred over the first half of 2012 could not be sustained. A lack of rainfall in the catchment areas of the hydroelectric plants arrested production during the second half of the year and resulted in an overall reduction of 15.8% in domestic electricity generation in 2012.....In the primary sector, the rehabilitation of storm-damaged acreages and favourable agronomic conditions helped banana production to increase by 39.9%, while citrus also recovered from weather-related damages to post a 14.3% increase in deliveries....'

The existing circumstance of Belize is such that climate change presents a significant challenge. The overall effect of climate change will ultimately depend on the balance of the effects of both climatic variables and non-climatic drivers. Building a resilient Belize is contingent on understanding how its climate has and will continue to be altered, the threats posed by the changing climate (new or exacerbated hazards), and knowledge of what is most vulnerable.

CLIMATE CHANGE AND BELIZE: HISTORICAL TRENDS AND FUTURE PROJECTIONS

The climate of Belize has changed in the recent past and is projected to continue to change through the end of the current century.

TEMPERATURES

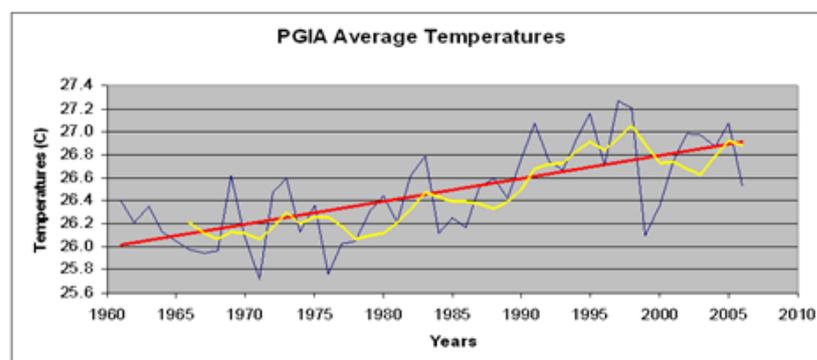
Global mean surface temperatures have increased by $0.85\text{ }^{\circ}\text{C} \pm 0.20^{\circ}\text{C}$ when a linear trend is used to estimate the change over the period 1880-2012 (IPCC, 2013). Attempts to calculate a similar trend for Belize are hampered by the lack of data of sufficient quality and length. Notwithstanding, trends for three stations - Philip S.W. Goldson International Airport, Central Farm and Middlesex - show changes of $0.4\text{ }^{\circ}\text{C}$ ($\sim 0.10\text{ }^{\circ}\text{C}/\text{decade}$), $0.4\text{ }^{\circ}\text{C}$ ($\sim 0.10\text{ }^{\circ}\text{C}/\text{decade}$), and $1.0\text{ }^{\circ}\text{C}$ ($\sim 0.20\text{ }^{\circ}\text{C}/\text{decade}$) for the recent past when records from the 1960s to present are evaluated. See Table 7. The trend for the airport stations is also plotted in Figure 6. The magnitude of change is similar to that determined by McSweeney et al. (2010) for Belize using available data from 1960 through 2003. They find that temperatures have increased by 0.45°C ($\sim 0.10^{\circ}\text{C}/\text{decade}$), with the average rate of increase being most rapid in the wet season ($0.14\text{-}0.15^{\circ}\text{C}/\text{decade}$) but slower in the dry season ($0.08\text{-}0.09^{\circ}\text{C}/\text{decade}$).

The data also indicate that the frequency of ‘hot’ (6) days and ‘hot’ nights has increased significantly since 1960 (McSweeney et al. 2010). Estimates are that the average number of ‘hot’ days (nights) per year has increased by 67 days (37 nights) or an additional 18.3% (10.2%) of days (nights) with largest rate of increase between June and August (September and November). The frequency of ‘cold’ days and nights has also decreased significantly. The average number of ‘cold’ days (nights) per year has decreased by 21 (23) or 5.7% (6.2%) of days and is most rapid in summer (winter).

Projected changes in temperature for Belize are derived from global circulation models (GCMs), regional climate models (RCMs), and statistical analysis of available station data. The GCMs provide a picture of change for the country as a whole and suggest mean increases in temperature of 0.1 to 2.0°C by the 2030s, 0.8 to 2.9°C by the 2060s, and 1.3 to $4.6\text{ }^{\circ}\text{C}$ by the 2090s when compared to a baseline period 1970-1999 (McSweeney et al. 2010) (7).

Figure 6: Historic temperature trend for Belize.

Figure source: [Gonguez \(2008\)](#).



⁶ ‘Hot’ day or ‘hot’ night is defined by the temperature exceeded on 10% of days or nights in current climate of that region and season. Similarly ‘cold’ days or ‘cold’ nights are defined as the temperature below which 10% of days or nights are recorded in current climate of that region or season.

⁷ McSweeney et al. (2010) use an ensemble of 15 GCMs running 3 future climate scenarios to make their determinations of future climate.

Table 7: Present and Future temperature (°C) and rainfall (mm) trends for selected stations in Belize.
Source: Gonguez (2008)

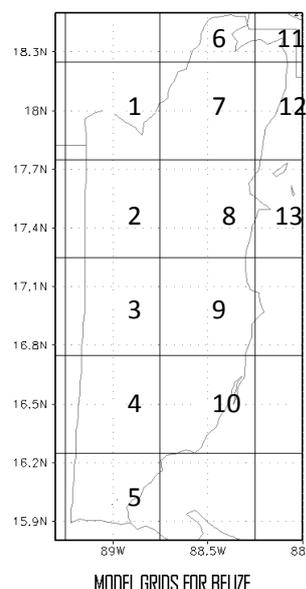
Station	(Lat, Long, elevation)	Present		2015 to 2040		2015 to 2090	
		Temp	Precip	Temp	Precip	Temp	Precip
Philip Goldson International Airport (PSWGIA)	(17.5°N, 88.3 °W, 5 meters)	+0.4	-65	+0.2	0.0	+2.6	-55
Belmopan (BMP)	(17.2 °N, 88.8 °W, 90 meters)	-	-400	+0.5	0.0	+3.5	-110
Central Farm (CFM)	(17.2 °N, 89.0 °W)	+1.0	-70	+0.7	+10	+3.4	-70
Melinda Forest Station (MID)	(17.0 °N, 88.5 °W, 120 meters)	-	-95	+0.7	-20	+2.8	-200
Libertad (LIB)	(18.3 °N, 88.5 °W, 12 meters)	-	-	+1.5	0.0	+3.5	-90
Punta Gorda (PG)	(16.1 °N, 88.8 °W, 6 meters)	-	-	+0.6	0.0	+3.7	-20
Pomona (POM)	(17.0 °N, 88.4 °W)	-	0.0	+0.4	0.0	+2.3	-120
Middlesex (MEL)	(17.0 °N, 88.3 °W, 30 meters)	-0.4	-420	+0.3	0.0	+2.0	-100
Consejo (CON)	(18.3 °N, 88.3 °W)	-	-	-	0.0	-	0.0
Mayan King (MYK)	(16.6 °N, 88.5 °W)	-	-	-	0.0	-	-110
Savannah (SAV)	(16.5 °N, 88.4 °W)	-	-	-	0.0	-	-30
Tower Hill (THill)	(18.0 °N, 88.6 °W)	-	-	-	0.0	-	-100

Note: Observations did not span the same time period, so standard time period was used. The best or most consistent period for each station was used. Where large quantities of data were missing from any month in a year, the month was simply deleted and no attempts were made at generating or interpolating information for missing data. Wherever climatological data were insufficient to identify trends, only projections were presented. Tendencies were determined by the linear trend analyses.

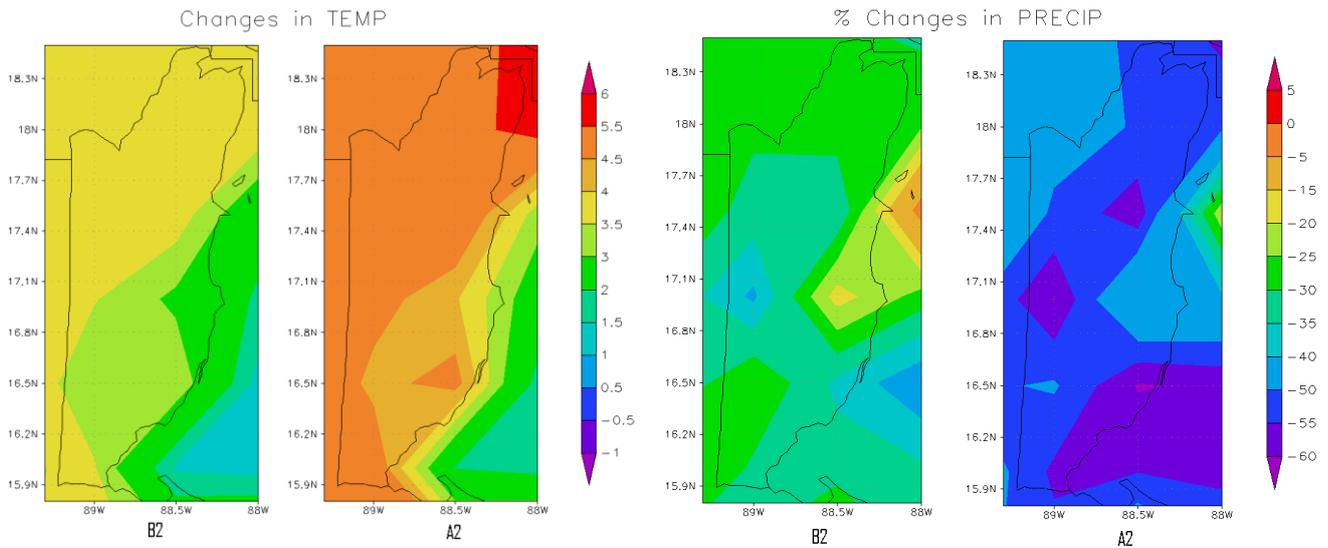
Results from the PRECIS-Caribbean regional modelling project (Taylor et al. 2007, 2013) facilitate more spatial detail by providing projected end of the century change for each of 13 grid boxes covering Belize. The range of end-of-century changes relative to 1960-1990 for an ensemble of 4 realizations is given in Table 8. Two of the model realizations are also plotted in Figure 7. In general, temperature increases are similar in magnitude to that projected from the global models, but with indications that the east-central coast will warm slightly less than the inland regions, and the extreme north and southwest will warm more than the east central regions. The regional differences are also reflected in the end of century projections for the eight stations analysed by Gonguez (2008) (see again Table 7).

Table 8: Projected changes in temperature per grid box by 2090s from a regional climate model.
Source: The PRECIS-Caribbean Project (Taylor et al. 2013)

Grid Box	Temperature (°C)	Rainfall (%)
1	3.02 - 4.23	-25.7 - 0.6
2	3.15 - 4.32	-64.6 - 8.1
3	3.14 - 4.36	-46.8 - 8.6
4	2.56 - 4.30	-46.4 - -38.8
5	2.85 - 4.42	-29.4 - -13.3
6	2.86 - 4.05	-46.1 - -31.9
7	2.94 - 4.09	-40.6 - -21.5
8	3.05 - 4.16	-39.3 - -23.9
9	2.55 - 4.11	-39.3 - -21.1
10	2.71 - 4.13	-33.5 - -13.7
11	2.93 - 3.96	-70.9 - -26.3
12	2.92 - 3.92	-40.7 - -20.4
13	2.27 - 3.12	-33.8 - -27.3



The models also project substantial increases in the frequency of days and nights that are considered ‘hot’ in current climate (McSweeney et al. 2010). Annually, ‘hot’ days (nights) will occur on 20-55% of days (30-61% of nights) by the 2060s, and 17-76% of days (37-84% of nights) by the 2090s. ‘Cold’ days and nights will also become rarer, occurring on 0-6% of days and 0-8% of nights by the 2090s.



CHANGES IN MEAN ANNUAL TEMPERATURE

Figure 7 RCM projected °C changes in mean annual temperature by the end of the century for the B2 scenario (left) A2 scenario (right). Data source: The PRECIS-Caribbean Project (Taylor et al. 2013).

CHANGES IN ANNUAL PRECIPITATION

Figure 8: RCM projected % changes in annual precipitation by the end of the century for the B2 scenario (left) A2 scenario (right). Data source: The PRECIS-Caribbean Project (Taylor et al. 2013).

RAINFALL

Annual rainfall across Belize displays significant year-to-year variability (King et al 1992 pg. 21) due to modulation by global climatic phenomenon including the El Niño Southern Oscillation (ENSO) and the Atlantic Multi-decadal Oscillation (AMO). McSweeney et al. (2010) suggest that mean annual rainfall for Belize has decreased at an average rate of 3.1 mm per month per decade since 1960; however the trend is not statistically significant because of the strong variability in the record. Gonguez (2008) also records decreasing trends for 6 of 10 stations for the recent past (see again Table 7).

Projections of mean annual rainfall from the ensemble of GCMs are broadly consistent in indicating a continuation of the decreasing trend through the end of the current century. The ensemble median values for all seasons and emissions scenarios for the 15 GCMs examined by McSweeney et al. (2010) are negative for the 2030s, 2050s and 2080s. The projections vary between -34% and +15% for the 2030s, -47% and +15% for the 2050s and -64% and +26% by the 2080s with largest changes projected for the period May through October. The change during May-October is significant because of the coincidence with the rainy season. Both the end-of-century RCM projections (Figure 8 and Table 8) and the statistical downscaling of station data (Table 7) also suggest a significant decrease in rainfall by the end of the century. Except for the northwest the upper lower bounds for the range of changes from the RCM study are all negative (Table 8). Figure 8 also suggests larger magnitude decreases in the coastal regions of southern Belize.

It is important to note that though the prevailing trend is for significant overall rainfall decrease through the end of the century, it does not imply the absence of variability i.e. swings between rainfall extremes driven by global climatic phenomenon. The IPCC (2007) suggests that the drying signal becomes robust sometime after the mid-century for Central America. For the period leading up to then (and even after) the region is (will be)

still characterised by year-to-year variability. The GCM studies of McSweeney et al. (2010) suggest heavy rainfall events still occur though the proportion of total rainfall that falls in heavy events is projected to decrease primarily in May-June-July. This is consistent with the projected decreases in total rainfall. Maximum 1- and 5-day rainfalls, however, show little consistent change from the present (except from May through July. Since the present-day trends indicate increases, when these rain events occur they are still likely to yield flooding.

SEA LEVEL RISE

It is estimated that between 1901 and 2010, global mean sea level rose by 0.19 ± 0.02 m (IPCC 2013). Tide gauge and satellite altimeter measurements suggest increasingly higher rates of rise over the period e.g. the mean rate of global averaged sea level rise was 2.0 [1.7 to 2.3] mm/year between 1971 and 2010 and 3.2 [2.8 to 3.6] mm/yr between 1993 and 2010. Historical estimates for the Caribbean Sea appear to be near the global mean (Church et al. 2004).

Table 9: Projected changes per grid box by 2090s from a regional climate model

Source: Various. Refer in table.

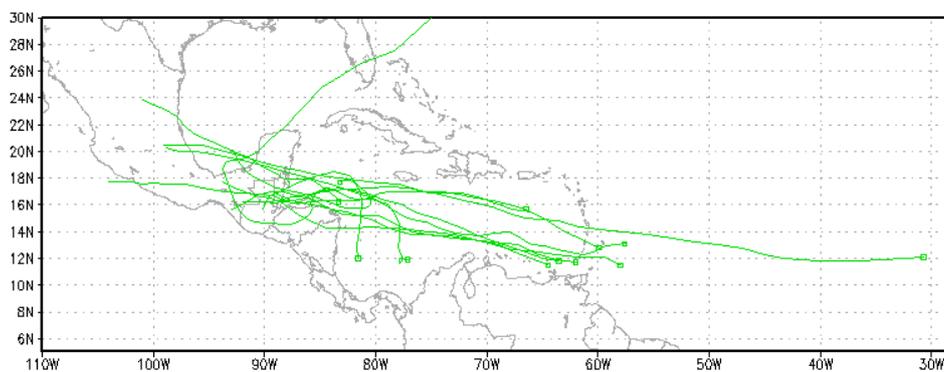
Scenario	Global Mean Sea Level Rise by 2100 relative to 1980 – 1999	Caribbean Mean Sea Level Rise by 2100 relative to 1980 – 1999 (\pm 0.05m relative to global mean)
IPCC B1	0.18 – 0.38	0.13 – 0.43
IPCC A1B	0.21 – 0.48	0.16 – 0.53
IPCC A2	0.23 – 0.51	0.18 – 0.56
Rahmstorf, 2007	Up to 1.4m	Up to 1.45 m
Perret et al., 2013		Up to 1.50 m

Table 9 provides a range of estimates for end-of-century sea level rise globally and in the Caribbean Sea under a number of scenarios. The values are taken from the IPCC’s Fourth Assessment Report. The combined range over all scenarios spans 0.13-0.56 m by 2100 relative to 1980-1999 levels. A number of other studies (e.g. Rahmstorf, 2007; Rignot and Kanargaratnam, 2006; Horton et al., 2008) including the recently released Summary of the Fifth Assessment Report (IPCC 2013) suggest that the upper bound for the global estimates in Table 8 are conservative and could be up to 0.98 m, with a rate during 2081–2100 of 8 to16 mm/year. Diagrams from Perret et al. (2013) suggest the same estimates for the Caribbean Sea i.e. a higher upper bound of up to 1.5 m by the end of the century.

HURRICANES

Tropical cyclone activity in the Caribbean and wider North Atlantic Basin has shown a dramatic increase since 1995. This is reflected in the history of hurricanes impacting Belize since 1950 which numbers at least five since 1998 (See Table 10). This recent increase in hurricane activity is largely attributable to the tropical Atlantic being in the warm phase of a multidecadal oscillation (Goldenberg et al. 2001), while the direct role of global warming is still uncertain. Notwithstanding, both frequency and duration of Atlantic hurricanes display statistically significant increasing trends and there has been an almost doubling of the category 4 and 5 hurricanes over the same time period for all ocean basins (Webster et al. 2005). The maximum intensity of hurricanes has however remained fairly constant over the 35 year period.

Table 10: Tracks and statistics for hurricanes which have caused significant loss of life or damage in Belize since 1950.



Name	Category	Date	Year
Janet	4	September 27	1955
Anna	1	July 24	1961
Hattie	5	October 31	1961
Franelia	2	September 03	1969
Fifi	2	September 19	1974
Greta	2	September 19	1978
Mitch	5	October 27	1998
Keith	4	October 1	2000
Iris	4	October 9	2001
Dean	5	August 21	2007
Richard	2	October 25	2010

The projections are for increases in rainfall intensity, associated peak wind intensities and mean rainfall with tropical storms under climate change. Projections range from a 2.9% (Knutson et al., 2008) through 20% (Oouchi et al., 2006) increase in the peak wind intensity of Atlantic hurricanes, and +37%, 23%, and 10% increases in near storm rainfall activity within 50, 100 and 400 km respectively of the storm centre (Knutson et al., 2008). There is no consensus on whether the frequency of tropical storms will increase.

PROJECTIONS FOR OTHER VARIABLES⁸

Sea Surface Temperatures: GCM projections indicate increases in sea surface temperatures through the end of the century. Projected increases range from +0.8 - +2.7 °C by the 2080s across three future emissions scenarios

Wind Speed: Available observations are insufficient to determine trends in winds speeds around Belize. Projected changes in annual average wind speed from GCMs are small and range from -0.1 and +0.6 ms⁻¹ by the 2080s. The RCM projected increases in the mean annual wind speed are in the same range.

Humidity: GCM median projections indicate decreases in RH (by 1-2%) in all seasons by the end of the century. RCM projections indicate larger decreases (up to 5.1%) by the 2080s.

A summary of all the projected climate changes in provided in **Box 2** below.

⁸ Projections for these variables are from a combination of GCM (15 member ensemble) and RCM (PRECIS) projections. They are reposted on in Simpson et al. (2012)

Box 2 – Climate Change Trends and Projections for Belize at a Glance

Historical Trend

Projection

Temperatures

- | | |
|--|--|
| <ul style="list-style-type: none"> • ~0.45°C (~0.10°C/decade) increase since 1960s. • More rapid increase in the wet season (0.14-0.15°C/decade); slower in the dry season (0.08-0.09°C/decade). • ‘Hot’ days and ‘hot’ nights have increased significantly since 1960. 18.3% (10.2%) more ‘hot’ days (nights) since 1960. Largest increase between June and August (September and November). • ‘Cold’ days and nights have decreased significantly. 21 (23) or 5.7% (6.2%) less ‘cold’ days (nights). | <ul style="list-style-type: none"> • Increase of 0.1 - 2.0°C by the 2030s; 0.8 - 2.9°C by the 2060s; 1.3 - 4.6 °C by the 2090s compared to 1960-2000. • East-central coast will warm slightly less than the inland regions. Extreme north and southwest will warm more than the east central regions. • Substantial increases in the frequency of ‘hot’ days and nights. Annually, ‘hot’ days (nights) will occur on 20-55% of days (30-61% of nights) by the 2060s, and 17-76% of days (37-84% of nights) by the 2090s. • ‘Cold’ days and nights will become rarer. They occur on 0-6% of days and 0-8% of nights by the 2090s. |
|--|--|

Rainfall

- | | |
|---|---|
| <ul style="list-style-type: none"> • Significant year-to-year variability due to the influence of phenomenon like the El Nino Southern Oscillation (ENSO). • Average rate of decrease for entire country of 3.1 mm per month per decade since 1960. • Varying rates of change for available stations but all showing a decrease in the recent past | <ul style="list-style-type: none"> • Negative median values for rainfall change for all seasons from 15 GCMs through end of the century. • Projections: -34% to +15% for the 2030s, -47% to +15% for the 2050s and -64% to +26% by the 2080s. • Largest changes projected for May through October. • Larger decreases in the coastal parts of south Belize. • Heavy rainfall events still occur but the proportion of total rainfall that falls in heavy events is projected to decrease primarily in May-June-July. |
|---|---|

Sea Levels

- | | |
|---|---|
| <ul style="list-style-type: none"> • An increase of 0.19 ± 0.02 m between 1901 and 2010. • Higher rate of increase in later years: 2.0 [1.7 to 2.3] mm/year between 1971 and 2010 and 3.2 [2.8 to 3.6] mm yr⁻¹ between 1993 and 2010. • Caribbean Sea changes are near the global mean. | <ul style="list-style-type: none"> • The combined range for projected rise over all scenarios spans 0.18-0.59 m by 2100 relative to 1980-1999 levels. • Recent studies suggest an upper limit for the Caribbean of up to 1.5 m under RCP8.5 |
|---|---|

Hurricanes

- | | |
|---|--|
| <ul style="list-style-type: none"> • Dramatic increase in frequency and duration of Atlantic hurricanes since 1995. • Increase in category 4 and 5 hurricanes and in rainfall intensity, associated peak wind intensities, and mean rainfall for same period. | <ul style="list-style-type: none"> • Projected increases in peak wind intensity (possibly up to 20%) associated with tropical storms. • +37%, 23%, and 10% increases in rainfall activity within 50, 100 and 400 km of the storm centre. No consensus on increase in frequency of tropical storms. |
|---|--|

Other Variables

- Sea surface temperatures increase by +0.8 - +2.7 °C by the 2080s.
- Changes in annual average wind speed from GCMs are small and range from -0.1 and +0.6 ms⁻¹ by the 2080s.
- RCM projections indicate decreases in relative humidifies up to 5.1% by the 2080s.

CLIMATE RISK

Significant to the challenge of climate change for Belize is the fact that it will modify the severity of existing climate and weather risks while possibly introducing new risks once important thresholds are passed in the coming years. Droughts, floods and hurricanes/storms are present climate risks faced by Belize which are likely to be significantly altered (frequency and/or magnitudes) under the continued progression of climate change through the end of the century. The onset of new climate regimes (for example when future temperatures become warmer than anything historically felt) similarly pose a challenge to the development of Belize.

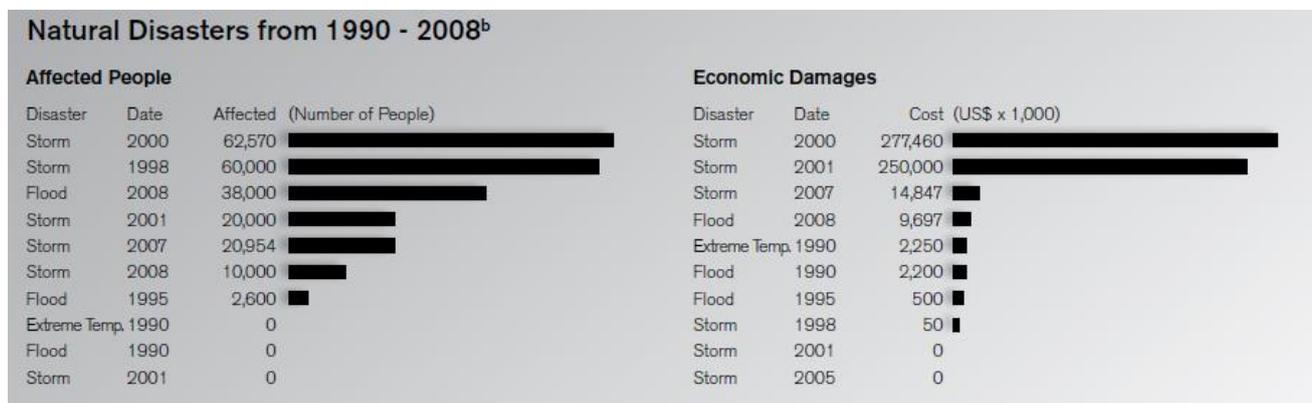
FLOODS AND STORMS

Flooding along with storm damages account for nine of ten significant disasters impacting Belize between 1990 and 2008 (GFDRR, 2010) with respect to population impacted. Historically, flooding most often results from intense or continuous rainfall associated with tropical systems e.g. tropical depressions, storms and hurricanes, and also from storm surge associated with storm events. Storm damages also result from strong winds.

The projected changes in sea surface temperature, sea levels and intensity of hurricanes will likely increase the exposure of Belize to both flood and storm risks. The projections suggest more damaging flood conditions in the coastal zones and low-lying areas of Belize due to both intense rainfall events from tropical systems including hurricanes and from enhanced storm surge. Increased risk also arises from stronger winds associated with storms.

Figure 9: Natural disasters impacting Belize and their impact. 1990-2008.

Figure Source: Caribbean Project (GFDRR, 2010).



DROUGHT

The strong year to year variability in rainfall as modulated by ENSO and other global phenomenon means that Belize is periodically subjected to droughts. Drought conditions in 2004-2005 significantly impacted the economy of Belize through its impact on agriculture. The projected decreases in annual rainfall amounts suggest increasing risk of drought conditions through the end of the century due to reduction in rainfall amounts and adjustments to the length of the rainy season, which will in turn be exacerbated by significantly warmer temperatures.

CLIMATE SHIFT (WARMER TEMPERATURE REGIME)

The fragile tropical ecosystems of Belize have survived in a climatic envelope characterized by relatively narrow ranges of variability (compared to other regions of the globe) e.g. the narrow bands of temperature variability for the tropics. A significant climate risk for Belize is the onset of new climate regimes which will challenge the ability of its ecosystems to survive. Determining thresholds for new climate regimes is difficult. Mora et al. (2013) offer a way to do so by determining the point when future projected variations in a climate variable exceed (or fall below) the maximum (or minimum) historical variations as determined from existing climate records. Using the ensemble mean of annual temperature for the GCM projections of McSweeney et al. 2010, it is suggested that a climate departure for temperature will be reached in the late 2020s to early 2030. Mora (2013) puts it at 2034 for Belmopan for a business as usual future scenario. That is, beyond those dates the mean annual temperature of the country (even when it is at its coldest) exceeds the warmest temperatures historically experienced.

VULNERABILITIES - WHAT'S AT STAKE?

Given what is known about how Belize's climate will change, it is likely that a number of critical sectors or areas of Belizean life will be impacted as a result of the increased climate risks. **Appendix A** tries to highlight through detailed but brief summaries some of the most vulnerable areas of the Belizean life and economy, noting some of the potential impacts of climate change. The summaries are of necessity brief and not meant to be comprehensive. The summaries also directly or indirectly placed within the framework of comprehensive risk assessment and risk analysis to facilitate discussions in later sections of this report. **Box 3** on the following page summarises Appendix A by providing Vulnerability by Sector in Belize.

[See **Appendix A** for detailed technical notes on 'Vulnerability by Sector in Belize']

Box 3 – Matrix of the Vulnerable. Some important areas of Belize economy and life and their vulnerability to climate.

<p>Health</p> <ul style="list-style-type: none"> • An increase in communicable diseases particularly those transmitted through vectors. • Increase in heat-related deaths, particularly amongst the elderly, the poor, those with existing heart, lung and other medical conditions, and to a lesser extent, children. • Enhanced disease threat due to contamination of waters within the urban and rural areas. • Strain on emergency response services and health infrastructure during climate extremes. • Increased health and hygiene risk for pregnant women and lactating mothers. 	<p>Infrastructure and Transportation</p> <ul style="list-style-type: none"> • Higher maintenance costs and/or increased risk of failure or loss of critical infrastructure components such as road segments, bridges, and storm water management infrastructure. • Disruption of public transport due to increased flood and storm risk. • Growing inadequacy of evacuation and emergency routes and procedures. • Disruptions of airport (particularly coastal airport) and port traffic due a combination of climate risks. 	<p>Water and Electricity</p> <ul style="list-style-type: none"> • Increased water demand as a result of higher temperatures e.g. for energy production, cooling systems and irrigation. • Lower levels of water in the Belize dams and reservoirs due to drought. This will create water scarcity for irrigation and reduce energy production from hydropower plants. • Increased energy demand to meet cooling needs. • Likelihood of greater incidents of damage to water and electricity infrastructure.
<p>Natural Resources and Coastline</p> <ul style="list-style-type: none"> • A reduction in surface water sources due to drought risk. • Saline intrusion of coastal aquifers and loss of coastline due to sea level rise. • Degradation of the physical integrity of critical forest, marine and fresh water environments. • Decrease in fish supply due to changes in sea surface temperatures and changes to coastal habitats. • Coral bleaching due to higher sea surface temperatures. 	<p>Climate Change</p> <ul style="list-style-type: none"> • Warmer temperatures • Increased flood risk (intense rainfall and storm surge) • Increased storm risk (more intense rains and stronger winds) • Higher sea levels • Increased drought risk 	<p>Economy</p> <ul style="list-style-type: none"> • Additional strain to a wide range of infrastructural sub-sectors. • Increased cost in the construction, operation and financial protection for all sectors and communities. • Greater stresses on government expenditures, liquidity and budgets. • Increase in non-productive expenditure associated with emergency response. • The creation of climate ‘winners’ and ‘losers’ challenging the duty of care that the state has.
<p>Agriculture</p> <ul style="list-style-type: none"> • Reduced yields and a proliferation of weeds, pests, bacteria and diseases under higher temperatures. • Drought conditions which affect agro biodiversity and lead to large scale losses of livestock. • Soil degradation and loss of fertility due to droughts. • Higher water and production costs for local food production. • Loss of agricultural assets, livestock, crops and agricultural infrastructure from the passage of extreme events. 	<p>Tourism</p> <ul style="list-style-type: none"> • Beach loss due to sea level rise. • Increased incidence of heat stress and heat related illnesses among tourists and outdoor workers. • Coral reef bleaching due to sea surface temperature increases. • Less reservations and/or more displaced visitors due to adverse rainfall /weather conditions, leading to losses in revenue. • Increased infrastructural damage, and need for additional emergency preparedness due to floods, coastal inundation and extreme events. 	<p>Communities, Women, The Poor</p> <ul style="list-style-type: none"> • Loss of livelihoods in highly vulnerable coastal communities dependent on coastal resources and in farming communities. • Women with reduced influence on policy-making processes, access to information/ resources/ programmes, leadership in adaptation efforts and especially those responsible for children and elderly are more vulnerable to the impacts of emergency measures. • Increase in human mortality and illness especially among (urban) poor communities due to multiple climate stressors. • Population displacement because of vulnerabilities of settlements in floodplains.

A003_Technical statement

PURPOSE

The Purpose of this section is to describe the *toolkit* of technical sub-projects and decision analysis that contributed in a major way towards identification of suitable components and interventions within the Belize *National Climate Resilience investment Plan* (NCRIP).

ABOUT TECHNICAL SUB-PROJECTS SUPPORTING NCRIP

The technical activities described below supported the Ministry of Finance and Economic Development (MoFED) and other stakeholders in the preparation of the NCRIP. These were implemented with financial assistance from the European Union in the framework of the Africa, Caribbean and Pacific – European Union (ACP-EU) Natural Disaster Risk Reduction Program, managed by the Global Facility for Disaster Reduction and Recovery (GFDRR) and with technical assistance from the World Bank. This package of activities are also informing the Belize Climate Resilience Infrastructure Project (BCRIP) that aims to finance priority improvements in the transportation sector in Belize in order to strengthen the resilience of the transport network to climate change and climate variability. The technical sub-projects and decision analysis supported by the GFDRR EU-ACP was, therefore a robust technical foundation, supporting the evidence led development and formulation of both the NCRIP and BCRIP.

In brief, the technical sub-projects toolkit comprises of a quantitative and participatory multi-criteria evaluation (MCE) process involving technical officers and CEOs from all government ministries and other participants from the private sector and civil society. The MCE also draws upon a strong baseline study of geo-spatially mapped infrastructure surveys, hazard conditions and related socio-economic data. These are complemented by a set of projects in the areas of training and capacity building for improved disaster risk management (DRM), land use planning, GIS infrastructure development and data sharing platform/open source data management.

The primary objective of the technical sub-projects has been to map the severity and susceptibility of critical assets to hazards and assess their resilience to climate impacts in order to identify and prioritize investments, specifically infrastructure investments that promote climate resilience. The specific objectives are outlined below:

Mapping exposure to Hazards: To determine the severity and extent of natural hazard risk, including the effect of climate change on these risks.

Establishing Criticality of Assets: To develop and conduct a multiple criteria evaluation (MCE) thus ranking (prioritization) of various segments of the national infrastructure (roads, drainage, public buildings, public transport) based on a composite index derived through consultation.

Mapping Condition of Assets: To conduct a critical infrastructure survey (roads, drainage, storm protection, public buildings) and determine their current conditions, as well as susceptibility and exposure risk to climate hazard, and assess their climate resilience.

Geo-spatial Risk analysis: Apply suitable GIS software to overlay climate hazard maps with critical infrastructure/ social/ economic assets – correlate those in poor condition and unable to resist the impact of adverse climate.

Develop GIS databases and management capability: To prepare an open-source data management schema supporting the various stakeholders in the management of their physical assets and programmes.

Secondary objectives include: (I) strengthening institutional capacity in the understanding, interpretation and application of hazard and risk information in institutional processes and multi-criteria decision-making for public investment programmes; (ii) strengthening environmental management systems, encouraging a stronger focus on the mainstreaming of DRM into sectorial planning and fostering a culture of ex-ante prevention through risk reduction; and (iii) developing strategies to reduce vulnerability to natural hazards.

IMPLEMENTATION OF SUB-PROJECTS SUPPORTING NCRIP

The sub-projects (particularly those related to data) supported a consensus building stakeholder approach with an MCE [Multi-Criteria Evaluation – see Box 4] in order to define and implement a strategy to reduce the vulnerability of critical infrastructure to natural hazards and the impacts of climate variability. The strategy was evidence-based and developed on existing available data, as well as any new hazard and infrastructure data (roads, drainage, public buildings) collected and surveyed during the last year.



Image (above) Damaged culvert along Western Highway, September 2013. In Belize disruption along critical roads from weather impacts is a frequent occurrence. The drainage and road pavement are unable to bear the impact of even current levels of precipitation and storm water run-off. Surveys conducted as part of the NCRIP sub-projects show this is a combination of factors including poor design and maintenance.⁹ Substantial investment is required to bring the drainage and road infrastructure up to a suitable standard.

MCE— is a process that provides a method for separating decision elements and tracking down the decision-making process—making it ideally suited to communicate the basis of the decisions, and a series of workshops and semi-structured interviews with GoB and other relevant stakeholders were held to assist in defining implicit problems, and help make explicit the decision-making criteria. This process brings about consensus amongst stakeholders with different interests, opinions and power positions, and results in clear policy recommendations that address and represent local issues, needs and concerns, and help improve the quality of the selected resilience measures. This process also generates ‘ownership’ of the investment prioritization plan to (I) provide a basis for the GoB to continue development and implementation of climate resilience measures; and (ii) further implementation and future maintenance of any of the selected measures.

⁹ Image: R Kalra, World Bank 2013

Box 4: Improving decision-making and prioritising investment using Multi-Criteria Evaluation

MCE [Multi-Criteria Evaluation] is the primary tool utilised to achieve participatory and quantified decision-making on major public investments. Workshops and meetings were conducted with all stakeholders including government, civil society and private sector to develop the investment prioritisation process and validate the outcomes. The MCE draws heavily upon data and thus data collection and management activities complimented this process. A brief overview of the MCE tool is provided below.

Multi Criteria Evaluation (MCE) is a decision-making tool, developed for complex multi-criteria problems that include quantitative and/or qualitative aspects of the problem in the decision making process. MCE consists of establishing a ranking of options by reference to an explicit set of objectives that the decision making body has identified, and for which it has established measurable criteria to assess the extent that the objectives have been achieved. In simple circumstances, the process of identifying objectives and criteria may alone provide enough information for decision-makers. However, where a level of detail related to CBA is required, MCE enables the aggregation of data on individual criteria to provide indicators of the overall performance of options.

A key feature of MCE is its emphasis on the judgment of the decision making team, in establishing objectives and criteria, estimating relative importance weights and, to some extent, in judging the contribution of each option to each performance criterion. Because it is the decision makers' own choices of objectives, criteria, weights and assessments of achieving the objectives, this type of analysis is intrinsically subjective. However, an MCE can bring a degree of structure, analysis and openness to classes of decision that cannot be reached by a simple CBA approach.

In summary, the selected criteria receive weights (points) relative to their perceived importance. Each intervention is then allocated the number of points corresponding to the fulfilment of the particular criteria. The aggregate number of points that each intervention receives is computed by simply adding the points allocated per indicator, or through the application of a more complex formula. The result of this process leads to a ranking of investment options. In most examples, indicators used under MCE implicitly reflect economic and subjective evaluations. The outcome of the MCE methodology depends highly on its simplicity, transparency, and participatory-based approach.

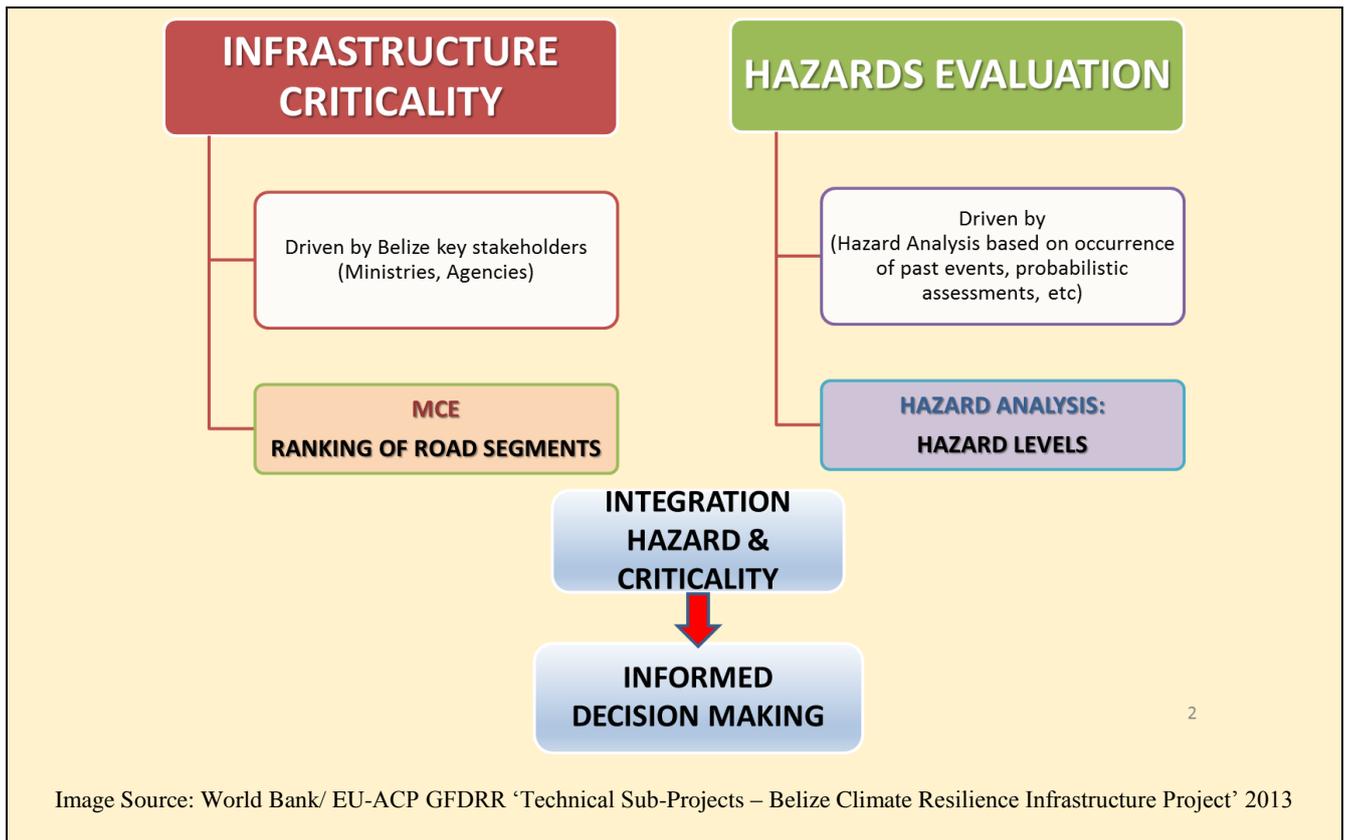
Advantages of the MCE over informal judgement: MCE has many advantages over informal judgment unsupported by analysis:

- It is open and explicit; The choice of objectives and criteria that any decision making group may make are open to analysis and to change if they are felt to be inappropriate;
- Scores and weights, when used, are also explicit and are developed according to established techniques. They can also be cross-referenced to other sources of information on relative values, and amended if necessary;
- Performance measurement can be sub-contracted to experts, so need not necessarily be left in the hands of the decision making body itself; It can provide an important means of communication, within the decision making body and sometimes, later, between that body and the wider community;
- And if scores and weights are used, it provides an audit trail.

Detailed Steps in MCE: It is recommended that decision making processes about proposals for future action should follow the sequence below.

1. Establish the decision context: A first step is always to establish the decision context, that is, the array of administrative, political and social structures that surround the decision being made.
 1. Establish aims of the MCE and identify decision makers and other key players
 2. Design the socio-economic-technical system for conducting the MCE
 3. Consider the context of the appraisal
2. Identify objective/s: Good decisions need clear objectives. These should be specific, measurable, agreed, realistic and time-dependent. It is sometimes useful to distinguish between ultimate and immediate objectives.
 - Ultimate objectives are usually framed in terms of strategic or higher-level variables, such as the level of economic growth, social cohesion or sustainable development.
 - Immediate objectives are those which can be directly linked with the outputs of the project. Consideration of a proposed option needs to concentrate in those criteria which contribute to the immediate, and hence the ultimate objectives.
3. Identify the options to be appraised (for achieving the objectives) Once the objectives are defined, the next stage is to identify options that may contribute to the achievement of these objectives.
4. Identify criteria and indicators: The next stage is to decide the criteria that will define the MCE, as well as the indicators that will be used to measure each of the criteria. Each criterion must be measurable by an indicator or a set of indicators. It must be possible to assess, at least in a qualitative sense, each of the indicators that will be used to define a criterion.
5. Scoring: Develop a scoring system to assess the importance of each of the indicators and criteria.
6. Weighting: Assign weights for each of the criterion to reflect their relative importance to the decision.
7. Combine the weights and scores for each option to derive an overall value
8. Examine the results
9. Sensitivity Analysis: Conduct a sensitivity analysis: do other preferences or weights affect the overall ordering of the options? Look at the advantages and disadvantages of selected options, and compare pairs of options

Converging Critical Infrastructure identified using MCE - with Hazard Exposure: Infrastructure thus identified as 'Critical' using the MCE approach is overlaid using GIS with condition assessment and climate hazard maps (floods, storm surge) to prioritise urgent investments.



INSTITUTIONAL STEERING GROUP FOR THE TECHNICAL SUB-PROJECTS SUPPORTING NCRIP

A 'NCRIP Steering group' with Ministry of Finance and Economic Development (MoFED) leading a steering group of other ministries advises the technical team and carries out oversight on the development and implementation of the Technical sub-projects. The outcomes of the technical sub-projects have been circulated and presented to all ministries - their CEOs and technical officers for validation. The steering group comprises of:

- Ministry of Finance and Economic Development
- Office of the Prime Minister
- Ministry of Trade, Investment Promotion, Private Sector Development and Consumer Protection
- Ministry of Fisheries, Forestry and Sustainable Development
- Ministry of Works and Transport
- Ministry of Tourism and Culture
- Ministry of Energy, Science, Technology and Public Utilities
- Ministry of Natural Resources and Agriculture
- Ministry of Health
- Ministry of National Security
- Ministry of Education, Youth and Sports
- Ministry of Public Services, Elections and Boundaries
- Ministry of Labour, Local Government, Rural Development, NEMO, Immigration and Nationality
- Ministry of Human Development, Social Transformation and Poverty Alleviation

- Ministry of Housing and Urban Development
- Ministry of Foreign Affairs

DESCRIPTIONS OF TECHNICAL SUB-PROJECTS SUPPORTING NCRIP

For ease of description the sub-projects have been grouped into ‘data and GIS’ [TP 1-5] benefitting users of data in the short and long term and those that perform ‘climate risk assessment or analysis’ [TP 6-9] using GIS in some instances with the outcome of priority infrastructure that will benefit from resilience investment.

TP1. TECHNICAL GIS-RELATED CAPACITY BUILDING, DATA SUPPORT AND TRAINING

This component includes: (i) provision of support to the Land Information Centre (LIC) in order to enable it to meet GIS database maintenance and information sharing requirements in-line with the National Spatial Data Infrastructure Policy (NSDI) and the World Bank (WB) open data for resilience infrastructure strategy; (ii) assist LIC in the listing, consolidation and availability of the existing GIS databases; and (iii) development of training programs for LIC and other government staff, as well as contractors, aimed at bridging the capacity gap on maintaining information and developing knowledge sharing capacity, on an as needed basis.

Initial steps were:

- Identification of key data repositories, both internal and external
- Identification of key partners associated with GIS data management
- Identification of key users and their needs
- Identification of resources that are available for and can support LIC data management

Following an initial review of the current status of data management, data, data managers, and data users, initial concepts were developed for discussion. After key partners both internal and external had been identified, a training workshop was delivered.

Outcomes for NCRIP: In selecting resilience interventions NCRIP draws upon data in such repositories. Lessons from this sub-project indicate the requirement for better spatial data on socio-economic vulnerability as well as need for better information for physical planning. Subsequently these have been identified as an intervention under NCRIP.

TP2. CLIMATE HAZARD DATA

The primary requirement of this component is to locate and characterize climate hazards, and to provide this information in GIS format. This includes the collection and analysis of existing data and reports of historical losses due to natural hazard in Belize, the mapping of the natural hazard risks, and identification of possible information gaps.

There are already several partial databases held by multiple agencies and institutions, as well as others held by individuals. The intent was to create a consolidated dataset that will include all the currently available inventory of hazard related information, and where possible within the existing primary data limitations, develop any additional required datasets. The development of these data sets was a collaborative process involving internal and external partners, collating media reports, interviews with district officers and workshop sessions with residents of various districts. Following the development of a formal data management structure, this information is being integrated and managed through the established procedures.

Outcomes for NCRIP: Hazard data collected through this exercise has been a key ‘layer’ in Geo-spatial analysis of risk conducted in the risk assessment related activities i.e.: in identifying the locations and socio-

economic assets that are at most risk from natural hazards and future climate hazards. [Fig 10] These have accordingly informed the locations of interventions in the drafting of the NCRIP. Gaps in hazard data and availability of down-scaled climate forecasts enabled relevant interventions to be drafted within NCRIP on improving the quality of hydro-meteorological information and capability about hazards and climate forecasting.

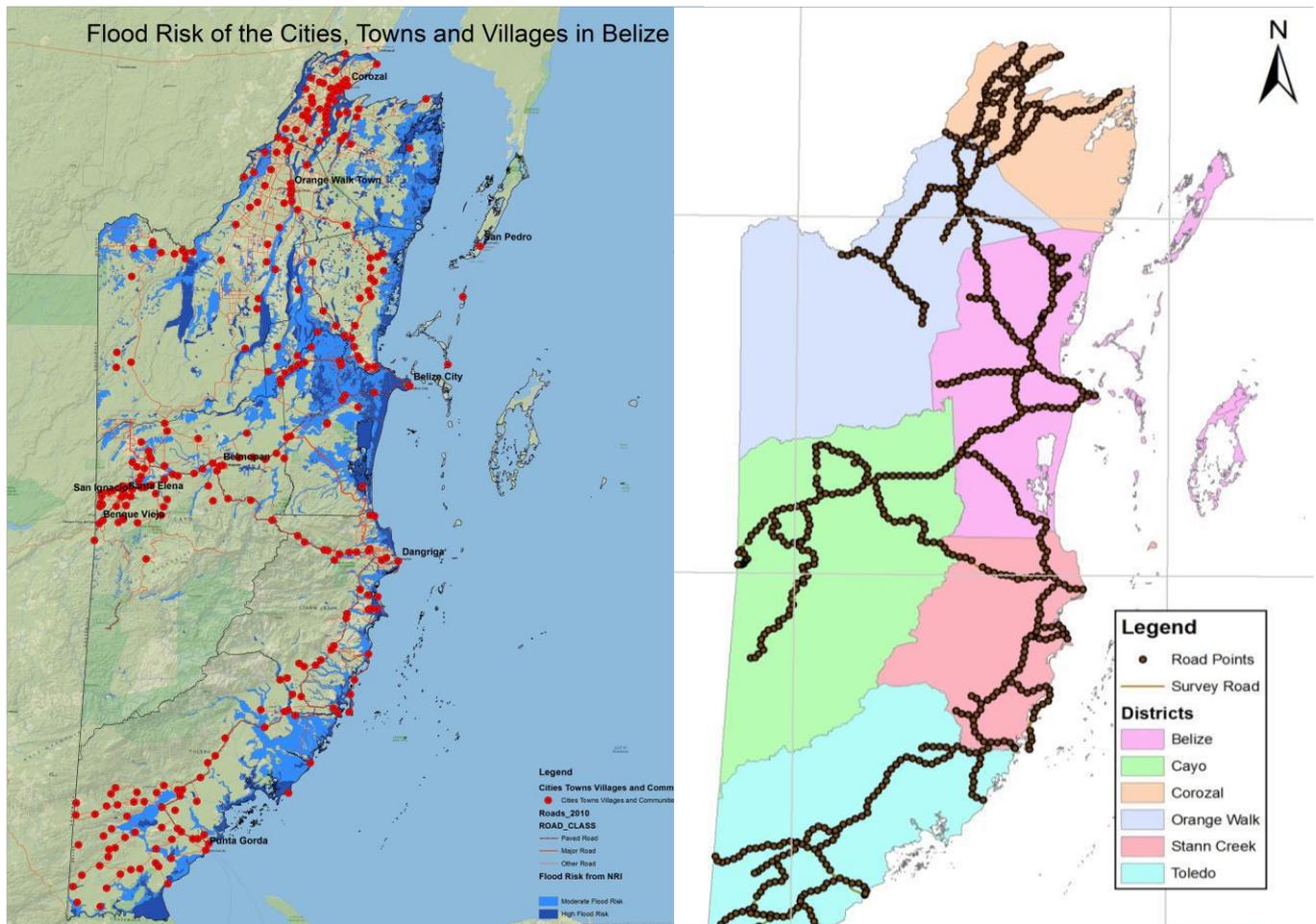


Figure 10 (Above Left) Location of major population centres in Belize w.r.t flood risk;

Figure 11 (Above Right) The Field-work under TP5 captured the condition of roads, bridges, culverts and other drainage structures across 1,400 Km of the Primary and Secondary Road Network.

Image Source: World Bank/ EU-ACP GFDRR ‘Technical Sub-Projects – Belize Climate Resilience Infrastructure Project’ 2013

TP3. SOCIO-ECONOMIC DATA COMPILATION

The main objective of this component is to complete the mapping of assets, socio-economic characteristics, current and future development against which hazards and risk exposure areas can be overlaid. Data was also drawn from the most recent sources such as the 2010 Census and disaggregated by Gender. The resulting GIS mapping is being integrated with datasets as well used for analysis within the risk assessment process to identify interventions for NCRIP.

Outcomes for NCRIP: Spatial data from this sub-project contributed towards the quantification of which parts of the infrastructure were most ‘critical’. [See Box 5 on Prioritisation of Roads using MCE for explanation on how this data was used to quantify ‘criticality’ of the roads] Being spatial in nature it has also

been used to locate development sites at risk from climate hazards. Data of this nature will be very useful in land-use planning for minimising risk - a fundamental intervention that has been included in the NCRIP.

TP4. CLIMATE DATA AND CLIMATE CHANGE FORECAST FOR BELIZE

Review of the historic observations and forecast climate specific (or downscaled) to Belizean territory with specialist input from the Belize meteorological office, climate change office, CCCCC and University of West Indies. A vulnerability and risk assessment was carried out across all sectors during the NCRIP national consultations and in face to face meetings.

Outcomes for NCRIP: The main conclusions have contributed directly to the vulnerability and risk assessment of multiple sectors included in the NCRIP, later in this document. Gaps in hydro-meteorological capability and infrastructure in Belize were also better understood and as mentioned previously a suitable intervention has been included in the NCRIP to develop this capacity. Based on risk assessment across multiple sectors, suitable resilience measures were identified within NCRIP.

TP5. CONDITION SURVEY OF ROADS & BRIDGES, DRAINAGE AND PUBLIC BUILDINGS

The primary requirement of this component was to survey, identify and assess the characteristics and components of the public buildings, transport sector and drainage system infrastructure that make them more, or less, vulnerable to climate change. Survey of almost 1,400 Km of primary and secondary roads has been completed in Belize (Fig 11) This includes, but not limited to age and condition of the infrastructure; construction material; design parameters and system characteristics; number of physical elements and their location; maintenance practices; the rate at which system is upgraded or replaced; the variation in design standards across the country.

The work on this component builds on existing work by Ministry of Works and Transportation (MoWT), and further develops their existing database. The intent is to create a consolidated dataset that will include all currently available road infrastructure inventory for primary and secondary national roads. The development of this data set is a collaborative process involving internal and external partners.

Outcomes for NCRIP: The survey has been one of the most comprehensive ever carried out in Belize and has provided useful data for risk assessment as well as built capacity within young surveyors working alongside experienced engineers in conducting condition surveys. The survey has both long and short term uses and in the case of NCRIP the results are being directly applied in the MCE analysis which prioritises on the basis of which infrastructure is critical AND exposed to hazards AND also requires urgent attention based on condition or ability to withstand climate hazards. The survey has directly contributed to the proposed interventions around critical infrastructure such as drainage and roads within NCRIP.

TP6. RISK ASSESSMENT: EXPOSURE DATABASE OF ROADS, BRIDGES, DRAINAGE AND PUBLIC BUILDINGS

The overall intent of this database is to enable better asset management by the stakeholders including the Ministry of Works and Transports. The searchable database enables a fuller record of the national assets and the identification of those elements of the public buildings, transport sector and drainage system infrastructure, and specifically infrastructure performance, that are at risk of failure, loss of service, damage and/or deterioration from hazards and extreme climatic events, or significant changes to baseline (climate) design values, and likely to be sensitive to changes in the particular climate parameters determined by earlier activities. Based on these parameters, a risk exposure assessment can be performed and will identify areas of key concern. The database also accommodates secondary information gathered from a large number of government agencies and provides a shared information resource on assets, their location, specification,

current condition and exposure. The database provides the flexibility to be used as an asset management tool for government agencies.

Being geo-spatial in nature the database can be useful in understanding spatial associations between hazardous sites and vulnerable infrastructure.

Outcomes for NCRIP: The database is under development but already correlates the condition of infrastructure and its exposure to hazards – pointing to requirement for any disaster mitigation measures. Amongst these are improved codes, quality assurance and specification in the design and construction of assets. Accordingly interventions have been designed within NCRIP for improved climate resilient specifications of infrastructure.

TP8. RISK ASSESSMENT: MULTI-CRITERIA EVALUATION FOR ROADS, BRIDGES, DRAINAGE AND PUBLIC BUILDINGS (INTEGRATING PRIORITISATION OF ASSETS WITH SPATIAL HAZARD/ VULNERABILITY USING GEO-SPATIAL ANALYSIS)

The primary objective for this component was the development of a prioritized investment list that will address climate resilience of the infrastructure (roads, drainage, and public buildings). This has been the result of a quantitative MCE and consensus building process. The MCE—a process that provides a tool for separating decision elements and tracking down the decision-making process—is ideally suited to make the basis of decisions explicitly clear and to easily communicate the basis of the decisions, an important aspect of decision transparency.

Process steps using the example of roads prioritisation have been described in the box below. The prioritized investment list for roads will serve as the basis for future WB road infrastructure investments in Belize and be used by the GoB to further their climate resilient investment strategies.

Outcomes for NCRIP: Contributes a list of critical infrastructure to NCRIP that needs urgent investment due to their exposure to hazard and vulnerable condition. The MCE process was received well in Belize and the process will be adapted and applied in decision-making on other physical assets and programme prioritisation. An intervention has been included within the NCRIP on institutionalising such a consultative, transparent and quantified process within the ‘Public Sector Investment Programme (PSIP)’ of the Government of Belize.

Box 5:

Evidence based and participatory decision-making using MCE and geo-spatial integration of criticality and hazard risk assessment. Text and Image Sourced from: World Bank/ EU-ACP GFDRR ‘Technical Sub-Projects – Belize Climate Resilience Infrastructure Project’ 2013

The principal aim is to geo-spatially overlay the infrastructure segments quantified as ‘critical’ and observe which of those are exposed to climate hazards and are vulnerable because of their poor condition or inappropriately design. Such segments of the infrastructure will be ripe for investment. Over 70 percent of the population in Belize is located near the primary road network and is exposed to meteorological hazards that pose a recurrent risk to highly productive agricultural lands, critical life-line assets such as access roads and major power infrastructure as well as private property and human life. The main challenge associated with primary and secondary road networks has to do with inadequate maintenance and rehabilitation works, resulting in unsafe road conditions and frequent flooding during the rainy season. As for the municipal infrastructure, the need for good drainage systems has become more urgent due to the exacerbation of weather related events coupled with Belize’s low-lying topography. Furthermore, sewerage and drainage systems as well as water infrastructure have deteriorated in urban areas, and have not kept pace with urban expansion. Although the Bank-supported MDP finances some drainage improvements, the investments remain largely insufficient and do not adequately meet investment needs, particularly for new and extended urban areas. The lack of sufficient drainage infrastructure combined with an ineffective land use planning and inadequate delivery of services have contributed to re-occurring flooding during periods of heavy rains.

Due to the importance of the road network to the national economy and other sectors (e.g. water, sanitation, health, etc.), as well as its key role at both response and recovery phases following an extreme event, it was decided that as a first step, the MCE methodology focussed on the prioritization of road infrastructure investments.

The Government of Belize (GoB) has mobilized substantial bilateral and multi-lateral financing for infrastructure investments - particularly transport investments, which are critical to support private sector development. The GoB prepares a five-year investment plan for key infrastructure sectors. However, this investment plan often lacks a strategic prioritization process and does not consider various financing instruments. Requirements for future investments on the primary network include raising the level of robustness to potential future disaster events (particularly coastal and in-land flooding) and addressing sub-standard conditions in parts of the network which have safety consequences.

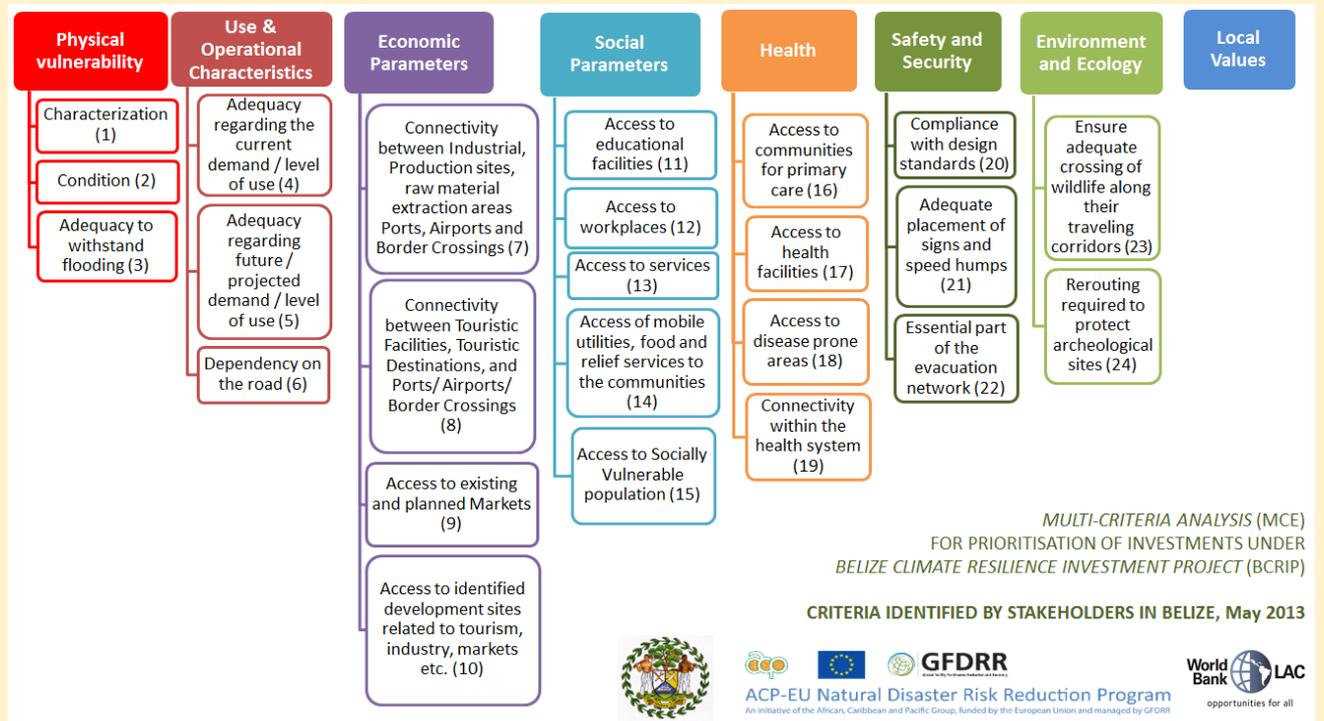
This initiative assisted to outline the methodology for the prioritization of infrastructure investments in Belize through the application of a multi-criteria evaluation (MCE) process. Now that the methodology has been developed and tested, this can be adapted/tailored and applied to other types of infrastructure as indicated under the NCRIP.

The process and geo-spatial analysis were applied as follows:

A. CRITICALITY: The ‘Criticality’ of various segments of the roads were quantified thus allowing the segments to be ranked. The estimation of the road network criticality was done based on a combination of physical, technical, social and economic ‘criteria’ with relative ‘weights’ determined through stakeholder workshops. These helped in assessing the importance of the different sections of the road network.

The starting point for assessing the criticality of the network was to consider the road network divided in road

segments defined by the sections of roads between two adjacent population nodes. Subsequently, each of these road segments was subdivided in smaller segments, as some of the criteria (e.g. condition of the road) have different values for different segments of the road between the two population nodes. The criticality was therefore be assessed for all the road segments identified with different measures ($S_{i,j}$) of the criteria (C_i). There will be as many road segments as different values of the criteria are estimated (as this will in turn result in different values of criticality).

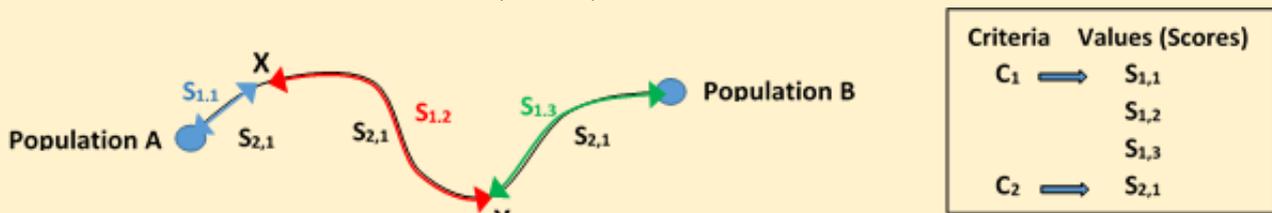


An example of this process can be seen in Figure below. This example shows a road segment between Population A and Population B. For simplicity, only two criteria have been considered in this example. As can be seen, for the first criterion, C_1 , this segment of the road was divided in three smaller sections (A-X, X-Y, Y-B), for which C_1 had different values, $S_{1,1}$, $S_{1,2}$, and $S_{1,3}$. In the case of the second criterion, C_2 , one unique value, $S_{2,1}$, was measured between Population A and B. As such, criticality will be estimated for each of the three segments of road identified, by “combining” the values or scores for each of the criteria measured for each of the segments. The approach suggested for the “combination” of the different criteria onto one overall value that measures criticality.

CRITICALITY A-X = “combination” of $S_{1,1}$ & $S_{2,1}$

CRITICALITY X-Y = “combination” of $S_{1,2}$ & $S_{2,1}$

CRITICALITY Y-B = “combination” of $S_{1,3}$ & $S_{2,1}$

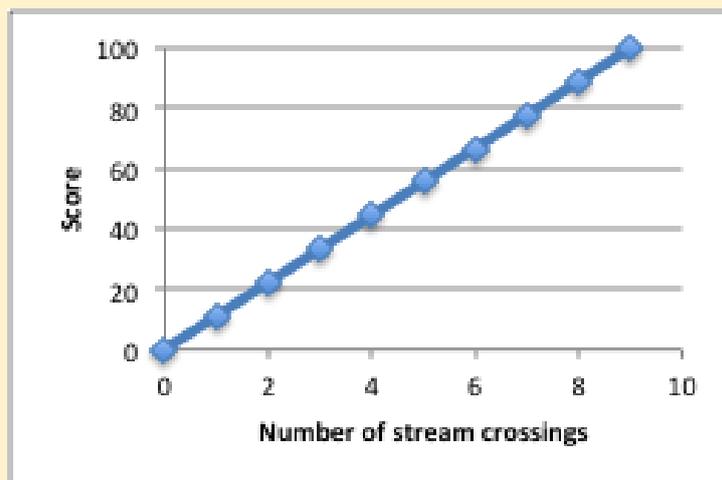


The assessment of the criticality was done on a GIS platform. The outcome of the assessment of criticality is a spatially distributed ranking of the different sections of the road network for each measure/level of criticality.

B. HAZARD ASSESSMENT: Geo-spatial location of climate hazards was marked and an assessment was carried out of the susceptibility of roads/ drainage to climate hazards. A hazard analysis was carried out to determine the hazard levels that different sections of Belize’s road network are exposed to.

Geospatial hazard information gathered from other sub-project was used to prepare a hazard map (per hazard) depicting the geographical distribution of the levels of hazards in Belize.

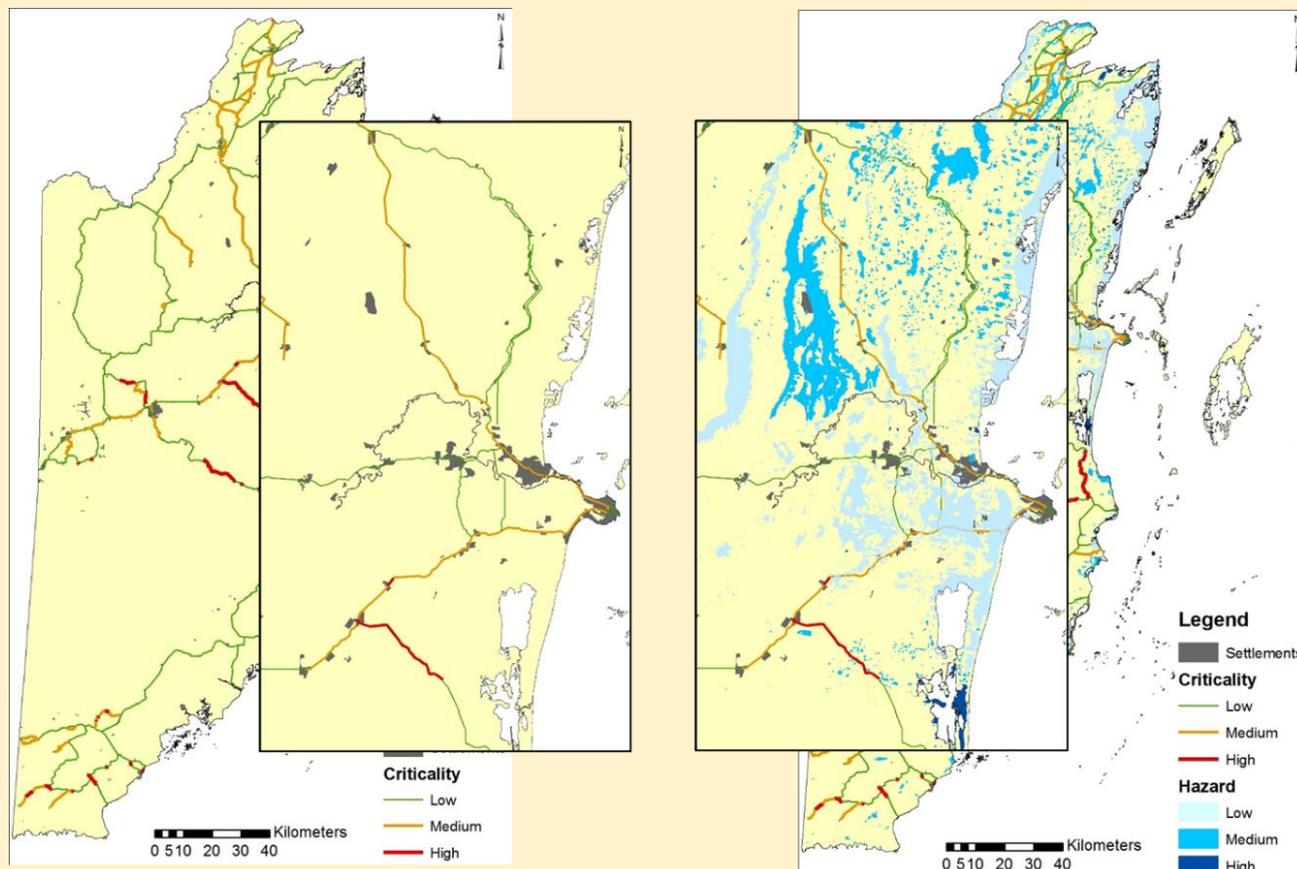
A susceptibility analysis was also carried out with the help of field visits to the site. Again the roads were divided into segments of up to 5Km and measurable indicators were used to allocate scores to various segments. For instance presence of streams crossing the road was an ‘indicator of the possibility of flooding and a scoring system was established to quantify flooding from crossing streams. Other indicators used were condition of culverts recorded during field survey, presence of road stretch in an area with a history of climate impacts.



CONDITION	SCORE
Culvert or bridge in good condition and clean stream.	0
Partially damaged culvert or bridge and/or partially clogged stream.	50
Heavily or completely damaged culvert or bridge and/or clogged stream	100

A general observation and significant has been that in most cases the cause of vulnerability of roads and their poor condition is from poor design of drainage as well as the road itself. Thus the improvements in roads will need to coincide with the improvements in drainage as well.

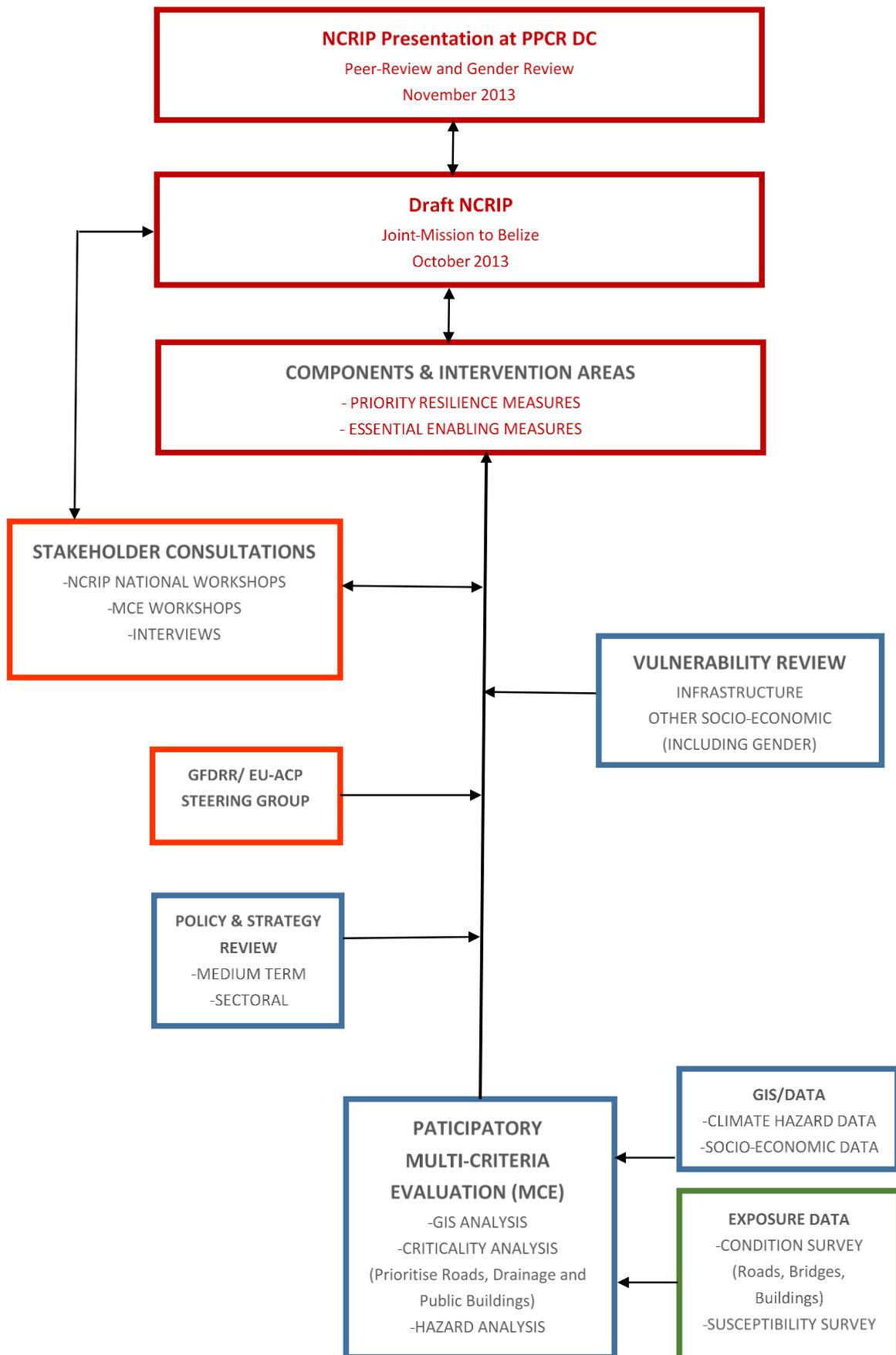
C. OVERLAY: The above two were combined using geo-spatial software to conclude which road segments were in need of priority investment



The process involved several stakeholder consultations to establish the ‘criteria’ and ‘weights’ and validate the process and its outcomes at every stage of decision-making: During a workshop held from 29-30 May 2013 a set of ‘criteria’ to be used in the evaluation of the criticality (importance) of the different segments of the road network were identified (see Criteria in Annex 2). The workshop was well attended by representatives of various government ministries, the private sector, and NGO community. As a continuation of this participatory process the Ministry of Finance and Economic Development and the World Bank Team hosted a one-day workshop on Tuesday, 02 July 2013 at the Black Orchid Resort in Burrell Boom with the double objective of i) Performing the ‘Weighting’ of the ‘criteria’ previously identified for the evaluation of priority investments and ii) Identifying sources of data and information necessary for the continuation of the MCE analysis. Subsequently, the ranking and weights of the criteria identified by the Technical Representatives were presented to CEOs during a meeting held on Wednesday, 03 July 2013 the outcome of the Technical Representatives workshop, the attendees of this meeting proceeded to individually weight the criteria, modifying the outcome of the technical workshop as perceived necessary. One to one meetings were held with stakeholders thereafter to discuss and validate the indicators selected to quantify the criteria.

HOW TECHNICAL SUB-PROJECTS UNDERPINNED NCRIP

The **Figure 11** (below) charts out how the process as well as outcomes of the NCRIP assisted with the identification of key components and interventions with the NCRIP. The technical activities described below supported the Ministry of Finance and Economic Development (MoFED) and other stakeholders in the preparation of the NCRIP. These were implemented with financial assistance from the European Union in the framework of the Africa, Caribbean and Pacific – European Union (ACP-EU) Natural Disaster Risk Reduction Program, managed by the Global Facility for Disaster Reduction and Recovery (GFDRR) and with technical assistance from the World Bank.



A004_NCRIP development process

PURPOSE OF SECTION

This section presents the process used to prepare the NCRIP and identify and prioritize the proposed investments. It describes the highly participatory nature of the process which included government and non-government stakeholders, and it discusses the various types of peer review that the process underwent.

FACTORS DRIVING PLAN PREPARATION

The preparation of NCRIP was led by the Ministry of Finance and Economic Development (MoFED). It did so at the same time that preparation of the next Medium Term Development Strategy (2014 to 2017) got underway, and while discussing Belize's Country Partnership Strategy with the IDB for the next five years, preparing a Climate Resilient Infrastructure Project that will be financed by the World Bank, and discussing CDB interventions for the upcoming period. Many of these initiatives under discussion with the MDBs and development partners include interventions that could contribute to the building of climate resilience among the women/men and within the economy and environment of Belize. MoFED therefore saw value in consolidating the climate resilience building efforts in the NCRIP.

This effort is considered transformative because it will move the discussion about resilience into the national planning framework. At present the technical agencies responsible for comprehensive disaster management and for technical approaches to climate change adaptation are also responsible for integrating these into the national development process even though they are not responsible for leading the national development efforts. The NCRIP will transfer the leadership for integration of these important themes, climate change adaptation, climate resilience, and comprehensive disaster risk reduction to the Ministry of Finance and Economic Development who is responsible development planning, budget preparation and policy coordination. The National Climate Change Office and the National Emergency Management Organization will continue to be important partners by bringing their technical knowledge about climate change and disaster management to the planning discussions and decision making along with the lessons they have learned in trying to mainstream these into development planning and action.

The Government had become aware of the Climate Investment Funds (CIF) and its Pilot Program for Climate Resilience (PPCR). GoB decided that it was timely to adopt the approaches developed by the PPCR to build resilience to climate change and disaster risk, and to integrate climate change adaptation and comprehensive disaster management into national development. These objectives of the PPCR are congruent with Belize's objectives for national development. The World Bank had received a grant from the European Union in the framework of the Africa, Caribbean and Pacific – European Union (ACP-EU) Natural Disaster Risk Reduction Program, managed by the Global Facility for Disaster Reduction and Recovery (GFDRR) to support the preparation of a loan financed project for infrastructure improvements known as the Belize Climate Resilient Investment project (BCRIP). Part of that financing was applied to support the preparation of the NCRIP. The BCRIP will be part of the financing mechanism for the NCRIP.

NCRIP STEERING GROUP

The GOB established a steering group, made up of Chief Executive Officers of the Ministry of Finance and Economic Development; Ministry of Works and Transport; Ministry of Forestry, Fisheries and Sustainable

Development; Ministry of Tourism and Culture; Ministry of Labour, Local Government, Rural Development, National Emergency Management and Immigration; Ministry of Natural Resources and Agriculture; and Ministry of Housing and Urban Renewal; to provide oversight to the multi criteria evaluation (MCE) of criticality of the segments of the road network and the climate and hazard risks to critical assets, and the preparation of the NCRIP. This steering group played a significant role in the preparation of the NCRIP. They provided oversight to the preparation process and supported MoFED in the NCRIP preparation process. They also helped to ensure that technical officers of the various government ministries and departments engage the plan preparation through their participation in consultations and by providing feedback and inputs into plan preparation.

NCRIP PREPARATION TEAM

A NCRIP preparation team made up of consultants financed through the European Union in the framework of the Africa, Caribbean and Pacific – European Union (ACP-EU) Natural Disaster Risk Reduction Program, managed by the Global Facility for Disaster Reduction and Recovery (GFDRR) and senior technical representatives from MoFED was established. They were responsible for the technical analysis for the multi-criteria evaluation, stakeholder consultation and preparation of the draft NCRIP. This team reported regularly to the Steering group led by MoFED and at MoFED's discretion, occasionally to all the CEOs of government ministries. The CEO's in turn briefed the Minister responsible on the progress. Over the plan preparation period the NCRIP preparation team contributed to three Cabinet Information Papers and two briefing notes that were used to brief Cabinet of the NCRIP and the progress being made.

PARTICIPATION IN THE PPCR PILOT COUNTRIES' MEETING

Given that the GOB had decided that it would adopt the PPCR approach to climate resilience planning and integration of climate change adaptation and CDM into the development framework the decision was made to seek advice from PPCR pilot countries. A request for advice was sent to the CIF Administration Unit who provided the opportunity for Belize to participate in the meeting of the Pilot countries in May 2013. Belize presented its proposed NCRIP preparation process to PPCR Pilot Countries with the view to draw lessons and advice through discussion with them. The session included a presentation on GOB's intention and proposed approach, followed by an open discourse about the kinds of things that the GOB should consider as it works on the NCRIP.

During the presentation the GoB explained that given the country's vulnerability to natural hazards, and the current and impending effects of climate change, a decision had been made to climate proof national investments while focusing on reducing poverty and on sustainable development of the environment, economy and women/men of Belize. The GOB also signalled its intention to adopt the participatory approaches and analysis used by Pilot Program for Climate Resilience (PPCR) pilot countries in the preparation of their respective Strategic Programs for Climate Resilience (SPCR), in the preparation of the NCRIP.

During the open discussions PPCR pilot countries emphasised the importance of a participatory process and encouraged the GOB to not only focus on central government departments, but to also include civil society and the private sector in the deliberations and discussions associated with preparation of the NCRIP. The participants cautioned that consultation does not only mean inviting these partners to workshops but also making meaningful efforts to dialogue with them. The participants cautioned that the private sector are focused on making business work and will pay attention to climate resilience from that perspective.

Consequently they advised that the dialogue with the private sector about the effects of climate change and the need for resilience should not be in abstract terms. It needs to be focused on how to keep business operations efficient and increase returns on investments.

The pilot countries also encouraged the GoB to ensure that men and women benefit from the resilience measures and adaptation actions that will be undertaken under the NCRIP. Given that Belize is a small country it has to find ways to use all of its human capital for the benefit of all Belizeans. The NCRIP implementation team should work to ensure that men and women become better off. The efforts should be toward resilient women/men and resilient families. More resilient families could mean a more resilient Belize. Of course there should also be focus on a more resilient economy that create jobs for men and women; jobs that expand women/men's options for development.

With this advice in hand, the GOB embarked on developing a participatory process that utilizes the lessons garnered by the PPCR in the preparation of the NCRIP. The process included extensive literature review, technical analysis of the impacts of natural hazards on the country's infrastructure, a series of stakeholder workshops to explore viable actions that can be taken to build resilience among the women/men and within the economy, and one on one discussion with several sector leaders.

LITERATURE REVIEW

As part of the effort to prepare the NCRIP, MoFED compiled a series of documents including various vulnerability assessments; sector plans; country partnership strategies; national policies; sample Strategic Plans for Climate Resilience (SPCR); climate model projections; and international best practise on approaches to building climate resilience in Small Island and low lying coastal states. These, along with the lessons from the PPCR, were used to guide the design of the consultation workshops and provide the context for resilience building.

STAKEHOLDER CONSULTATION

In line with the PPCR approach, the Government led a series of local stakeholder workshops to identify interventions that will help to build climate resilience while reducing poverty and enabling sustainable development. Two broad categories of consultations were undertaken. The first was to support the multi-criteria evaluation of critical assets, and the second was to explore the broader issues associated with building climate resilience and identification of intervention to achieve the objectives of NCRIP. Stakeholders who participated in the workshops fully engaged the process. They did not just sit back and listen to presentations, they actually engaged in working sessions that produced materials for successive workshops. There was also continuity among many of the organizations that participated. Most often, the same representatives attended successive events. This was good because each succeeding workshop built on progress made in previous workshops.

After each workshop, forms or templates were prepared and distributed to solicit additional inputs from participating organizations. Quite often those were also sent to agencies that were not present at the consultations so that they too could have an opportunity to make an input. Through the workshops and follow up forms and templates, the NCRIP preparation team got suggestions on what should be the development objective of NCRIP, the kinds of issues it should address, and the interventions that could achieve the goal of integrating considerations of climate change into national development planning while addressing the vexing problem of poverty reduction and sustainable development.

In general, the participants were optimistic that it is possible to build a climate resilient Belize in which every resident of the country could have an opportunity to establish a quality of life that will allow them to quickly rebound with minimum assistance in the wake of natural hazards. They share the view that while Belize is prone to natural hazards, particularly floods, and storm surge, due to hurricanes and heavy rains, drought conditions, and seismic activity particularly in southern Belize, not every hazard has to leave a disaster in its wake. Building climate resilience in a way that women and men in each household have the opportunity to become resilient and an economy that is more resilient will help Belize to achieve the 2030 vision.



Image (above): Multi-Criteria Evaluation workshop, Burrell Boom, July 2013. Technical officers of all the ministries allocate relative weights to the criteria used for prioritising roads. More than 5 national workshops were organised for the NCRIP and MCE consultations where stakeholders gave their opinions as well as technical inputs into the process, paving the way for participatory decision-making. Successive workshops were attended by some technical personnel ensuring continuity in the discussions. Each MCE workshop was followed by a presentation to the NCRIP/BCRIP Steering group so that the results were disseminated to all CEOs of relevant ministries. Participatory decision making of this type has been included as a potential intervention in the Draft NCRIP to ensure the Public Sector Investment Programme (PSIP) of the Government of Belize similarly selects projects on the basis of multi-sector consultation and evidence from the field.

ONE ON ONE DISCUSSION

In addition to the national stakeholder consultation workshops the NCRIP preparation team held discussions with several agencies, including the Belize Chamber of Commerce and Industry (BCCI), Belize Electricity Limited (BEL), Belize Water Services Limited (BWSL), the Belize Port Authority (BPA), and the National Climate Change Office (NCCO). These discussions were used to address gaps that the NCRIP preparation team identified in the interventions that were proposed. Those discussions often provided additional insights and led to interventions that are now included in the NCRIP.

TECHNICAL ANALYSIS

The NCRIP preparation team, with technical support from the World Bank and financing from European Union (ACP-EU) Natural Disaster Risk Reduction Program, managed by the (GFDRR) undertook an array of technical analysis including condition survey, hazard vulnerability analysis, road segment criticality analysis, and climate and socio-economic data analysis. These were discussed at length in the previous section of this document.

JOINT MISSION

The Government hosted a Joint Mission of multilateral development banks (MDBs) and development partners on October 3rd-4th, 2013 to discuss the components and interventions within the NCRIP. The main objective of the proposed mission was to review the draft NCRIP and solicit feedback on its contents.

During the mission, the MDBs and the international development agencies participated in a discussion about the plan with representatives of the GoB, private sector, NGOs and civil society with the view to improve the Draft NCRIP prior to its finalization by GOB. The Joint Mission reviewed the draft investment plan taking into consideration:

- a. The Multi Criteria Evaluation (MCE) process that was used to assess the criticality of the various road segments in Belize's road network to the women/men and economy of Belize;
- b. The development objectives, key results, and results framework;
- c. The proposed interventions to build climate resilience;
- d. How the investments were identified and prioritized;
- e. The priorities for public sector and non-state actions to build climate resilience in the women/men, environment, and economy of Belize;
- f. The roles of the respective MDBs and other development partners in plan implementation; and
- g. The extent to which gender implications are considered and addressed in the plan.

The mission participants made recommendations to enhance the NCRIP. The mission noted that the draft NCRIP was the outcome of a strong consultative and technical process. The proposed areas of interventions were closely linked to the socio-economic activities in Belize that need to be strengthened in order to build resilience to variable and adverse climate. Most of the recommendations were related to adding further detail in the document in the following areas:

- Strengthen the discussion on policy and institutional framework. In particular the NCRIP could focus on: i) the policies that would encourage climate resilience; ii) the operational structures that facilitate integration; and iii) the methods to reform existing policies and operations in order to facilitate the transformational process that is required.
- Add further detail about the engagement of development partners in activities that build climate resilience or that is helping to integrate adaptation and resilience into national development actions. This process will help to identify the areas that do not have any investments and those areas that have some investments and actions but require more.
- Present the actual financing required to enable achievement of the development objective and the key results, and facilitate the transformational process, based on the clarifications on the distribution of current investments and the investment needs.
- Review the intervention areas to ensure that they relate to the Government's policy direction as proposed investments should be in line with the country's development goals. Two new intervention areas were identified: i) strengthening fiscal planning and management; and ii) supporting the transformation of the public service to build technical capacities within the various ministries.

- Consider the cost of monitoring and evaluation. The NCRIP needs to ensure that the monitoring and evaluation capabilities are established. The mission cautioned that it is difficult to measure adaptation and M&E could be expensive, so the results framework should be simple but effective.
- Expand on the sustainability of action when elaborating the implementation arrangements. Ensure that stakeholders are engaged throughout the process and do not just meet to validate a plan. The Government of Belize, the relevant line ministries and the national stakeholders need to take the lead in the implementation process.
- Involve the private sector and civil society (non-state actors) in the oversight and implementation of the plan.
- Expand the discussion and treatment of gender to create the opportunity for the genders to participate in the decision making process. All genders should have sufficient representation to ensure that the impacts on them are addressed.

PEER REVIEW

The Ministry of Finance & Economic Development (MoFED) solicited the expertise of Prof. John Agard, peer-reviewer from the CIF roster to provide comments on the draft NCRIP. His input and that of the Joint Mission will be taken on board to improve the NCRIP. Once all this is done, the NCRIP will be used to seek financial support to augment existing investments and build Belize's resilience to climate impacts and natural hazards.

REVIEW OF GENDER PERSPECTIVES

Gender considerations are vital in planning successful interventions and building climate resilience. A wide range of perspectives have been sought in prioritising interventions and it is envisaged that the *gender review* will point to due considerations that can be given in detailed planning and implementation of the resilience interventions that will also enhance the progress that the Government of Belize is already making towards mainstreaming Gender considerations in its' daily business.

LEARNING FROM OTHER PPCR COUNTRIES

The NCRIP emerges from a rigorous process undertaken by the Government of Belize (GoB) that is inspired by and builds upon the PPCR methodology and south-south knowledge transfer with PPCR pilot countries. Here are some of the areas in which lessons were drawn from other PPCR countries:

- Stakeholder identification and organising stakeholder consultations.
- Review and validation of the outcomes of consultation. [Gender/ Peer review; Joint-mission]
- Prioritisation and selection of components and sub-projects. Identifying financing gap.
- Thinking about the future sustainability of the *climate resilience investment plan*.
- Institutional changes that will result in mainstreaming climate resilience.
- Approaches and challenges in monitoring the results of the investment plan.

A005_Institutional Context

PURPOSE OF SECTION

This section briefly discusses Belize's governance arrangements, relevant policies, and the institutional arrangements that can be leveraged to mainstream climate change adaptation and comprehensive disaster management into national development planning and action.

GOVERNANCE AND ADMINISTRATION

Belize is a parliamentary democracy following the Westminster model. The head of state is the British monarch represented by a Governor General nominated by the government in office and appointed by the Queen of England. Two people have served as Governor General since Belize became independent in 1981. The functions of the Governor General are largely ceremonial since the power of government lies in the bicameral National Assembly.

Administratively, Belize is divided into six districts and 31 electoral divisions known locally as constituencies. One member of the House of Representatives is elected for each constituency. North to south the districts are: Corozal, Orange Walk, Belize, Cayo, Stann Creek and Toledo. Of the 31 electoral divisions, 13 are in the Belize District, (10 in Belize City and 3 rural), and 18 are distributed across the rest of the country; with 6 in Cayo, four each for Corozal and Orange Walk and two each in Stann Creek and Toledo.

Commenting about the electoral process in Belize after the 2012 general elections the OAS observed the strong presence of women in the political process. Women serve at high levels of electoral administration, as senators and as secretaries general of political parties. Nonetheless, the OAS mission noted with concern the extremely low numbers of women who offer themselves as candidates; only three out of the 74 candidates for the 2012 general election for the House of Representatives were women, a mere 4%. Of those three, one was elected; the member for Belize Rural Central. This places Belize near the bottom of the listing on progress of women in political representation worldwide.

The Women's Commission has been working to change the low participation rate of women in electoral politics in Belize. They have been providing training to women on the electoral process and on how they can make inroads into the political arena. The situational analysis confirms that women play a very important role in electoral politics in Belize but they do not offer themselves up for election in any significant numbers.

Laws are made by the National Assembly which consists of a House of Representatives made up of 31 elected members (one for each constituency) and an appointed senate of 12 members, (Shoman, 2011, pg. 312). There is no clear separation of legislative and executive powers, as the prime minister is chosen by the majority party in the house who in turn chooses the cabinet from the National Assembly (ibid).

The current Cabinet, the executive arm of government, is made up of fifteen government ministers. Eleven of these members come from the elected House of Representatives and four come from the appointed Senate. There are five ministers of state who have some executive powers, but technically are not members of the Cabinet. Of the fifteen government ministers and members of Cabinet, two are women; the Minister responsible for Energy, Science and Technology, and Public Utilities; and the Minister responsible for Forestry, Fisheries and Sustainable Development. Both women were appointed from the Senate.

There are 17 chief executive officers and one financial secretary in the public sector. They are the chief accounting officers and key decision makers within the central government. Of these seven are women and ten are men. These seven women are responsible for key ministries, including, the Office of the Prime Minister, Economic Development, Human Development, Natural Resources, Tourism, National Emergency Management, and the Public Service.

On average, the Cabinet meets formally every two weeks. The day after each Cabinet meeting, the Chief Executive Officers (CEO) meet with the Cabinet Secretary for briefing about Cabinet's discussion, and any directives which arose therefrom. The CEO meetings are also used to raise issues that the CEOs want to introduce for discussion among the ministers.

DISTRICT LEVEL GOVERNANCE AND ADMINISTRATION

The districts do not have a district level government so the districts primarily serve as geographic divisions of the country. Nonetheless, each district has a capital town where several central government transactions can be initiated. Government departments typically found in district capitals include the Post Office, Lands and Survey Department, Health Department, and Treasury Department.

District level planning with district stakeholders driving the process is non-existent though the Ministry of Local Government is working on a rural area development strategy that will establish an Area Development Group (ADG) in each district (NRDCC, 2011). Each ADG will be responsible for local development planning and for promoting the projects that could achieve rural development in their respective districts. This effort does not envisage district level government and ADGs will not be able to directly influence the national budget though they will be able to raise and attract grant funds for some of the activities and they will be able to lobby the government.

LOCAL GOVERNMENT

In terms of local government, Belize has four systems: city councils, town boards, village councils and the alcalde system of the Maya in southern Belize. Elections are held every three years for city councils, town boards and village councils. The Mayor in the case of town and city councils and the village Chairman in the case of village councils are directly elected by the residents (Shoman 2011). A Municipal Bill that harmonizes city and town councils under one act is being promulgated. Once passed by the National Assembly, it will provide the framework within which town and city councils will operate.

To date, local government entities have very limited legislative powers or autonomy. They fund their activities with financial subventions from the central government and by collecting a limited number of taxes and fees. There is a Mayor's Association that bring mayors together to identify and discuss common issues and strategize to seek redress. A National Village Council Association (NAVCO) that advocates for the involvement of village councils in national development is also operational (ibid, 313).

PUBLIC PRIVATE PARTNERSHIP

The Government of Belize has established the Economic Development Council (EDC) and the Office of Public/Private Sector Dialogue. Twice every year, the executive of the Government of Belize, under the leadership of the Prime Minister, hosts a Business Forum to facilitate dialogue between the public and private sectors. The EDC was established as a critical medium for the exchange of views and the sharing of information between the public and private sectors on matters affecting business and its economic

performance in the country. It is also the forum to address on an on-going basis, issues and concerns raised by both the private and public sectors with a view to activate and accelerate the cooperation and to coordinate decisions taken at the Business Forum. The intent is to *utilize the skills and strengths that each side brings to the table, to strategically address the obstacles to doing business in Belize; to remove them and instead build a road to opportunity.* The Director of Public/Private Sector Dialogue facilitates the work of the EDC among other tasks.

PRIVATE SECTOR REPRESENTATION

Belize has a small but active private sector. Like most developing countries much of the economy is informal. The two main private sector advocacy groups are the Belize Chamber of Commerce and the Belize Business Bureau. As in the Public Sector, the role of women has been steadily increasing. The Director of Public/Private Dialogue is a woman and the current president and executive director of the Belize Chamber of Commerce and Industry are women.

BELIZE CHAMBER OF COMMERCE AND INDUSTRY

The Belize Chamber of Commerce and Industry (BCCI) is the largest private sector membership based organization in Belize. Founded in 1920, the organization has been consistently championing the causes of its private sector constituency and considers among its primary objectives the social and economic development of Belize through the development of all sectors of industry and commerce. Additionally, since 1997, the Chamber is the only recognized "Employers Organization" in Belize under the International Labour Organization's (ILO) tri-partite social partnership.

Currently the BCCI boasts a fluctuating membership of almost three hundred (300) Belizean businesses from a wide cross section of the agricultural, productive, service and industrial sectors. The BCCI's mandate is legally enshrined in Chapter 308 of the Laws of Belize under the Belize Chamber of Commerce & Industry Act. The specific objectives of BCCI are:

- To foster the economic growth and social wellbeing of the nation through the free enterprise system at all levels, by promoting and protecting, both nationally and internationally, commerce, and all sectors of industry which includes agri-business, tourism and manufacturing, the professions and the trades;
- To continually strive to enhance the Chamber's ability to better serve its members whilst operating as a self-sustaining, non-profit, non-political organization.

BELIZE BUSINESS BUREAU (BBB)

The BBB was established by law in 1999. The objectives and goals of the BBB are:

- to deal with matters affecting the interests of the members of the productive sector, and to take such action thereon as may be appropriate;
- to promote the development, continued growth, sustainability and preservation of the productive sector, as defined by the United Nations and other international authorities;
- to undertake, promote, and facilitate the creation of new industries in the productive sector in Belize;
- to promote the growth and development of small and medium enterprises;

BELIZE'S DEVELOPMENT AGENDA

The GOB seeks to develop a people, economy and environment that is resilient to economic and climate shocks and where development is sustainable. The development framework is articulated in Horizon 2030 and the development strategies are further articulated in the national development policies, the Medium Term Development Strategies (MTDS), and the country partnership strategies with respective MDBs and development partners.

HORIZON 2030

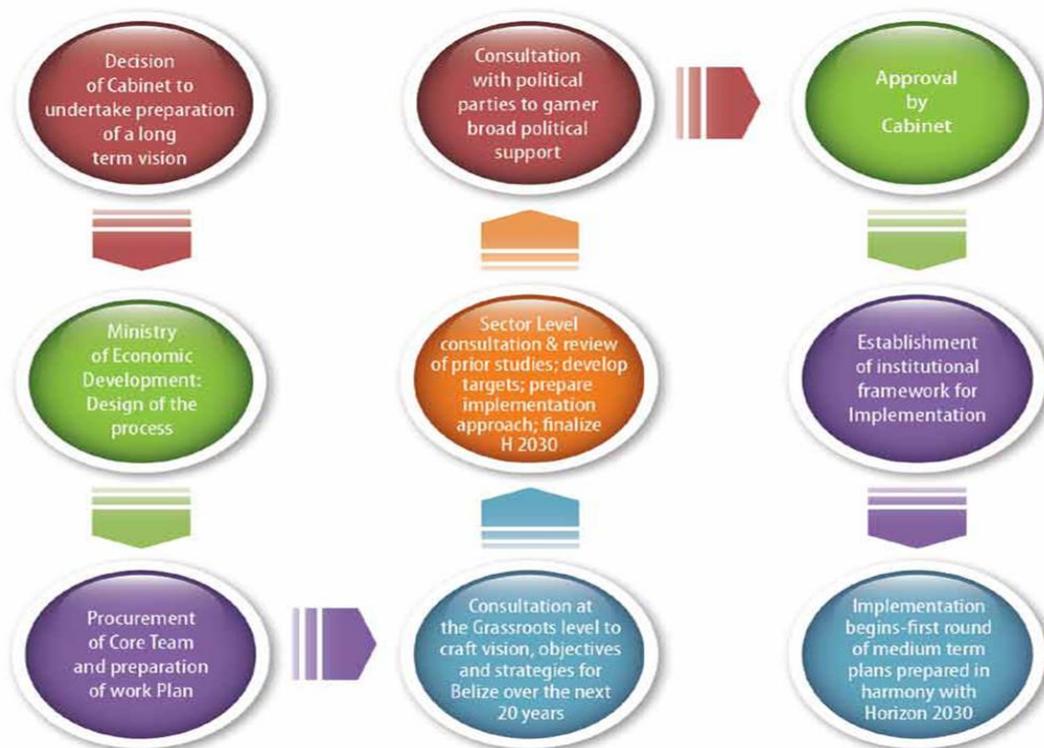
Belize's overarching development agenda is articulated in Horizon 2030. The figure below shows the process through which Horizon 2030 was prepared and adopted. Horizon 2030 embodies the vision for Belize in the year 2030 and the core values that are to guide citizen behaviour and inform the strategies to achieve this common vision for the future. It represents the consolidated views of many stakeholders-young and old, men and women, students and private sectors, farmers, tourism operators and artists. The Horizon 2030 Team met with stakeholders during many meetings in all the districts of Belize. There was great similarity of views across these very varied groups, not only on the critical issues facing Belize, but also on the desired goals for the future and the strategies to achieve these goals.

It is important to see Horizon 2030 not as a plan with pre-determined projects and programmes, but as a framework within which planning in all sectors is to take place going forward to the year 2030. Government should henceforth prepare sectorial medium-term plans that will seek to place and keep Belize on the path to achieving the Horizon 2030 Vision.

The National Vision as stated in Horizon 2030 is: *“Belize is a country of peace and tranquillity, where citizens live in harmony with the natural environment and enjoy a high quality of life. Belizeans are an energetic, resourceful and independent people looking after their own development in a sustainable way.”*

The Medium Term Development Strategy (MTDS) 2014 to 2017 will be the first to be prepared within the framework of Horizon 2030. Work on that strategy is underway and the activities undertaken in the preparation of NCRIP is contributing to the MTDS.

Figure 13: Process for Preparation and Use of the Horizon 2030 Development Framework



MEDIUM TERM DEVELOPMENT STRATEGY (MTDS)

Belize articulates its medium term strategy in three year blocks. The current MTDS is for the period 2010 to 2013. The executive summary of the MTDS 2010 to 2013 asserts “As with other Caribbean countries, Belize’s small size, openness and physical location make it highly susceptible to social and economic shocks and to natural disasters, particularly tropical cyclones. More frequent tropical cyclones experienced since 1999 and new experiences such as severe localized flooding and earthquakes combined with the on-going World Economic Crisis (WEC) and increasing citizen insecurity all underscore the urgent need for resilience”. The main thrust of the MTDS 2010 to 2013 is to incorporate measures to improve the economic and social structures and the capacity of Belize’s citizens to embrace economic opportunities in the face of the global economic crisis which started in 2008 and continued through the plan period, and to proactively manage economic shocks and the effects of natural hazard events. The Government is now embarking on the preparation of the 2014 to 2017 MTDS. The new MTDS will be adopted at the beginning of the 2014 fiscal year. It is the first to be developed under the Horizon 2030 Framework.

BOX 6: Transformational opportunity on climate change in Belize

Led by the Ministry of Finance and Economic Development (MoFED), a series of national stakeholder consultations and workshops were conducted over two months with private and public sectors, as well as civil society and non-governmental organizations (NGOs), to develop the NCRIP and addresses the impacts of climate change on social and economic development. MoFED has received significant support from several ministries including the Ministry of Natural Resources and Agriculture; the Ministry of Forestry, Fisheries and Sustainable Development; the Ministry of Works and Transport; and the National Emergency Management Organization, to embark on **a transformational process that integrates climate change and disaster risk reduction/ disaster management** considerations into national development planning. MoFED is ideally placed to do as it has the mandate for both development planning and budget preparation in the country. It works closely with the Office of the Prime Minister and leads the ‘GFDRR steering group’ that oversaw the technical projects assisting with the selection of interventions for NCRIP. Participants at the two national NCRIP workshops have suggested continuing with this leadership in the oversight and implementation of NCRIP and its multi-sector interventions.

DEVELOPMENT POLICIES

The Government of Belize has articulated a number of development policies and sector strategies that need to be taken into consideration through the development and implementation of the NCRIP. These include:

- The National Tourism Policy and the Sustainable Tourism Plan
- The National Trade Policy
- National Agriculture Policy
- The National Social Policy Framework
- Belize Environmental Policy Framework
- The Gender Policy
- National Hazard Mitigation Policy
- The National Land Use Policy and Integrated Planning Framework
- The National Spatial Data Infrastructure Policy
- The Climate Change Adaptation Policy

THE NATIONAL TOURISM POLICY

Belize's policy declaration on responsible tourism states:

“The Government of Belize shall support and engage in responsible tourism as its preferred approach to the management of Belize as a tourism destination in order that the integrity of Belize's natural resources and biodiversity be sustained, that there be equitable distribution of the economic benefits derived from tourism, that the local culture and communities involved in tourism activities be respected, and that visitors to Belize act in an appropriate manner that respects the natural resources and cultural heritage of the country. This shall be achieved by managing tourism as a shared responsibility requiring the support of and partnership among the public sector, private sector and those involved in and benefitting from the management of the country's protected areas and natural resources” (Alonzo and Dujon 2010). This declaration recognizes the importance of Belize's natural resources to the tourism sector and the importance of protecting these resources. It also acknowledges the importance of providing opportunities for the women/men in Belize to earn an income.

THE NATIONAL TRADE POLICY

Belize's trade policy is articulated in the 2004 report to the World Trade Organization (WTO). That report states: *“The Government of Belize (GOB) recognizes that trade is instrumental in advancing Belize's economic and social prosperity... Cognizant of the difficulties faced by Belize in participating in the global economy, GOB underscores the principle that any integration agreement (between asymmetric parties) takes due account of the needs and weaknesses of developing countries and the vulnerabilities endemic to small developing states. Belize advocates the Principle of Gradualism which mandates that small economies should be gradually integrated into the rules based international economy...”* The Government sees the importance of diversifying exports and to expanding the opportunities for women/men in Belize to earn an income and improve their quality of life. Building the resilience of the women/men and economy of Belize to weather events, climate change, and economic shocks will ensure that Belize is better able to participate in world trade and earn the foreign exchange that the country needs.

NATIONAL AGRICULTURE POLICY

The main constraints to the agriculture sector include limited organization of markets and marketing, low yields in small-scale agriculture, lack of drainage/irrigation, limited research/development, outdated farming practices/equipment, inadequate packaging & grades/standards, limited government land available for agriculture & land tenure insecurity.) The focus of the agriculture policy is therefore accelerating the diversification of both local/export-oriented agriculture, promoting agro-processing and value adding as a means of expanding opportunities and increasing the income of the rural sector, actively promoting market/trade expansion both locally and internationally, increasing the efficiency, profitability and competitiveness of the sector, and improving and conserving the natural/productive resource base to ensure long-term sustainable productivity and viability.

For the fisheries sector, the constraints/challenges include ensuring the long-term sustainability of capture fishery. Part of that challenge is ensuring that there is a reliable seed stock to replenish the capture. The industry has to be managed to ensure a sustainable harvests that provides a good quality of livelihood to fishers. On the aquaculture front utilization of locally produced feed and disease management are critical to viability. Efforts need to be directed at production of good quality feed that is cost effective and to develop,

disseminate and implement husbandry practices that reduce or eliminate the incidence of diseases that reduce productivity.

The policy focus is therefore on ensuring a sustainable supply of marine products, particularly, lobster, shrimp and conch, while continuing to contribute to food production and foreign exchange earnings. For aquaculture the focus will be on developing a globally competitive industry with high quality/safe products and in an environmentally responsible manner.

The GoB sees both agriculture and fisheries as important employers in the economy so every effort is being made to keep these sectors viable. Their resilience to the impacts of climate change is critical to Belize's sustainability.

NATIONAL SOCIAL POLICY FRAMEWORK

Belize's social policy framework aspires to support the national development agenda. It targets the most vulnerable and offers opportunity to spiral out of poverty. The framework is gender-sensitive and reflects the need to tailor its programs to cover the needs and interests of Belizean women, girls, men and boys. The Government's social policies seek to help the vulnerable using four different approaches:

- Developmental approaches which include capacity building through vocational or general training schemes
- Supportive approach which include the provision of 'welfare' to persons at risk
- Remedial approaches which aim to restore individuals to a former state of higher functioning such as after disasters or personal traumas
- Preventative approaches which provides support to at risk persons to protect them and increase their resilience.

ENVIRONMENTAL POLICY FRAMEWORK

Belize ratified the Convention on Biodiversity and this has influenced its environmental policies. The country also recognises that its competitive advantage lies in its natural resources. Belize is therefore committed to protecting its natural capital. The country has passed and is implementing the National Protected Areas Policy and System Plan. It is currently revising its forest policy and is working on a sustainable development policy. All of these actions are with the view to protecting the natural capital and ensuring that the ecosystem remains robust and continue to provide environmental services.

THE NATIONAL HAZARD MITIGATION POLICY

The Belize Hazard Mitigation Policy recognizes that the country is susceptible to a variety of hazard events that could result in incalculable damage to the environment and the erosion of our social and economic development. Hazard mitigation can reduce our vulnerability to these hazards and vastly increase the nation's ability to recover from these events. The policy therefore places emphasis on building national capacities to reduce vulnerability based on the principles of sustainable development and the active participation of all stakeholders in hazard risk reduction activities. The goal of the policy is to enhance sustainable social and economic development and environmental management through the integration of hazard risk reduction into national development processes and to build the capacity of national institutions to more effectively implement programmes and projects to reduce vulnerability of the nation and women/men to natural and

technological hazards. The goal of this policy is congruent with the overall objectives of the NCRIP so successful implementation of NCRIP will further this policy.

THE NATIONAL GENDER POLICY

The national gender policy is driven by the vision of a society in which all men and women, boys and girls are able to achieve their full potential through the enjoyment of their human rights; live together in mutual respect, dignity and harmony; and are equal partners as they participate in services and resources for realizing and sustaining their economic, social, political, and cultural development for equal enjoyment of all. The gender policy calls for all state policies, regulations and programmes to explicitly aim to identify and eliminate gender-based discrimination in the allocation of resources, benefits, or access to services. This includes women's and men's right to equality of opportunity, of access, and/or of outcomes. It upholds the concept of equity recognizing that women and men have different needs and power, and that these differences should be identified and addressed in a manner that rectifies the imbalance between the sexes. This extends to men and women of all ages, geographic location and ethnicities. The gender policy is therefore seeking to improve the quality of life of all Belizeans and is looking to the actions of government and non-state actors to incorporate this notion. Women make up 50% of Belize's population, yet they are underrepresented in the workforce and still suffer higher unemployment rates; even while young women outnumber males in secondary and tertiary education institutions. Women as a group fall among the vulnerable populations in Belize because they are generally more economically dependent than men.

NATIONAL LAND USE POLICY AND INTEGRATED PLANNING FRAMEWORK

The National Land Use Policy seeks to enable improved land governance at national, local and community levels while ensuring that land is put to its most suitable. Through the integrated planning framework it provides a participatory platform for the women/men of Belize to partake in decision making regarding the use of, and equitable access to, land resources through an accountable and transparent process and to facilitate economic growth and social progress by ensuring that the development of land is founded upon feasible and sustainable grounds. Land use should bring about maximum national and local benefits. The Government will put in place robust land administration procedures to guarantee land tenure security, document land transactions, and support land taxation. The government will support the preparation of a spatial plan that will provide guidance for acceptable land use across the country. This land use plan will integrate climate change adaptation, and comprehensive disaster management into development planning and actions.

NATIONAL SPATIAL DATA INFRASTRUCTURE POLICY

The National Spatial Data Infrastructure (NSDI) is a national initiative that is driven by multiple stakeholders, particularly agencies in the country that are actively producing spatial data. The focal Ministry leading the development of Belize's NSDI is the Ministry responsible for Lands in collaboration with Five (5) NSDI Working Committees and various local and regional agencies. Cabinet approved the Draft National Spatial Data Infrastructure (NSDI) Policy in August 2012 as the first step in the development of a fully functional NSDI in Belize.

Through this policy, the National Spatial Data Infrastructure (NSDI) is considered a key part of a country's wider infrastructure assets such as roads, electricity, telecommunications networks etc. It is an umbrella of

policies, standards, and procedures under which organizations and technologies interact to foster more efficient use, management and production of spatial data. The NSDI will enable the sharing of data and information, and production of information products that support decision making. The NSDI is still in its early stages but deliberate efforts are being directed at its development, since data sharing is considered a bottleneck and is limiting the use of data in decision making.

CLIMATE CHANGE POLICY

In 2008 the Government of Belize adopted *Belize Climate Change Adaptation Policy*. The policy objectives are:

- a. Explore and access the opportunities being developed through the climate change negotiation process to meet the development objectives of the nation.
- b. Prepare all sectors of Belize to meet the challenges of global climate change.
- c. Promote the development of economic incentives, which encourage investment in public and private sector adaptation measures.
- d. Develop Belize's negotiating position on climate change at the regional and international levels to promote its economic and environmental interests.
- e. Foster the development of appropriate institutional systems for planning and responding to global climate change.

The policy is directed at: (A) those government agencies, which elaborate, enunciate and guide government's policies. (B) All government agencies, which execute policies or provide services in sectors, which may be impacted by global climate change. These include but are not limited to agriculture, coastal zone, energy, environment, fisheries, forestry, health, housing, local government, tourism, transportation, and water resources. (C) Those government agencies responsible for education and public awareness. (D) The private sector, academia, civil society and the media

When the policy was first adopted, The Chief Meteorologist, National Meteorological Service was identified as the Focal Point on all matters related to climate change. In recognition that there are many initiatives on climate change, which involve different sectors, the Chief Meteorologist was directed to remain abreast of these initiatives, and agencies involved in these initiatives were requested to provide reports to the Chief Meteorologist on those activities.

The policy remains in place, but the focal point is now the National Climate Change (NCCO) Office in the Ministry Of Forestry, Fisheries and Sustainable Development. That office is currently working on a revision of the policy which will be submitted to Cabinet for adoption.

PROGRESS ON CLIMATE CHANGE ADAPTATION MEASURES BY BELIZE

The Government of Belize (GoB) is a signatory to UN Framework Convention on Climate Change (UNFCCC) and has so far has submitted two national communication reports. The country, under the leadership of the National Climate Change Office is preparing its 3rd national communication. Over the last

ten years Belize has been slowly but steadily building its capacity for CDM and climate change adaptation. The country adopted its national hazard mitigation policy and has prepared a national hazard mitigation plan which seeks to implement the policy.

The Ministry of Forestry, Fisheries and Sustainable Development has been designated as the government agency responsible for the coordination and implementation of climate change policies in Belize. To assist the Ministry in carrying out its responsibilities, the Belize National Climate Change Committee (BNCCC) was established as a broad-based multi-stakeholder committee comprised of public and private sector, and civil society members. Its task is to advise the government on its responsibilities under the UNFCCC and to implement appropriate policies and strategies to ensure continued economic growth given the impact of climate change on Belize. The BNCCC was endorsed by Cabinet in November 2010.

Moving forward, the BNCCC and the NCCO will need to work closely with MoFED to support the integration of climate change adaptation and resilience building into national development planning and actions.

In 2008, the National Integrated Water Resources Policy was finalized. This policy has fully integrated climate change adaptation. As a follow up to the Policy, Belize adopted the National Integrated Water Resources Management Act in April 2011. The Act calls for the establishment of a National Integrated Water Resources Authority and the elaboration of enabling regulations to operationalize the Act. That work is underway but is not yet complete.

There is a general awareness of the importance of climate change adaptation since the government has hosted a regional United Nations Framework Convention on Climate Change (UNFCCC) workshop on May 5th -7th 2010 in Belize City and is a regular participant at the Conference of Parties and has signed agreements to participate in the Clean Development Mechanism. The challenge now is to undertake the transformational process to fully integrate climate change adaptation and resilience building to nation development, being mindful of the different ways in which interventions can benefit or detract each gender's development prospects.

Successful implementation of NCRIP will help the transformational process. NCRIP will strengthen the national planning framework and provide for climate change adaptation and resilience building to be a pillar of development alongside poverty reduction and economic growth for sustainable development.

DISASTER RISK MANAGEMENT

Over the last fifteen years the Government of Belize has undertaken a number of initiatives to reduce the economic impact of damage and the loss of life due to hazardous events. A key accomplishment was the enactment of the Disaster Preparedness and Response Act, Chapter 145 of the laws of Belize which provides the legal, regulatory and administrative framework for the National Emergency Management Organization (NEMO).

Using support provided by the Inter-American Development Bank (IDB) between 1999 and 2006, the country has steadily increased its capacity for preparedness and response. The Government established NEMO and put in place policies, procedures and structures for disaster response. In addition, since 2003, the Government of Belize (GOB) has taken important steps to implement a more comprehensive approach to the

management of disaster risk. These include (i) the endorsement of Comprehensive Disaster Management (CDM); (ii) the adoption a national hazard mitigation policy in 2004; (iii) the elaboration of a draft national hazard mitigation plan; and (iv) participation in the Caribbean Catastrophe Risk Insurance Facility (National Policy Development Committee, 2003).

Box 7: Linked institutions within NEMO

The NEMO comprises the Cabinet, with the Prime Minister as the Chairperson, the Cabinet Secretary, as Secretary, the NEMO Secretariat and the 10 Operational Committees (chaired by Permanent Secretaries). The ten Operational Committees are as follows: Education, Communication and Warning; Medical and Relief Measures; Housing and Shelter; Search, Rescue and Initial Clearance; Collection Control and Distribution of Food and Material; Assessment and Evaluation of Damage; Foreign Assistance; Transport; Environment and Utilities.

The other permanent members are the Belize Red Cross, the Belize Teachers Union, the Chief Meteorological Officer, the Commandant BDF and the Commissioner of Police. Integral to NEMO are its 9 District Emergency Committees (chaired by the senior Minister in each District) representing Belize, Corozal, Orange Walk, Cayo, Stann Creek, Toledo, Belmopan, San Pedro and Caye Caulker.

NEMO is the national coordinating and implementing agency for disaster risk management. It consists of a secretariat and a network of twelve national level operational committees and nine district and special committees (Rogers, 2010 p. 157 – 158). The committees are made up of representatives from the public sector ministries, departments and other institutions; private sector agencies; nongovernment organizations and community organizations. These committees assist with the discharge of the functions of the National Emergency Coordinator as described under the Disaster Preparedness and Response act, Chapter 145 of the Laws of Belize, Revised Edition 2000 (ibid).

Despite the advances toward a more comprehensive approach to the management of disaster risk, Belize faces several challenges to achieving sustained disaster risk reduction in the context of climate change which could lead to more frequent and more intense hazard events. The focus of the disaster risk management system continues to be on preparedness and response with minimal attention given to disaster prevention and impact mitigation (ibid p. 162). One of the barriers to comprehensive disaster risk management is the limited extent to which disaster risk management is integrated into the operations of public and private sector organizations, and the wider society. It is imperative that disaster risk reduction is mainstreamed into the plans and operations of public agencies, private sector companies, and the society at large. Once that is done, NEMO will be better poised to place greater emphasis on ex-ante risk reduction, and incorporate Integrated Disaster Risk Management (IDRM) into the core operations of public sector institutions. NEMO will need to work with MoFED to integrate comprehensive disaster management into the national planning framework.

Some critical actions that are required to achieve this integration include strengthening of the institutional capacity and the legal and regulatory framework for comprehensive disaster management (CDM); improving risk information and education to inform development decision making; and development and implementation

of a comprehensive sector-wide program for prevention and mitigation as well as a strategy for the ex-ante financing of disaster risk mitigation.

INTEGRATION OF CLIMATE CHANGE ADAPTATION AND COMPREHENSIVE DISASTER MANAGEMENT INTO NATIONAL DEVELOPMENT

The *National Emergency Management Organization* (NEMO) and the National Climate Change Office (Office) are responsible for disaster risk reduction and climate change adaptation in Belize. While they are aptly suited to provide the technical lead in these areas, they need to work with the national development and planning agency in the country to successfully mainstream these actions into national development.

NEMO – NATIONAL EMERGENCY MANAGEMENT ORGANISATION

NEMO was established in 2000 to preserve life and property throughout the country of Belize in the event of an emergency, threatened or real, and to mitigate the impact on the country and its women/men. NEMO is comprised of the Cabinet, with the Prime Minister as the Chairperson, the Cabinet Secretary, as Secretary, the NEMO Secretariat and the 10 Operational Committees (chaired by Chief Executive Officers). The ten Operational Committees are as follows: Education, Communication and Warning; Medical and Relief Measures; Housing and Shelter; Search, Rescue and Initial Clearance; Collection Control and Distribution of Food and Material; Assessment and Evaluation of Damage; Foreign Assistance; Transport; Environment and Utilities. The other permanent members are the Belize Red Cross, the Belize Teachers Union, the Chief Meteorological Officer, the Commandant BDF and the Commissioner of Police. Integral to NEMO are its nine District Emergency Committees (chaired by the senior Minister in each District) representing Belize, Corozal, Orange Walk, Cayo, Stann Creek, Toledo, Belmopan, San Pedro and Caye Caulker.

NEMO has been forging ahead with the implementation of the hazard mitigation policy and plan and with developing capacity among the various sectors to prepare hazard mitigation plans as part of their overall sector plans. NEMO is also developing data management capacities to support disaster mitigation, preparedness, response and recovery. NEMO's experience with integration of CDM into sector plans should provide useful lessons to the integration of CDM and climate change adaptation into national development. The NCRIP Implementation and Coordination Team will need to forge strong relations with NEMO and include them in the National Planning Framework.

In responding to the challenges of climate change, Belize has committed itself to defining its institutional and legal landscape for climate change adaptation and mitigation, focusing on the roles of various actors, existing institutional capacities and governance issues relating to institutions. In essence the political and administrative systems needed to handle emerging national issues of climate change mitigation and adaptation are being put in place.

NCCO – NATIONAL CLIMATE CHANGE OFFICE

As the potential impacts of climate change on Belize's development become more broadly socialized into the mandates of national decision makers, the country has sought to undertake several key base initiatives in addressing the issue. Instrumental among these is the preparation of national communication reports to the UNFCCC which outlines national circumstances, greenhouse gas inventories, and vulnerability assessment reports, that have been undertaken over the last decade. Most recently, the government, with support from the European Union through UNDP has helped to establish the National Climate Change Office (NCCO). The

GoB, through the NCCO, with the support of the United Nations Development Programme has committed itself to updating Belize's National Adaptation Policy and to put in place a related adaptation strategy which provides a road map for Belize's development in the context of climate change. Despite national efforts to formalize a National Climate Change Advisory Body through Cabinet decree, current efforts continue to need support from the Ministry of Finance and Economic Development, the agency responsible for development planning. There is need therefore for the technical agency responsible for promoting climate change adaptation, the NCCO, to collaborate closely with the development planning ministry to advance the climate change adaptation agenda. The NCCO will need to engage the dialogue on the National Planning Framework to ensure that climate change adaptation become an integral part of the planning process.

It is expected that both NEMO and NCCO will be key partners with MoFED, through the NCRIP Implementation and Coordination Committee and the Director of Policy and Planning in the articulation of the National Planning framework.

PART B: PROPOSED INTERVENTIONS

B001_Development Objectives

As discussed in Part 1, Belize has made a strategic choice to build resilience among its women/men and the economy and within the environment because the country as a whole is highly sensitive to the effects of intense weather events and to climate change. While the GoB and its development partners have raised and applied substantial resources toward this end, resilience, climate change adaptation and comprehensive disaster management are still to be integrated into the planning and development discourse and process. While more resources are certainly required, there is also the fundamental need to reengineer the workflows of the various government ministries and departments to ensure that the data and information products needed for decision making and development actions are produced and made available in the right form, at the right time, and to the right officers.

GoB has taken a knowledge driven and analytical approach, along with broad based consultation, to identify the most vulnerable women/men, sectors of the economy and ecosystems, and the kinds of actions that need to be taken to build their resilience, as the most critical interventions that should be undertaken first. During the NCRIP Review, it was suggested that the NCRIP should identify those interventions that build resilience to climate related events while reducing poverty and building economic capacity as priority areas of intervention. It was also suggested that actions which enable the government to integrate climate change adaptation and mitigation of the potential effects of extreme weather events into national development planning and actions should be addressed through the NCRIP.

Successful implementation of NCRIP will help to move Belize toward the vision articulated in the Horizon 2030 Development Framework: “a country of peace and tranquillity, where citizens live in harmony with the natural environment and enjoy a high quality of life, and where the citizens are an energetic, resourceful and independent people, looking after their own development in a sustainable way.

The GoB is mindful of the fact that gender, climate change adaptation and disaster risk management efforts are inexorably linked, and that inequality between men and women in their access to productive resources, services and opportunities limits the success of any climate resilience endeavour. The GoB also recognizes that in addition to bringing potential productivity improvements, proactively increasing women’s access to and control over information, resources and decision-making processes, can have positive effects on women, men, and children as well as overall development outcomes. Specifically, important human development outcomes including household food security, child nutrition and education, and women’s own well-being and status within the home and community will also benefit (Dookie, Lambrou and Petrics 2013). The NCRIP seeks to proactively enable gender-specific measures both in planning and the decision making processes and in the implementation processes. Therefore, gender dimensions have been mainstreamed across the NCRIP, including data-collection, physical investments, and non-physical investments and monitoring in all stages of the climate resilience process.

The NCRIP provides a mechanism through which to fully integrate climate resilience and disaster risk management into national development efforts. GoB considers this necessary given Belize’s vulnerability to natural hazard events, and the likelihood that the frequency, intensity and array of natural hazards facing Belize will continue to increase in light of the climate change projections and their likely effects. The

Government of Belize is actively seeking grant and concessionary financing to support the implementation of the interventions proposed in the NCRIP.

NCRIP's development objective and overall goal is to improve the resilience of the women, men and children, and economy and the ecosystems of Belize to the effects of climate change, climate variability, weather and natural hazard events, by strengthening the capacity of the national and local governments, private sector and civil society to cope to with the ever increasing intensity of natural hazard events in the wake of climate change and climate variability, and the ever increasing frequency and intensity of natural hazards. Successful implementation of NCRIP will help to make progress toward Belize's vision as articulated in the Horizon 2030 Development Framework: "a country of peace and tranquillity, where citizens live in harmony with the natural environment and enjoy a high quality of life, and where the citizens are an energetic, resourceful and independent women/men, looking after their own development in a sustainable way.

The key partners in the implementation of NCRIP are the Government of Belize (GOB), NGOs, civil society, the private sector and the country's development partners. The efforts under NCRIP will be led by MoFED and include the various partners who have participated in its preparation.

Successful implementation of NCRIP will produce two Key Results and four intermediate results:

The key results are:

- a. Increased resilience of women and men, economy and environment in Belize to climate variability and climate change.
- b. The national planning framework is clearly articulated and fully integrates climate change adaptation, comprehensive disaster risk management alongside poverty reduction and economic growth for sustainable development.

The Intermediate results are:

- a. The relevant agencies are collecting, analysing, and disseminating gender disaggregated data and information to support smart decisions that increase the resilience of the women and men and economy of Belize.
- b. Belize's critical infrastructure (roads, airports, sea ports, coastal defences, and building facilities) are withstanding the impacts of natural hazards and continue to operate and serve the nation in the wake of these impacts.
- c. Livelihood activities, markets and value chains are resilient to the impacts of natural hazards for Belizean women and men.
- d. Building resilience to the effects of climate change, climate variability and weather related hazards, and implementation of comprehensive disaster risk management, are fully integrated into national development planning and action, along with poverty reduction, in the pursuit of sustainable development of the women/men and economy and the environment of Belize.

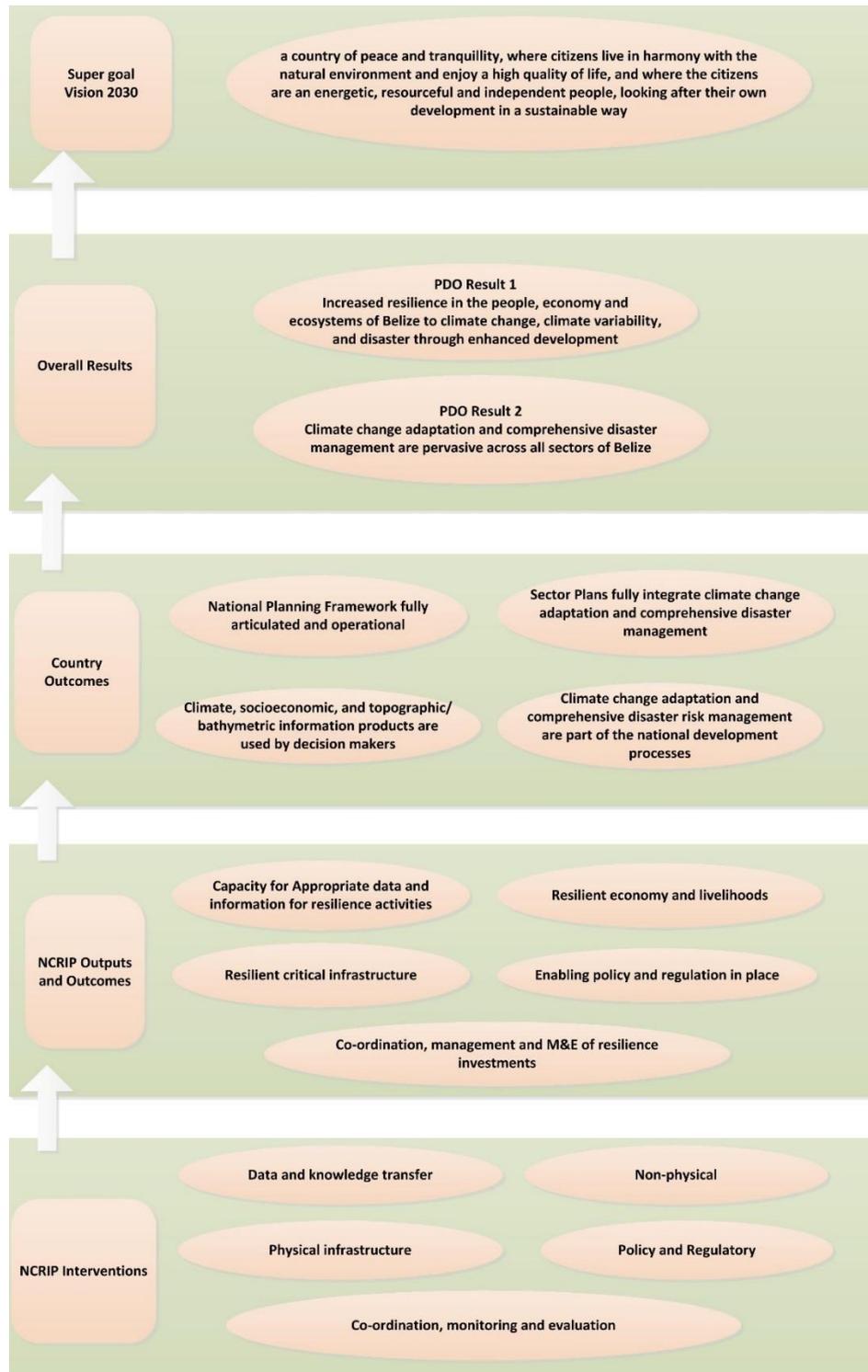
Table 11: Key Results and Indicators of Success

Results	Indicators
<p>PDO Result One:</p> <p>Increased resilience of women and men, economy and environment in Belize to climate variability and climate change</p>	<p>Percentage below the Poverty Line</p> <p>Change in percentage of households (in areas at risk) whose livelihoods have improved (acquisition of productive assets, food security during sensitive periods of the year)</p> <p>Change in damage/losses (USD) from extreme climate events in areas at risks that are the geographical focus of the interventions.</p>
<p>PDO Result Two:</p> <p>The national planning framework is clearly articulated and fully integrates climate change adaptation, comprehensive disaster risk management alongside poverty reduction and economic growth for sustainable development</p>	<p>Integration of climate change, climate variability and comprehensive disaster management into national and sector planning (Review and assessment of the planning framework)</p> <p>Budget allocations target investments that build resilience while reducing poverty and enabling economic growth (Investment analysis)</p>
<p>NCRIP Intermediate Results</p>	
<p>Intermediate Result One:</p> <p>The relevant agencies are collecting, analysing, and disseminating data and information to support smart decisions that increase the resilience of the women and men and economy of Belize to the vagaries of climate change, climate variability and weather related hazards</p>	<p>Gender-disaggregated data, information and tools to integrate CV, CC, and CDM into decision making are being developed and disseminated by the relevant agencies</p> <p>The physical assets required to collect, analyse and disseminate data and information are in place and in use in the appropriate agencies (government, private sector, and civil society)</p> <p>The competencies and the recurring resources are in place and in use in the appropriate agencies (government, private sector, and civil society) to produce gender-disaggregated data and information that can support smart decisions.</p>

Results	Indicators
<p>Intermediate Result Two:</p> <p>Belize’s critical infrastructure assets (roads, airports, sea ports, coastal defences, and building/facilities) are withstanding the impacts of climate change, climate variability and natural hazards, by continuing to operate and serve the nation in the wake of these impacts</p>	The critical assets continue to operate in the wake of extreme weather events.
	The government and women and men of Belize know what the critical assets are.
	The maintenance plan is being implemented.
	There are minimal disruptions with the operations of the critical assets in the wake of natural hazards.
<p>Intermediate Result Three:</p> <p>Livelihood activities, markets and value chains are resilient to the impacts of natural hazards for women and men.</p>	A gender-disaggregated baseline of livelihood activities and options are in place.
	Unemployment of women and men are decreasing and women participation rate in the workforce is increasing.
	Markets and value chains continue to operate after weather related events for women and men.
<p>Intermediate Result Four:</p> <p>Building resilience to the effects of climate change, climate variability and weather related hazards, and implementation of comprehensive disaster risk management, are fully integrated into national development planning and action, along with poverty reduction, in the pursuit of sustainable development of the women and men and economy and the environment of Belize</p>	Planners and leaders in the public and private sectors and civil society are incorporating weather and climate information (gender-disaggregated when relevant) into their decision making processes.
	MoFED have clearly articulated protocols for incorporation of weather and climate data and information (gender-disaggregated when relevant) into national development planning and decision making processes.
	Evidence of strengthened government capacity and coordination mechanism to mainstream climate resilience.

LOGICAL FRAMEWORK

The diagram below shows the logical process from NCRIP interventions to Development Outcomes, making Belize Climate Resilient and meeting the development goals set out in its Vision 2030. This effort is considered transformative because it will move the discussion about resilience into the national planning framework.



B002_Proposed interventions and financing

PURPOSE OF SECTION

This section presents a summary of the components and interventions that can comprehensively address the required range of resilience actions for dealing with the climate risks that Belize is faced with. These actions will also have co-benefits such as creation of new skills, jobs, knowledge transfer and adaptation. They will enable more complex and ambitious resilience programmes to be undertaken by laying the foundation requirements. The ultimate objective of the NCRIP is to highlight such interventions that will enable Belize to resist weather impacts and rebound rapidly if affected. The section further presents some estimates of the financing required to implement the components and interventions, and describes the steps in identifying those. These estimates are based on discussions with the stakeholders as well as some element of benchmarking on the cost of comparable activities in the region. These costing have been elaborated and reviewed with stakeholders and should be treated as indicative as the proposed feasibility studies will identify the costs in more detail. There was research and discussion around current in-country activities (of Government of Belize and MDBs) that have the potential to compliment and benefit from these interventions; this has been acknowledged in finalising the resource requirements for NCRIP.

THE MAIN COMPONENTS OF NCRIP

BACKGROUND

As discussed earlier, Belize faces vulnerability from climate variability across its economy. Financial resources in Belize have to be used diligently and the Government of Belize aims to invest in many activities with the intention to derive multiple benefits, across multiple sectors of the society and the economy. Thus prioritizing resilience measures based on their relevance and from which the widest possible co-benefits could be derived was an integral part of the process in defining the most appropriate interventions at the present moment.

Priority resilience measures in dealing with risks were identified through a series of workshops and one to-one discussions carried out with technical officers of the government as well as other stakeholders. See **Appendix B** for tables that describe such measures against various climate risks. Technical officers represented all the sectors of the Belize economy and relevant ministries including but not limited to health, finance, economy, works, transport, tourism, agricultural & natural resources, physical planning, fisheries, forestry, utilities across the three major ecological zones of Belize - marine, coastal and terrestrial. As the NCRIP gains momentum and the foundation is laid with the key resilience measures, it can be reviewed and revised to add more complex measures in future.

OBJECTIVES

The NCRIP is envisaged as a dynamic plan that responds to the emerging variability in climate context and new knowledge of tools and practices in the course of its implementation. During the course of learning and consultations the GoB identified two categories of measures.

- **Resilience measures:** Interventions that will directly reduce the risk and vulnerability in critical areas.
- **Enabling measures:** Interventions that will enable proposed resilience measures to be more effective.

The objective behind the investment components was to capture urgent requirements that will enable more complex resilience measures to be more effective. These measures will have co-benefits for several types of projects and sectors and lay the foundations for resilience in Belize. In prioritizing measures, stakeholders also considered the co-benefits that interventions brought to Belize, its women, men and economy. For instance resilience interventions that filled gaps in development planning, built exemplar skills, generated new sources of livelihoods were given priority.

RATIONALE FOR COMPONENTS

Climate resilience interventions in Belize have thus been clustered and described under five components. The NCRIP (National Climate Resilience Investment Plan) identifies both physical and non-physical intervention areas that take into account current and future risks posed by existing and future climate variability. A component on implementation and monitoring will ensure that the various strands of the NCRIP are well coordinated, maximising the efficiencies and the NCRIP itself can be reviewed and amended as the work progresses. The intervention areas identified within the NCRIP compliment the portfolio of investment being implemented under the *Public Service Investment Programme (PSIP)*¹⁰ to strengthen infrastructure, social protection, economic services and public administration services. The PSIP reports on most projects and financing from multi-lateral sources including loans and grants from MDBs and development partners working with Government of Belize¹¹. The intervention areas have been identified with a view to lay the foundations for further more complex resilience measures to be undertaken in future and intend to compliment any ongoing projects listed within the PSIP as well as in the private and NGO sector.

Technical Data and knowledge transfer: Interventions mainly in the ICT sector that result in improved base-line information and analysis to prepare and sustain operations during weather hazards.

Physical: Interventions related to physical planning or critical assets that will minimise the disruption from weather hazards. This will allow for exemplar measures and practices to be demonstrated.

Non-physical: Interventions comprising strategic planning, organisation and management leading to improved levels of continuity amongst women/men, business or operations.

Policy and Regulatory: Interventions related to the response of government in supporting or creating a more conducive environment for maintaining continuity throughout weather hazards. Typical tools that the government may employ are policies, standards, regulations and incentives.

Implementation, Monitoring & Evaluation: Interventions related to the monitoring and evaluation of climate change related interventions in Belize such that lessons can be learnt.

¹⁰ <http://www.belize.gov.bz/index.php/useful-links/publications/finish/26-ministry-of-finance/138-public-service-investment-report>

¹¹ Including CCCCC, CABEI, CDB, EU, IADB, UNDP, WB.

Box 8: Milestones in selection of Resilience measures under NCRIP

RISK AND RESILIENCE MEASURES

Risks and resilience measures (*interventions*) were identified through a series of workshops and one-to-one discussions carried out by facilitators in Belize over the last few months with technical officers of the government as well as other stakeholders. Technical officers represented all the sectors of the Belize economy and relevant ministries including but not limited to health, finance, economy, works, transport, tourism, agricultural & natural resources, physical planning, fisheries, forestry, utilities. [See Appendix B for tabulation of risk measures identified against various climate risks.]

The shorter and final selection of intervention areas for the NCRIP underwent a number of consultative and technical filters. A number of principles were applied in achieving the short-list. These were: The *interventions* will complement (not duplicate) and co-ordinate ongoing efforts in Disaster Management/ Climate Change adaptation or mitigation as well as existing improvements under the *Public Services Investment Programme* (PSIP), lay the foundation for climate resilience to be mainstreamed within development planning/ national budgeting and for complex climate resilience projects to be undertaken in the future, for instance, including but not limited to upgrading to all-weather infrastructure, spatial planning, robustness of key economic sectors and risk financing and insurance.

MAPPING ONGOING INVESTMENTS AND TECHNICAL GAP ANALYSIS

The NCRIP team referred to PSIP, PSIP pipeline and carried out additional consultation with MDBs, Private Sector, Development Partners to capture other ongoing/ planned investment with a view to rule out duplication and maximize complementarity. The Belize Public Service Investment Programme (PSIP) 2013 reports 100+ development projects totaling 320 million USD that are improving infrastructure, social protection, economic services, public administrative services. These include loans and development assistance grants to the Government of Belize from MDBs and Development Partners including but not limited to CCCCC, CABEI, CDB, EU, IADB, and WB.

The NCRIP team also used this exercise to identify any major gaps in ongoing investments. These were of two kinds: gaps in demonstrating exemplar practice or foundation level information that will be essential to inform all resilience projects. A number were found and included in the list of resilience interventions under NCRIP. For instance - more cost-effective and reliable energy will benefit every sector. Topographical information and quality testing is a must for resilient engineering projects. Zoning information guiding development at the national scale 'where to build, where not to build' is vital to prepare more complex strategies and guide investment in vital economic sectors such as tourism, and agriculture. Climate impact data is necessary before micro-finance schemes can be rolled out. A few years' down the line these gaps would have been filled and thus setting the foundation for more complex resilience efforts to be undertaken.

INVESTMENT COMPONENT 1: TECHNICAL DATA AND KNOWLEDGE TRANSFER

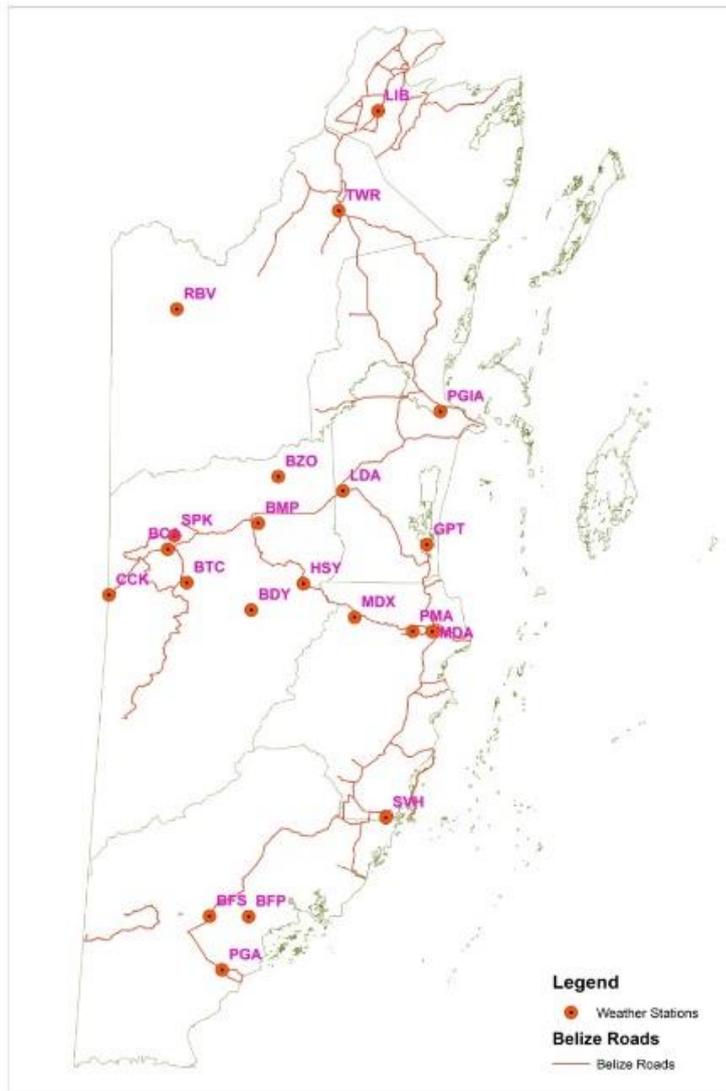


Image (Above) Hydro-meteorological data in Belize is drawn from a very sparse network of monitoring stations. In addition topographical and bathymetric informatics that will allow suitable engineering and planning projects to be developed is also not available. Thus strengthening data and knowledge is a priority investment under NCRIP.

In addition to the data related to technical sub-projects described earlier, the GoB, under the leadership of the Ministry of Natural Resources and Agriculture is implementing the National Spatial Data Infrastructure Policy and is organizing itself to implement the National Land Use Policy and Integrated Planning Framework. For the first time, part of the national census has been given a spatial dimension. Together these actions are laying the foundation for making spatial and a-spatial data seamlessly available for planning and decision making. All of these actions are evidence that the GoB is organizing its data management and dissemination structures to facilitate data sharing and analysis. The structure and procedures are not yet all in place, but the decision to move in that direction has been made, and the actions to get there have started.

During the preparation of NCRIP stakeholders from among the state and non-state actors have constantly raised the need for meteorological, bathymetric and topographical data at a suitable scale to support planning and decision making. These datasets are constantly identified as missing or inadequate for detailed planning. Collection, analysis and dissemination of social, economic and demographic data in spatial formats also need support. Given that Belize's comparative advantage is its natural capital, monitoring of ecosystem services and resource valuation have also been raised. It is acknowledged that this array of data can enable better decisions through integration of spatial planning into development planning as a way to adapt to climate change.

This component of the NCRIP charts a road map toward the acquisition of the array of data to support spatial planning for social and economic development that is resilient to the impacts of climate change and intense weather events. It identifies the types of data that is needed; explores the options for their acquisition; and works to build the capacities of the agencies that are responsible for the collection, maintenance and dissemination of the data and the derived information products. It will help to put in place database structures that could hold the spatial and a-spatial data need for planning and decision making in a seamless package that encourages use. It will also help to establish data management and maintenance procedures to ensure that historical and current data is available for the production of relevant information products. This component will also need to work with data users such as planners and decision makers to understand their workflows and data and information needs to ensure that the NSDI and other dissemination mechanisms provide what is needed in the formats that enable use. Through this component a stronger relationship and understanding will be established between data creators and data and information uses.

Box 9: Linkages with Belize National Spatial Data Infrastructure (NSDI)

Spatial Data is essential in developing appropriate strategies and interventions for Climate Resilience and monitoring their effectiveness. In 2012, the Government of Belize adopted the *National Spatial Data Infrastructure (NSDI) Policy*¹². The National Spatial Data Infrastructure (NSDI) is a national initiative that is driven by multiple stakeholders, particularly agencies in the country that are actively producing spatial data. The NSDI is considered a key part of a country's wider infrastructure assets such as roads, electricity, telecommunications networks etc. It is conceived to be an umbrella of policies, standards, and procedures under which organizations and technologies interact to foster more efficient use, management and production of spatial data. The focal Ministry leading the development of Belize's NSDI is the Ministry responsible for Lands in collaboration with Five NSDI Working Committees and various local and regional agencies.

Prior to the NSDI initiative, there were no standards in the country for development and management of spatial data, and stakeholders faced a myriad of challenges in accessing and sharing data. The NSDI seeks to resolve the existing barriers to data sharing and increasing availability of data and information products to support decision making.

¹² GoB 2012

Belize's NSDI has five (5) Committees; they are¹³

1. Data Quality and Data Standards – is the Working Committee set up to establish standards and norms for spatial data;

2. Data Ownership and Security Issues – is the Working Committee set up to ensure that ownership of data is secured and sensitive data layers are not compromised, while at the same time ensuring that equitable access to spatial data is provided;

3. Network Assets and System Architecture – is a very technical Working Committee set up to ensure that the NSDI network components are in place (hardware, software etc.)

4. Maintenance and Oversight – this Working Committee is established to ensure that best practices are followed in the development of Belize's NSDI to make certain that it is sustainable and will address issues such as the equitable sharing of expenses for the up-keep of the NSDI.

5. The Executive Committee – this Working Committee is responsible for ensuring that the entire NSDI process is sustained and successful.

During the preparation of NCRIP, technical support was provided in the form of training in the use of *GeoNode* and *GeoServer*¹⁴, deployment of the national node and training in the administration of the *GeoNode*. The Data and Knowledge Transfer component will continue to support the development of the NSDI. All the data and information products produced in *Component one* will be shared via the *GeoNode*.

NCRIP *Component one* Technical Data and Knowledge Transfer will also reinforce the NSDI efforts and help to build sustainability in the NSDI.

¹³ Per Carren Williams 2012

¹⁴ GeoNode is a web-based application and platform for developing geospatial information systems (GIS) and for deploying spatial data infrastructures (SDI). GeoNode (<http://geonode.org/>) and GeoServer (<http://geoserver.org/display/GEOS/Welcome>)

INVESTMENT COMPONENT 2: PHYSICAL INTERVENTIONS



Image (above) Damaged culvert along Western Highway, September 2013. In Belize disruption along critical roads from weather impacts is a frequent occurrence. The drainage and road pavement are unable to bear the impact of even current levels of precipitation and storm water run-off. Surveys conducted as part of the NCRIP sub-projects show this is a combination of inter-related factors including that some older infrastructure did not incorporate climate resilience measures. Substantial co-ordinated investment is required in planning and infrastructure to retrofit critical assets (transport, health, safe shelters) up to a suitable standard. In addition other priorities are identified such as a national zoning plan to guide future development on safe sites and ensuring health facilities are affordable and accessible in the aftermath of a major hazard.

The population and economy of Belize is in need of reliable and cost-effective services provided through physical infrastructure. This includes roads, buildings and utilities particularly water/ energy. During the preparation of NCRIP stakeholders from among the state and non-state actors have constantly raised the issue of disrupted and costly physical infrastructure and its impact on daily life of both women and men as well as the financial sustainability of business in Belize. One amongst many challenges associated with primary and secondary road networks has to do with maintenance and rehabilitation works, resulting in unsafe road conditions and frequent flooding during the rainy season. As for the municipal infrastructure, the need for good drainage systems has become more urgent due to the exacerbation of weather related events coupled with Belize's low-lying topography. Furthermore, sewerage and drainage systems as well as water infrastructure have deteriorated in urban areas, and have not kept pace with urban expansion.

This component was seen as an opportunity to demonstrate exemplar engineering, asset management and planning practice across four types of critical assets, vital to 'keep Belize moving' namely: roads, public transport, critical public buildings (for instance health/ storm shelters) and drainage. Interventions have been visualised in a way that will pave the way for accessible, reliable and cost-effective physical infrastructure that has been adequately screened for climate risk. As earlier described a 'participatory MCE' process was used to determine the criticality and prioritise road segments for urgent investment. This can be scaled to other parts of the physical infrastructure. During consultations 'gaps' were also identified in the physical planning workflow for instance appropriate scale of topographical information or a 'national zoning plan' that could provide relevant guidance on 'what kind of development is most suitable in which locations'. This is the foundation

upon which other strategies can be developed such as master plans for the tourism, transport and services sectors.

Upgrading physical infrastructure in Belize is a substantial undertaking given the dispersed population and small economic base and the high costs associated with current practice of building and asset management. Under the current PSIP a number of projects are planned that address physical upgrading and asset management of critical assets. However the gap in financing is very large. The NCRIP recognised that interventions were an opportunity firstly, to screen all investment for climate risk and secondly to develop specifications and practices that reduce cost without compromising on quality. (See image below). Thus introducing tools and practices such as better modelling are suggested to minimise design problems, select appropriate specifications and minimise life-cycle costs.

Culvert Data

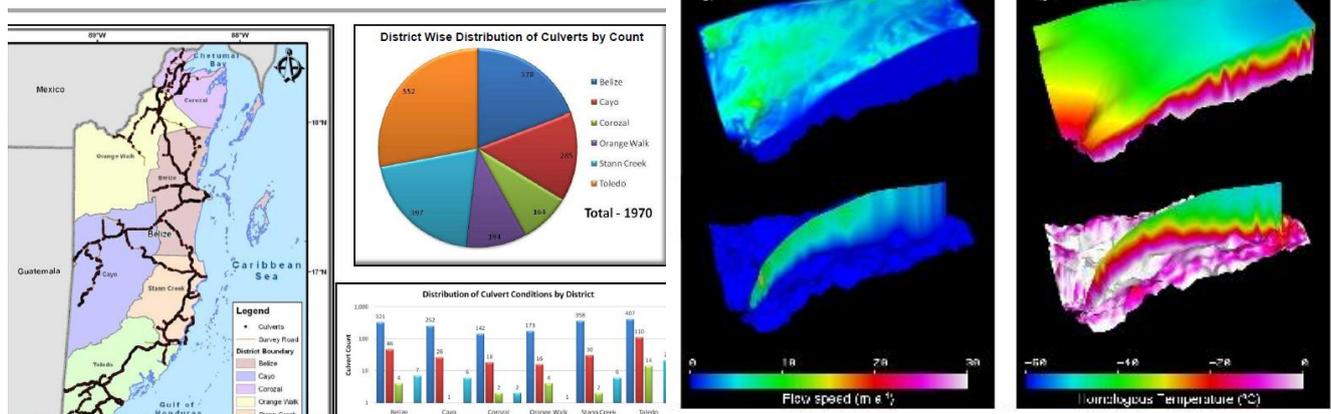


Image (above) Screenshots of the ‘Asset Management Database’ being developed in Belize for the Ministry of Works and Transport (MOWT) alongside a visualisation of a ‘drainage modelling’ exercise. The NCRIP has proposed knowledge and screening tools and practices such as these to be introduced. These are cost-effective and industry tested ways to ensure that all future upgrades and investment into critical physical assets considers climate resilience and thereafter select specifications whose life-cycle costs of asset management are affordable to Belize. The NCRIP will propose and implement a suitable package of modelling and screening tools alongside equipment and training to Belizean staff to implement them.

INVESTMENT COMPONENT 3: NON-PHYSICAL INTERVENTIONS



Image (above) Component 3 has three kinds of interventions; those focused on expanding livelihood options, those focused on integrating climate change adaptation into sector plans, and those focused on comprehensive disaster management. Agriculture and fisheries are key part of the subsistence and economy of a majority of Belizean population and have been suitably addressed.

Belize's vision 2030 sees women/men who are able to take care of themselves and who are self-sufficient. It sees vibrant women/men enjoying a good quality of life. To get such a Belize, the country needs to have robust livelihood options and needs to develop capable and enabled women/men. Component 3, non-physical interventions, establishes the foundation to achieve that state.

Component 3 has three kinds of interventions; those focused on expanding livelihood options, those focused on integrating climate change adaptation into sector plans, and those focused on comprehensive disaster management. At present the targeted sectors small scale producers in the agricultural and fisheries sectors. However the kinds of livelihood activities promoted are not necessarily limited to agricultural and fishing activities. Rather, the approach is to expand the menu of livelihood options available to men and women who currently rely on these two sectors to earn their household living. Consequently, livelihood activities in other sectors of the economy can be promoted, and it is up to each household to engage in a combination of activities or enterprises that draw on the available menu.

Livelihood options will focus on the entire household, building on each member's current roles and potential. Moreover, specific outreach measures will be implemented to ensure livelihood activities are equally accessible and appropriate to both men and women, such as: (i) identifying the most effective channels of communication to reach women and provide information in forms that correspond with their educational levels and access to information sources. This might include face-to-face, radio, mobile, etc.; (ii) using multiple channels of communication to proactively recruit women into programs through the presence of community-based organizations or women's groups that have already established contacts with poorer female community members; (iii) accommodating for gender differences in literacy, mobility and access to public venues, labour schedules (for example, day fishermen/factory workers may only be available in the evening) and preferences for the means of participation; (iv) setting quotas and/or incentives for female participation in programs and enforcing them; (v) including both male and female staff among the service providers in contexts where male-female interactions are limited; (vi) opening bank accounts in the woman's name or jointly with the male head of household; (vii) ensuring that women have access to payment systems, for example for cases when a bank account or mobile phone is needed; (viii) scheduling transactions to establish

eligibility and for distribution of cash, food or asset transfers to take place at convenient hours and in culturally acceptable conditions; (ix) providing technical support and services at times and places that are compatible with women's productive and caregiver roles, for example for mobile credit and banking services; (x) ensuring grievance procedures are accessible to poor women and men, without relying on levels of literacy or skills in negotiating through local power structures that they may not possess, by providing support to bridge these gaps through for example technical assistance to lodge or present claims.¹⁵

With respect to mainstreaming resilience in sector plans through adaptation to climate change and comprehensive disaster management, the current focus is on the recently completed tourism master plan and the transport sector master plan whose preparation is about to get underway. It is recognized however that mainstreaming of gender-appropriate resilience will need to target all sector plans in the medium to long term. As sector plans are revised and new plans are prepared attention will need to be given to building resilience through explicit adaptation and CDM measures. Ideally, the priority actions will be those that enable the reduction of poverty and economic growth for sustainable development while building climate resilience.

The third kind of actions under non-physical interventions are those related to comprehensive disaster management. The GoB has been taking strides toward CDM and has made some progress. Through the NCRIP the focus is on building the first responders network and on providing support for integration of CDM into the national planning framework.

INVESTMENT COMPONENT 4: POLICY AND REGULATORY

Several stakeholders have pointed to the importance of having a suitable system by which the government incorporates and prioritises climate resilience into decision-making. This will also send the correct signal to investors and communities to place their time, investment and resources into resilience related measures. Government is already looking into the better management of 'Public Sector Investment Programme' and using tested methodologies such as the MCE process used in the NCRIP development process for prioritisation of road infrastructure.

Interventions related to the response of government in supporting or creating a more conducive environment for maintaining continuity throughout weather hazards and strengthening the impact of investments within other components. Typical tools that the government may employ are gender-appropriate policies, standards, regulations and incentives.

Gender dimensions will be built into these policies, standards, regulations and incentives accordingly by incorporating participatory data on the differentiated impacts, needs and capacities of women, men, girls and boys into the policy-making process and mitigating institutional or cultural barriers to women's participation with targeted actions and specific performance indicators.

INVESTMENT COMPONENT 5: NCRIP CO-ORDINATION, MONITORING AND EVALUATION

Using resources under this component the MoFED, through the CEO, will establish an NCRIP Coordination and Implementation Team. The core members of that team will come from the Policy and Planning Department and the Budget Management Department. Both agencies will need to participate in, and drive the efforts, to coordinate and implement the NCRIP. They will be joined by NEMO and the NCCO. Together,

¹⁵ Source: *World Bank Gender and Disaster Risk Management Guidance Notes*, 2012

these agencies will form a team led by the Director of Policy and Planning and co-led by the Director of Budget Management and Fiscal Planning. The rest of the team will be made up of planners from these two agencies and experts that they co-opt from selected ministries and from other sectors to support implementation and monitoring and evaluation activities. The team will have a trained gender expert to monitor gender-related analysis and actions of the Plan. This team will work closely with, and may well be made up of the same leaders who will be driving the implementation of the Medium Term Development Strategy 2014 to 2017.

The Implementation and Coordination Team will be responsible for finalizing the procurement of goods and services, coordination with the implementation team for each intervention, and for monitoring and evaluation of the implementation and outcomes of NCRIP. In addition, they will also be responsible for keeping the CEO updated and informed, for briefing the steering group on progress and implementation challenges, and for proposing and implementing strategies to ensure that the transformational process of integrating climate change adaptation into national development planning alongside poverty reduction and economic growth for sustainable development of the women and men and economy of Belize occurs.

INVESTMENT REQUIREMENTS OF NCRIP

The Belize Public Services Investment Programme (PSIP) 2013 reports 100+ development projects totalling 320 million USD that are improving infrastructure, social protection, economic services, public administrative services. These include loans and development assistance grants to the Government of Belize from MDBs and Development Partners including but not limited to CCCCC, CABEL, CDB, EU, IADB, and WB.

The NCRIP team reviewed ongoing investments within PSIP and also took into account any forthcoming (pipeline) investments (loans or grants being approved for improving infrastructure, social protection, economic services or administrative services) and identified an additional requirement of 112.5 m USD to build climate resilience within the five intervention areas identified above. This financing will compliment (not duplicate) and co-ordinate ongoing efforts in Disaster Management/ Climate Change adaptation or mitigation, lay the foundation for climate resilience to be mainstreamed within development planning/ national budgeting and for complex climate resilience projects to be undertaken in the future, for instance, including but not limited to all-weather infrastructure, spatial planning, robustness of key economic sectors and risk financing and insurance.

Consultative steps in estimating financing for NCRIP:

- Invited interventions from stakeholders at national workshops and other consultations, one to one technical discussions on critical gaps in ongoing programmes w.r.t. utilities, logistics, economic sectors and considered critical activities that have multiple benefits.

- Referred to PSIP (A), PSIP pipeline (B), and additional consultation (C) with MDBs, Private Sector, Development Partners to capture other ongoing/ planned investment and rule out duplication.

- Finalized list and scope of NCRIP resilience interventions with a view to fill gaps, develop exemplar practice, enhance collaboration and derive efficiencies from ongoing investments.

- Costed list of NCRIP interventions (D): Review and refine initial costing received from stakeholders to include both time (operational and technical) and materials.

Component	Financing committed in PSIP (and PSIP pipe-line) [A-B] (USDm)	Relevant financing from other sources [C] (USDm)	Gap- Financing required under NCRIP [D] (USDm - years)
1 Technical Data and Knowledge Transfer	0.6 m	0.4	8.6 m (up to 5 yrs)
2 Physical interventions	304.4 m	29.3	94.4 m (over 10 yrs) ¹⁶
3 Non-physical interventions	64.3	0.5	4.5 m (over 5 yrs)
4 Regulatory and Policy	6.8 m		2.5 m (over 3 yrs)
5 NCRIP Co-ordination, monitoring and evaluation	-	1.9	2.5 m (over 10 yrs)
TOTAL	376.1 m	32.1 m	112.5 m (10 yrs)

The following Table 14 summarises each intervention area and a more detailed fact sheet on each intervention area can be found in the **Appendix C**.

Table 14: Summary of Intervention Areas under each NCRIP Component		
Intervention/ project preparation and brief description [institutional driver]	Outcomes	Delivery time-scale (Years)
INVESTMENT COMPONENT 1: TECHNICAL DATA & KNOWLEDGE TRANSFER. TOTAL ESTIMATED COST > 8.60 million USD		
1.1 Hydro-meteorological, topographic and bathymetric data road-map: Improves the hydrological and meteorological services within Belize by improving data capture as well as its' analysis to meet the specific information requirements of multiple sectors in improving resilience.	-A catalogue of changes in temperature and rainfall patterns as indicated by the climate change detection indices Projections of changes in those indices based on results of the downscaled models The NMS and Hydrology - Departments would have an improved network of observation stations to assist	2-5

¹⁶ Actual requirements are much greater. This indicates the most critical and priority requirements in this area to lay the foundations for future, more complex work.

<p>[Institutional driver: Belize National Meteorological Service – Ministry of Labour, Local Government, Rural Development, NEMO, Immigration & Nationality; Climate Change Office - Ministry of Forests, Fisheries and Sustainable Development.]</p>	<p>with collection and analysis of hydro-meteorological data -NMS and Hydrology Department are undertaking analysis and providing information to support a climate resilient Belize.</p>	
<p>1.2 National spatial data and climate project: Improves the statistical and spatial data on weather sensitivity and weather related impacts across all sectors in Belize. This information is invaluable in strategic planning to identify vulnerable communities/ assets and monitoring the impact of resilience measures. For instance the preparation of a gender segregated information to determine the different impacts, needs and capabilities of women, men, girls and boys to climate-related risks identified by the plan, to be used to gender the Plan’s specific actions and monitoring.</p> <p>[Institutional Driver: Statistical Institute of Belize/ Social Investment Fund - Ministry of Finance and Economic Development; Ministry of Public Services, Elections and Boundaries; Land Information Centre – Ministry of Natural Resources and Agriculture; Ministry of Human Development, Social Transformation & Poverty Alleviation; Ministry of National Security]</p>	<p>-The implementing agencies will have the capacity to develop and analyse spatial data. -There is greater awareness of the available spatial data related to weather, climate and vulnerable populations. -Gender considerations in NCRIP interventions.</p>	<p>2-5</p>
<p>INVESTMENT COMPONENT 2: PHYSICAL INFRASTRUCTURE ESTIMATED TOTAL COST 94.4 million USD</p>		
<p>2.1 Critical Assets: Roads, drainage, public buildings & public transport: Improves comprehensive planning and asset management of critical assets across Belize. Provides demonstration of exemplar measures. The most critical roads, public buildings and public transport routes will be identified through a participatory and analytical process that has already been trialled in Belize. Feasibility studies will be carried out to determine the improvements that can be carried out and how</p>	<p>-Critical roads, drainage and public buildings identified through the participatory Multi-criteria evaluation process, a method already well tested amongst stakeholders within Belize. -Feasibility studies identify measures to be applied to critical assets in making them resilient. -Critical assets are resilient in the face of multiple weather related hazards. -Co-benefits include livelihoods and</p>	<p>5-10</p>

<p>best the asset can be managed and maintained to function well over its designed life cycle.</p> <p>[Institutional Driver: Ministry of Works & Transport; Ministry of Education, Youth and Sports; Ministry of Health; Ministry of Labour, Local Government, Rural Development, NEMO, Immigration & Nationality; Ministry of Housing & Urban Development; Ministry of National Security]</p>	<p>skills improvements in the works and transport sectors. Demonstration of exemplar measures.</p>	
<p>2.2 Land-use & infrastructure plan: Improves spatial and infrastructure plan of Belize balancing development pressures and hydro-meteorological hazards across the various development (and protected) sites of Belize.</p> <p>[Institutional Driver: Ministry of Works & Transport; Ministry of Finance & Economic Development; Ministry of Forest, Fisheries and Sustainable Development; Ministry of Natural Resources & Agriculture, Ministry Trade, Investment Promotion, Private Sector & Consumer Protection; Ministry of Housing & Urban Development]</p>	<p>-A spatial zoning plan guiding the spatial location and characteristics of future development in all sectors. In particular it will provide statutory guidance on what type of development is suitable in which locations.</p>	1-2
<p>2.3 Coastal logistics: ports and airports (Feasibility study only): Coastal logistics such as ports and the Municipal air-ports will benefit from climate vulnerability assessment and upgrading to improved standards and avoid weather related disruption.</p> <p>[Institutional Driver: Ports Authority/ Aviation Authority - Ministry of Works & Transport; Ministry of Finance & Economic Development; Ministry Trade, Investment Promotion, Private Sector & Consumer Protection]</p>	<p>-Climate change risk considerations are mainstreamed into planning procedures of coastal logistics such as ports and airports.</p> <p>-Fully costed plans for resilience: Raised airfields, all-weather docks or identification of other potential sites to increase the resilience of facilities in the low-lying areas in coastal zone.</p>	Up to 10
<p>2.4 Utilities: Energy, water and wastewater: Improves the reliability of energy supply, equipment and reduction in operational costs. The feasibility work will look at alternative sources of energy, improved specification of equipment to improve reliability and value-</p>	<p>-Climate change risk considerations are mainstreamed into utilities –water and energy which comprise some of the biggest cost to society and economy in Belize.</p> <p>-Fully costed plans for resilience:</p>	Up to 10

<p>form-money. It will also look at increasing the reach of essential services to communities during hazard events.</p> <p>[Institutional Driver: Ministry of Energy, Science, Technology and Utilities; Ministry of Works & Transport; Ministry of Housing & Urban Development; Ministry of Labour, Local Government, Rural Development, NEMO, Immigration & Nationality]</p>	<p>Measures in generation, distribution and efficient consumption of energy and water.</p>	
<p>2.5 Built-environment modelling and testing facilities: Improves the specification and quality control on buildings and infrastructure through better modelling and testing facilities for buildings and roads. Materials, structures and designs can be tested for their performance under various weather conditions.</p> <p>[Institutional Driver: Ministry of Works & Transport; Ministry of Housing & Urban Development]</p>	<ul style="list-style-type: none"> -Facilities to model and test the quality of infrastructure for weather risk thus improving resilience. -Improved training and skills amongst professionals. -Improved facilities for building a low-Carbon environment. 	<p>1-2</p>
<p>2.6 Health facilities: Improves the accessibility and performance of district hospital facilities during weather stress for women and men. Prepares an action plan for facilities and staff to cope with increased likelihood of communicable disease and infections. Provides linkages with ongoing investment by Private Sector in improving Health Facilities and standardising medical practice.</p> <p>[Institutional Driver: Ministry of Health; Private Sector; Ministry of Labour, Local Government, Rural Development, NEMO, Immigration & Nationality; Ministry of Housing & Urban Development]</p>	<ul style="list-style-type: none"> -Gender differentiated Vulnerability assessment from climate change followed by Action plan to deal with disease impacts of climate variability. -Improved training and skills amongst medical professionals. -Improved, accessible and affordable district level medical facilities covering gender specific needs. -Public awareness. -Public-Private partnership in upgrading and management of health facilities. 	<p>2-5</p>
<p>2.7 Prevention Coastal erosion (Feasibility study): Feasibility to identify locations at high-risk and propose structural, land-use and ecological measures for preventing erosion.</p> <p>[Institutional Driver: Ministry of Works & Transport; Ministry of Housing & Urban Development]</p>	<p>-Climate change risk considerations are mainstreamed into management of the coastline and the habitat and economic activity along the coastline. Fully costed plans for resilience</p>	<p>Up to 10</p>

INVESTMENT COMPONENT 3: Non-Physical Infrastructure
TOTAL COST 4.5 million USD

<p>3.1 Resilient agricultural & forestry practices and trials: Disseminating a range of tested measures and trials to prepare farmers households growing staple foods through longer drier periods and prevent damage from extreme precipitation.</p> <p>[Institutional Driver: Ministry of Forests, Fisheries and Sustainable Development; Ministry of Natural Resources and Agriculture]</p>	<ul style="list-style-type: none"> -The amount of steep slopes used for farming has reduced -The capacities of the agriculture extension service to educate and support farmer women and men has increased -The capacities of the forest rehabilitation program degraded slopes through restoration efforts has increased -Agriculture best practices are being promoted to women and men in rural Belize -Suitable varieties for crops produced by farmers households are identified 	<p>2-5</p>
<p>3.2 Diversifying fishermen household income: Implementing measures to protect the fishermen’s tools during adverse weather and imparting training on alternative commercial skills to build resilience to lower catches and increased regulation on fishing.</p> <p>[Institutional Driver: Ministry of Forests, Fisheries and Sustainable Development; Ministry of Tourism and Culture]</p>	<ul style="list-style-type: none"> -Fisher’s households able to cope with economic losses due to natural disasters and having constant production year-round. -Reduction in the number of fishers engaged in commercial fishing by 25% during a 10 year period. 	<p>2-3</p>
<p>3.3 Mainstreaming climate resilience in tourism and transport sector master plans: Review the tourism and transport master plans with a view to mainstream climate resilience measures within the design and implementation of the plans.</p> <p>[Institutional Driver: Ministry of Finance and Economic Development; Ministry of Tourism and Culture; Ministry of Works & Transport; Ministry of Energy, Science, Technology and Utilities]</p>	<ul style="list-style-type: none"> -The Tourism mater Plan has built in Climate Resilience -The Transport Master Plan has taken into consideration and ensured the need for climate resilient roads. 	<p>1-2</p>
<p>3.4 Emergency response and recovery capacity: Scale-up the emergency response and recovery capacity in Belize. A range of measures can be implemented including training</p>	<ul style="list-style-type: none"> -A first responders network is operational -Communities have a mechanism for quick response before, during and after a 	<p>1-2</p>

<p>of tourist guides as first responders, training paramedics and/or building a fleet of emergency responders modelled on the service already provided by the ‘Spanish look-out’ community.</p> <p>[Institutional Driver: Ministry of Labour, Local Government, Rural Development, NEMO, Immigration & Nationality; Ministry of National Security; Ministry of Trade, Investment Promotion, Private Sector & Consumer Protection; Ministry of Health; Ministry of Human Development, Social Transformation & Poverty Alleviation; Ministry of Tourism and Culture]</p>	<p>hazard</p> <p>-Protocols for first response are in place and in use, led by female community leaders.</p>	
<p>INVESTMENT COMPONENT 4: Policy and Regulatory Measures ESTIMATED TOTAL COST 2.5 million USD</p>		
<p>4.1 Green building measures: Drafting an implementation plan for green building measures in Belize including vehicles such as regulation, awareness and fiscal incentives.</p> <p>[Institutional Driver: Ministry of Works and Transport; Ministry of Finance and Economic Development]</p>	<p>-All sectors particularly Tourism, Works, Transport, Housing, Urban Development, Agriculture that are intensive users of energy and water based on participatory inputs from both women and men. Spin-off benefits include training in green skills for Belizean professionals – women and men.</p>	<p>1-2</p>
<p>4.2 Marine regulation: Assessment and legislation development for monitoring the fisheries reserves and practices in Belize.</p> <p>[Institutional Driver: Ministry of Labour, Local Government, Rural Development, NEMO, Immigration & Nationality; Ministry of Forests, Fisheries and Sustainable Development]</p>	<p>-Regulatory measures for ensuring the well-being of marine diversity and communities dependent on fisheries for their livelihoods.</p>	<p>1-2</p>
<p>4.3 Integrating priority investments into Public Sector Investment Programme (PSIP): Developing an institutional tool to prioritise climate resilience related investments from all sectors into the PSIP.</p> <p>[Institutional Driver: Ministry of Finance and Economic Development]</p>	<p>-Management system and tools mainstreamed for making the PSIP process more objective and efficient.</p>	<p>1-2</p>

<p>4.4 Co-ordination of climate resilience assistance by MDBs and Development Partners Maintaining a roster of interventions being carried out by MDBs and Development Partners for climate resilience under various programmes.</p> <p>[Institutional Driver: Ministry of Finance and Economic Development]</p>	<p>-Co-ordinated roster of work in the resilience area and efficient information sharing.</p>	<p>10</p>
<p>INVESTMENT COMPONENT 5: Implementation, monitoring and evaluation ESTIMATED TOTAL COST 2.5 millón USD</p>		
<p>5.1 Implementation, monitoring and evaluation of the NCRIP with regular interim reviews and amendments as necessary. Supported by a roster of specialists.</p> <p>[Institutional Driver: Ministry of Finance and Economic Development]</p>	<p>-NCRIP reporting, monitoring and evaluation and implementation with the inclusion of a gender specific indicators.</p>	<p>10</p>

Table 15 below summarises the costs for each intervention level within NCRIP. See Also Appendix C for fact-sheets providing details of each intervention area.

Table 15: Summary of financing requirement at Intervention level				
Intervention	(A) PSIP (USDm)	(B) PSIP Pipeline (USDm)	(C) Other sources (USDm)	(D) NCRIP requirement (USDm)
1.1 Hydromet/bathymetric/topographic data road-map	0.6		0.4	7.4
1.2 Spatial data and climate impacts				1.2
2.1 Critical assets: Roads, drainage, buildings, transport	118.2	144.7		80.5
2.2 land-use and infrastructure plan	2.7		2.8	0.4
2.3 Coastal logistics assessment				0.2
2.4 Utilities: energy and water assessment	27.8		20.0	2.0
2.5 Built-environment modelling facilities			1.0	1.8
2.6 Health facilities	11.0		5.0	9.0
2.7 Coastal prevention (assessment)			0.5	0.5
3.1 Resilient agriculture trials	38.2		0.5	1.6
3.2 Diversifying fisher income	0.3			1.0
3.3 Mainstreaming climate in tourism/transport masterplan	16.2			0.5
3.4 Emergency response capacity [within CDM]	9.6			1.4
4.1 Green buildings regulation			0.4	1.0
4.2 Marine regulation	6.5			0.5
4.3 Enhancing project prioritisation & donor co-ordination	0.3		1.5	1.0
5.1 NCRIP Implementation, monitoring, evaluation				2.5
TOTAL	231.4	144.65	32.1	112.5

A = Financing included in PSIP 2013

B = Financing in PSIP pipeline

C = Financing mapped from further discussions with MDBs/ DPs/ Private Sector not already included in A/B

D = Financing requirement for NCRIP

B003_Institutional arrangements

PURPOSE

The Purpose of this section is to describe the *institutional arrangements* for the implementation of Belize *National Climate Resilience Investment Plan* (NCRIP), and the proposed interventions therein. The proposal is for the Ministry of Finance and Economic Development to lead the implementation and for ensuring that the transformational process of integrating resilience into national development occurs. Figure 1 presents a high level organizational chart for the Implementation arrangements for NCRIP. The proposed arrangements draws on suggestions and recommendations made during two national stakeholders' consultations and discussions during the NCRIP Review Mission.

INSTITUTIONAL AND IMPLEMENTATION ARRANGEMENTS

Over the course of two national workshops stakeholders from government, private sector and civil society expressed their views on the institutional responsibilities and arrangements in delivering the NCRIP with its cross-sectorial interventions. The consensus is that the implementing arrangements for NCRIP will need to help strengthen and transform the national planning framework and processes and enable the participation of state and non-state actors in national decision making and development. The transformation should integrate climate change adaptation, comprehensive disaster management, poverty alleviation, environmental management, and economic growth as equally important themes in the development of Belize and its women/men.

NCRIP brings together investments that build resilience among the women/men and within the economy and the environment; and that supports the integration of climate change into national development planning and actions. The financing for NCRIP will come from the consolidated revenue fund of GoB, bilateral arrangements with friendly governments, multilateral development banks and other multilateral arrangements with development partners. The intent is to manage these interventions in a consistent and coherent way so that the potential synergies from their implementation could be derived. The Ministry of Finance and Economic Development (MoFED) will be responsible for the overall implementation of the NCRIP.

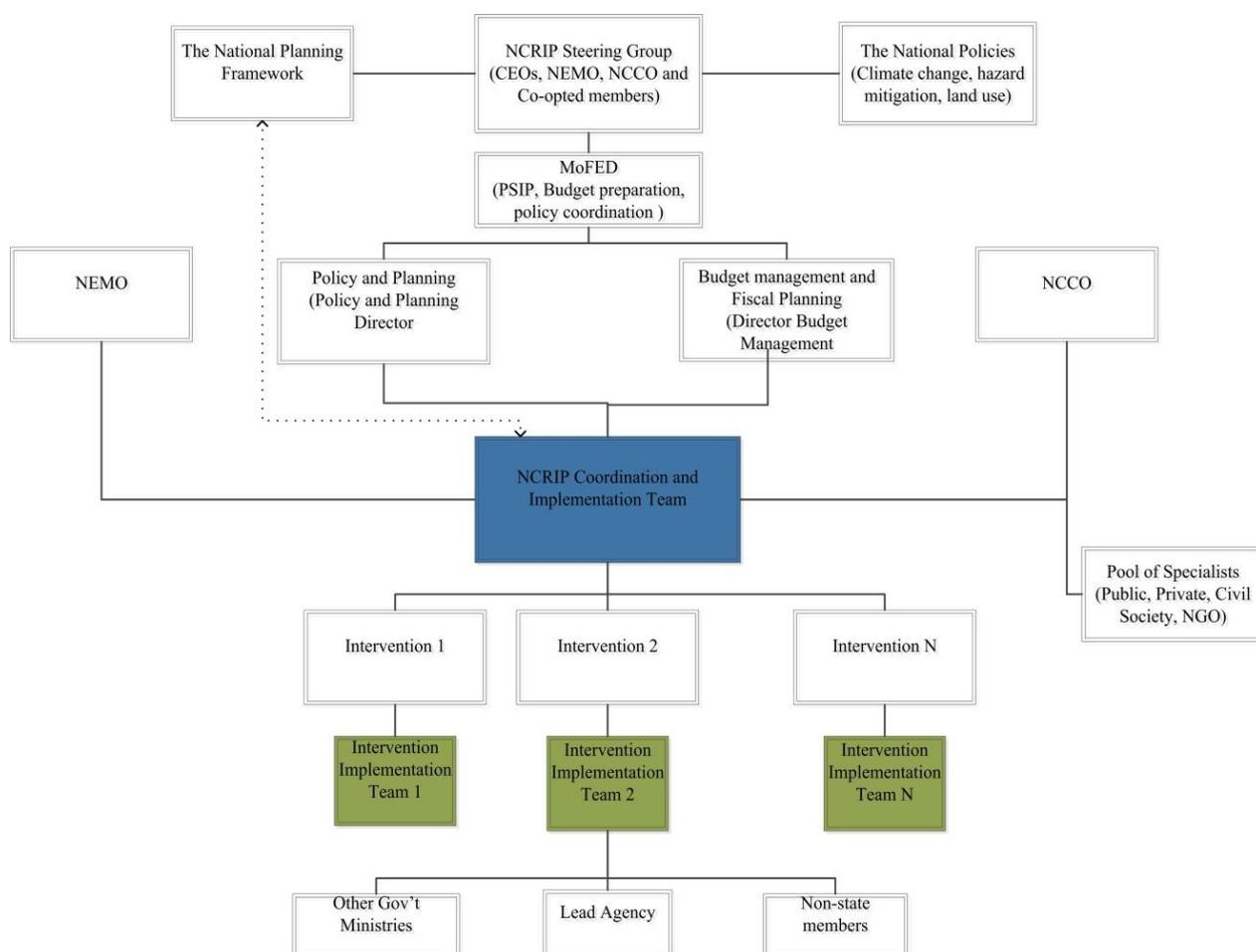
NCRIP's implementation will require management and coordination, support for policy and legislative implementation and reform, development of technical capacities, and process development and reform. The various components within NCRIP seek to invest in these areas while improving critical assets, developing useful databases, supporting data and information dissemination, and supporting the development and reform of the national planning framework and processes.

Effective implementation of components and interventions in NCRIP to address climate change and disaster risks will be embedded within the national planning process, and will support the operations of an effective national planning framework. This framework will support the implementation of NCRIP and the Medium Term Development Strategy within the context of Horizon 2030. Implementation arrangements outside of this framework will not be optimal since an important key result is mainstreaming of resilience and comprehensive disaster management into national development planning and actions.

Embedding implementation within the national planning framework is critical since allocation of resources for climate change and disaster risk mitigation must lead to a better quality of life for the women/men of Belize

and to sustainable growth and development. As articulated by the CDB representative during the NCRIP Review Mission, “Priorities for addressing climate change and disaster risk mitigation must be situated within Government’s wider approach to setting priorities to achieve enhanced and sustained economic and social development. In setting such wider priorities, a number of factors will have to be considered including, the size of investments required, the terms of financing, prioritization of constraints in relation to desired impact on achieving enhanced and sustained development, urgency, phasing, and various socio-political considerations. Consequently, prioritization of actions, should lead to the elevation of those interventions that can simultaneously address several development constraints. Thus, in setting wider government priorities, there may be implications for when specific climate resilient investment may take place”.

Figure 14: Implementation and co-ordination of NCRIP and its mainstreaming within National Planning Framework



OVERSIGHT OF NCRIP IMPLEMENTATION

The Ministry of Finance and Economic Development (MoFED) is responsible for fiscal management, national planning, and revenue and budget management. The Ministry of Finance and Economic Development will therefore be the lead implementation agency for the NCRIP. Ultimate responsibility will rest with the CEO, Finance and Economic Development.

The CEO, MoFED will convene a steering group (NCRIP Steering Group) that will provide oversight and help to champion the implementation efforts. The Steering Group will be chaired by MoFED. Members will

include Ministry of Forestry, Fisheries and Sustainable Development (MFFSD); Ministry of Labour, Local Government, Rural development, NEMO, and Immigration; Ministry of Natural Resources and Agriculture (MNRA); Ministry of Works and Transport (MoWT); Ministry of Education; and Ministry of Human Development, Social Transformation and Poverty Alleviation; and Office of Public/Private Sector Dialogue. Consideration will also be given to the participation of the private sector and civil society including those working to ensure a gender perspective, through their respective umbrella organizations. In addition, the Government also reserves the right to engage advisors to sit on the steering group if it is considered that their participation will lead to better decisions about climate resilience and integration of resilience into national development planning and actions.

The CEO MoFED will determine when all CEOs should be briefed, and when Cabinet Information Papers or Memorandums should be submitted to Cabinet for information, directives or decision.

The SC will hold a regular meet every two months during the first year of implementation and every three months thereafter. Special meeting can be called by MoFED when such a meeting is warranted. Members of the SC can be polled by email, and electronic meetings using voice over Internet Protocols (VoIP) and audio and video conferences can be held and will be valid as long as minutes of the meeting are recorded.

The CEO MoFED will be the primary contact with the multilateral partners regarding the implementation of NCRIP. This responsibility may be delegated to members of the NCRIP Implementation Team when the purpose of the dialogue is to discuss implementation details.

NCRIP IMPLEMENTATION AND COORDINATION

MoFED will establish a NCRIP Implementation team that will be led by the Director of Planning, MoFED. Team members will include the Director of Planning, Focal points for the MDBs and Development Partners within MoFED, the Finance Officer appointed by the CEO MoFED, and the officer responsible for management and update of the PSIP. The team will manage the NCRIP implementation process, and the interventions included within it. The team will report to the CEO MoFED through the Director of Planning.

All procurements for NCRIP will be done through MoFED and will be reviewed by the appropriate members of the NCRIP Implementation Team. This will facilitate the auditing of plan implementation, and will enable a comprehensive review of implementation activities as well as an assessment of inputs to outputs, and outputs to outcomes assessment and review. This is important since the implementation of NCRIP should facilitate a transformational process through which climate resilience will be integrated into development planning and actions alongside sustainable development and poverty alleviation.

There are four components under the NCRIP and about 16 intervention areas. Each intervention area has a coordinating team and a lead agency that will be responsible for implementation of that intervention area. That team and lead agency is responsible for day to day implementation of the intervention area. The lead agency will prepare procurement requests, Terms of Reference, bidding documents, progress reports, and requests for payments, etc. to the NCRIP Implementation Team at MoFED for review and action. A member of the NCRIP Implementation Team will sit on each intervention coordinating team.

RESULTS MONITORING AND EVALUATION

The Director of Planning in MoFED and the NCRIP Implementation Team will be responsible for the overall monitoring and evaluation of NCRIP. The team will use the intervention logic and the results framework

along with the detailed work plan of each intervention that will be implemented in a given year as the guidance documents for implementation, along with directives provided by the CEO MoFED and the SC. They will prepare reports and updates for the SC that summarize the overall progress of implementation, and raise issues associated with the interventions being implemented. They will also prepare materials that the SC will share with the CEOs of Government Ministries.

In addition to procurement of goods and services to implement the interventions under NCRIP, the NCRIP Implementation Team will be responsible for monitoring and evaluation of the progress of NCRIP and the extent to which the key results and expected outcomes are being achieved. They will use the results framework and the related documents as the guidance for monitoring and evaluation of the plan. The results framework identifies the list of indicators that will be monitored and how the data and information for assessment will be collected.

IMPLEMENTATION OF THE INTERVENTIONS

Each of the sixteen interventions will have an Intervention team that will coordinate implementation. Each team will have a lead agency and a set of collaborating agencies. The teams are made up of state and non-state actors. A lead agency the composition of each team has been suggested.

Each intervention team will be responsible for the implementation details for a particular intervention. They will prepare procurement documents for review and action, coordinate implementation activities for the intervention, and prepare and submit progress reports. All submissions will be made to the NCRIP Implementation and Coordination Team, with whom they will need to work closely.

The Intervention team will be expected to identify implementation challenges and address them where possible. They will draw on the NCRIP Implementation and Coordination Team when necessary, who in turn will draw on MoFED and the Steering Group as appropriate to ensure success.

LEARNING AND KNOWLEDGE SHARING

A wealth of knowledge has been developed by the Climate Investment Funds (CIF) through the implementation of Pilot Program for Climate Resilience. Pilot countries are also adding to the pool of lessons. The NCRIP preparation process has drawn lessons from the CIF and from the Pilot countries currently participating in the PPCR. Fortunately, both the CIF, through the Administration Unit and the Pilot countries have been willing to share the lessons learnt.

Using those lessons, financing from the European Union through the European Union (ACP-EU) Natural Disaster Risk Reduction Program, managed by the GFDRR and technical assistance through the World Bank, the GoB has adopted those lessons. Technical rigor should underpin decisions that integrate adaptation and risk management into development planning and action, evidence based identification of lessons that will reduce poverty and enable growth while building resilience, target the most vulnerable segments of the society (the poor, children, women) and sectors of the economy that need to be bolstered because they could become the binding constraint to development. Perhaps, one of the biggest lessons that emerged from following the PPCR process is that there is considerable knowledge on the ground and transparent and wide-spread consultations should be an integral part of the plan development and decision-making process.

During the NCRIP preparation process, the team focused on lessons related to plan preparation though attention was also given to what makes for successful implementation of *transformative efforts*. The main

lesson was that strong leadership from those responsible for the national planning framework is essential. As a result MoFED, the ministry responsible for budgeting, planning and development in Belize has led throughout in the preparation of the NCRIP and will sustain its efforts during implementation.

Lessons drawn from the CIF and other PPCR pilot countries in drafting the NCRIP are being documented. These are being shared in Belize and with stakeholders. As part of this process a webinar series is being planned, using the *Collaboration for Development* platform¹⁷, on data collection and national planning, and on participatory consultation for national development.

There will be new lessons for Belize as the Government progresses with the implementation of the NCRIP. In this the Government of Belize (GoB) will continue to find the feedback from other PPCR countries very useful, in particular in enhancing its co-ordination of a complex set of interventions. GoB is thankful to CIF for sharing lessons and showing a clear process that has been followed in the development of NCRIP thus far.

NCRIP will be a living document; one that builds upon the first tranche of investments into climate resilience, and thereafter, may be reviewed to build upon those foundations. We recognise the value of monitoring impact and channelling resources where they will make the best possible impact and in particular for the most vulnerable women, men and economic sectors in Belize.

ROLE OF IFI(S) AND DEVELOPMENT PARTNERS

International financing agencies and development partners will play an integral role in the implementation of NCRIP. The GoB does not have all the resources required to build climate resilience, nor does it have all the technical capacities needed. Furthermore IFIs and development partners are already playing an important role in financing climate resilience building activities, construction and rehabilitation of critical assets, and capacity building activities to enable the integration of climate resilience into development planning and actions. The IFIs and development partners therefore bring a wealth of knowledge and resources to the table. Most of the IFIs and development partners dialogue with Belize through MoFED. MoFED will continue to be the focal point for these conversations and for the elaboration and implementation of country partnership strategies.

In addition the GoB will look to the IFIs and development partners to help with the development and implementation of the Planning framework for the implementation of NCRIP and development planning generally. Furthermore the IFIs and Development partners will be directly involved in the coordination teams for each intervention implemented under NCRIP.

¹⁷ collaboration.worldbank.org

B004_The Results Framework

Based on lessons learned from the implementation of the PPCR, the CIF Administration Unit proposed a revised and simplified PPCR logic model and results framework pursuant to the approved *Measures to Improve the Operations of the Climate Investment Funds*. The revised results framework is based on the first-hand experiences of the pilot countries and the MDBs in implementing the original PPCR results framework. The revised results framework takes into account key PPCR objectives and an improved understanding of what is possible as part of the development and implementation of a Strategic Plan for Climate Resilience.

The results framework establishes a basis for future monitoring and evaluation of the impact, outcomes and outputs of climate resilience investment plans and the action therein. The PPCR logic model includes five **core indicators**, which should be incorporated into the results framework of investment plans that seek to build resilience to climate change, climate variability and weather hazards and on which there should be annual reporting. These are:

- a) Number of women and men supported by climate resilience programming to cope with effects of climate change;
- b) Degree of integration of climate change in national, including sector planning;
- c) Extent to which vulnerable women/men, communities businesses and public sector services use improved climate resilience planning tools, instruments, strategies, activities to respond to CV&CC;
- d) Evidence of strengthened government capacity and coordination mechanism to mainstream climate resilience; and
- e) Quality of and extent to which climate responsive instruments/ investment models are developed and tested.

The NCRIP results framework attempts to incorporate the lessons as well as the core indicators proposed by the PPCR into the monitoring and evaluation of the NCRIP. This is possible because the NCRIP's development objective and those of the PPCR are congruent.

As mentioned in the section on the development objectives, there are four key results that the GoB seeks to achieve through the implementation of NCRIP. Successful achievement of these results will indicate that the GOB is well on its way to building climate resilience among the women/men and within the economy and environment of Belize. This section of the NCRIP presents the results framework and the mechanisms for monitoring and evaluation of performance.

Table 16 below presents the draft Results framework. This serves as a starting point for discussion on how the NCRIP's contribution to climate resilience, poverty reduction and economic growth can be assessed. It has tried to take into consideration the simplified PPCR logic model, the discussions with stakeholders and the comments from the various professionals within MDBs and from the Independent reviewer. Nonetheless we expect that the indicators will become even more specific as the full details of the interventions are developed and as Belize engage with its development partners on the financing of the NCRIP. Consequently the results framework will further improve over the ensuing months.

Table 16: NCRIP Results Framework and Monitoring

Results	Indicators	Baseline	Cumulative Target Values	Frequency	Data Source/ Methodology	Data Collection By
PDO Result One: Increased resilience of Women/men, economy and environment in Belize to climate variability and climate change	Change in percentage of households (in areas at risk) whose livelihoods have improved (acquisition of productive assets, food security during sensitive periods of the year) Change in percentage below the Poverty and indigent lines.	Circa 40%	20%	Year 1 & 5	Poverty assessment	SIB/ MoHDPA
	Change in damage/losses (\$) from extreme climate events in areas at risks that are the geographical focus of the interventions.	USD (2000-2010)	As recorded	After climate event	Damage assessment	NEMO/ MoWT/ SIB
PDO Result Two: Climate change, climate variability and comprehensive disaster risk management is integrated into development planning	Degree of integration of climate change, climate variability and comprehensive disaster management into national and sector planning.	2010	Full integration	Annual or Bi-Annual	Expert opinion and agency records	MFFSD/ MoFED/ NEMO
	Changes in central government and local government budget allocations to take into account effects of CV& CC and CDM.	2010	-	Annual or Bi-Annual	Budget Assessment	MoFED/ Municipalities

Results	Indicators	Baseline	Cumulative Target Values	Frequency	Data Source/ Methodology	Data Collection By
<p>Intermediate Result One: The relevant agencies are collecting, analysing, and disseminating data and information to support smart decisions that increase the resilience of the women/men and economy of Belize to the vagaries of climate change, climate variability and weather related hazards.</p>	Gender disaggregated Data, information and tools to integrate CV, CC, and CDM into decision making are being developed and disseminated by the relevant agencies	As of 2010	>60% data marked preferred.	Annual or Bi-annual	Data user survey. Review of citations in decision-making to determine the extent to which CV, CC, CDM data and info is being used in decision making.	MFFSD/NEMO/SIB/MoFED NEMO/MoFFSD/SIB/NMS
	The physical assets required to collect, analyse and disseminate data and information are in place and in use in the appropriate agencies (government, private sector, and civil society)	As of 2010	>60% of the array of physical asset required are in place and operated	Annual or Bi-annual	Inventory of operating physical assets. Gap analysis based on self-reporting by asset users or survey.	Auditor General MoFED/MoFFSD/NEMO/NMS
	The competencies and the recurring resources are in place and in use in the appropriate agencies (government, private sector, and civil society) to produce gender disaggregated data and information that can support smart decisions	As of 2010	>60% of the competences are in place	Annual or Bi-annual	Survey of staffing. <i>Systematic review</i> of data and information produced.	MoFED/MoFFSD

Results	Indicators	Baseline	Cumulative Target Values	Frequency	Data Source/ Methodology	Data Collection By
Intermediate Result Two: Belize's critical infrastructure assets (roads, airports, sea ports, coastal defences, and building/facilities) are withstanding the impacts of climate change, climate variability and natural hazards, by continuing to operate and serve the nation in the wake of these impacts	The critical assets continue to operate in the wake of extreme weather events	As of 2010	As reported	Annual or Bi-annual	Reported by MoWT or other asset owners. Reference to maintenance plans or surveys.	MoWT and other asset owners.
	The maintenance plan is being implemented	-	Maintenance is on schedule	Annual or Bi-annual	Reported by MoWT or other asset owners.	MoWT and other asset owners.
	There are minimal disruptions with the operations of the critical assets in the wake of extreme natural hazard events	As reported (2010-2010)	As recorded	Annual or Bi-annual	Reported by MoWT or other asset owners.	NEMO/ MoWT and other asset owners.

Results	Indicators	Baseline	Cumulative Target Values	Frequency	Data Source/ Methodology	Data Collection By
Intermediate Result Three: Livelihood activities, markets and value chains are resilient to the impacts of natural hazards for women and men.	A baseline of livelihood activities and options are in place	-	Baseline available	Start of implementation of NCRIP	Survey of livelihood activities across Belize	Rural Development/ SIB
	Unemployment of women and men are decreasing and women participation rate in the workforce is increasing	As of 2010 9% men 23% women	Halved	Annual or Bi-annual	Assessment of changes in the labour force survey indicators	SIB/ MoFED
	Unemployment of women and men are decreasing and women participation rate in the workforce is increasing	As of 2010		After climate event	Market and value chain performance analysis after hazard events	NEMO/ MNRA/ BELTRAIDE
Intermediate Result Four: Building resilience to the effects of climate change, climate variability and weather related hazards, and implementation of comprehensive disaster risk management, are fully integrated into national development planning and action, along with poverty reduction, in the pursuit of sustainable development of the women/men and economy and the environment of Belize	Planners and leaders in the public and private sectors and civil society are incorporating weather and climate information (gender-disaggregated when relevant) into their decision making processes	-	Fully incorporated	Annual or Bi-annual Review	Citation or systematic review	MFFSD/ MoFED/ NEMO

	MoFED have clearly articulated guidance or screening for incorporation of weather and climate data and information (gender-disaggregated when relevant) into national development planning and decision making processes.	-	Fully incorporated into PSIP	Annual or Bi-annual Review	Citation or systematic review of PSIP	MFFSD/ MoFED/ NEMO
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Monitoring the impact of resilience investment is an important part of appreciating how to review and develop the NCRIP in future. As mentioned in the document, there are many fundamental activities to be undertaken such as putting basic technical information, tools and skills in place before more complex resilience measures can be attempted. Diligent implementation will ensure that gradually the investment will start to influence smarter more resilient growth in Belize.

We expect that The 'Technical Data and Knowledge Transfer' interventions will specifically assist with developing data and information that meets the needs of measuring indicators. Furthermore, The Government of Belize hopes for continued dialogue with other PPCR countries to learn from their experience of developing practical measures and indices of resilience and adapting them for the NCRIP.

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National Climate Resilience Investment Plan [NCRIP]

Government of Belize

APPENDICES
OCTOBER 2013

APPENDIX 1 TECHNICAL NOTES ON VULNERABILITY BY SECTOR

HEALTH

Health issues are closely linked with poverty and economic development. As with education, health is both a pre-requisite for and an outcome of sustainable and equitable economic growth and poverty alleviation. Invariably it is the poorest, and children and women that are most exposed to the greatest health risks, including those related to climate change such as extreme weather events. Addressing the health risks of the most vulnerable must involve a multi-faceted approach targeting improved access to economic opportunities, improved primary health-care delivery and improved access to basic infrastructure (in particular storm-water drainage, water supply and sanitation).

The Belize Ministry of Health (MoH) is responsible for key functional areas including primary healthcare, HIV and AIDS, public health, environmental health and management of care facilities at both district and national level. The Ministry of Health envisions a “national health care system which is based upon equity, affordability, accessibility, quality and sustainability in effective partnership with all levels of government and the rest of society in order to develop and maintain an environment conducive to good health”.

The elderly, the young and women, constituting respectively about 5.7%, 46.5% and 50% of the population in Belize (Census 2010), have the most complex health needs. The health sector is challenged by a lack of infrastructure in many areas with the population widely spread across the country. Public access to medical services is predominantly via mobile primary health-care workers, district hospitals and the main referral facilities in Belize City. Lack of infrastructure combined with poor access to facilities, in particular during adverse weather makes health care delivery particularly vulnerable to climate change impacts.

Diseases such as Dengue are also a cause of concern and attention within Belize. Belize has been steadily striving toward vector control though the seeming adapting nature of the vector poses a new challenge each year. At present the health sector in Belize thus suffers from low capacity to serve the requirements of the population.

Some potential impacts of climate change on the health sector are:

- An increase in communicable diseases particularly those transmitted through vectors as climate change may create a more favourable environment for vectors to propagate. The current challenge with Dengue is a case in point.
- Increase in heat-related deaths, particularly amongst the elderly, the poor, those with existing heart, lung and other medical conditions, and to a lesser extent, children.
- Increased flood risk may lead to contamination of waters within the urban and rural areas.
- Increased flood and storm risk may put additional strain on emergency response services and the health sector as a whole particularly during an event.

INFRASTRUCTURE

STORM WATER

This sub-sector includes storm-water collection, distribution, detention, and retention infrastructure. Storm-water management is a particular concern around inhabited areas as well as locations where deforestation (due to agriculture for instance) has increased the peak run-off leading to flash flooding as well as washing away of critical transport infrastructure such as roads, culverts and bridges. In urban areas such as Belize City contamination of storm water with sewerage is commonly reported.

Responsibility for management and removal of storm-water lies with municipalities in the urban areas while it is the Ministry of Works and Transport that primarily deals with any impacts on the road infrastructure across districts. In the absence of a comprehensive land-use plan and development restrictions, many developments are in the hands of private entities that may not suitably integrate the development of the site into the wider drainage scheme of the landscape. This exacerbates harmful storm water runoff causing pollution as well as land erosion and scour.

A recent assessment of roads indicates that a high percentage of the primary and secondary roads are prone to poor storm water drainage and require urgent attention. Similarly in the urban areas, the condition of storm water infrastructure is generally poor. The cost of energy associated with storm water disposal is also a concern for The Belize Water Services Ltd. Once the storm water enters the sewer system it must be disposed of using pumps. The additional challenge posed by rising levels of sea is that of a limited number of places that the waters may be pumped into unless a major retrofitting of the entire storm-water system is carried out.

Storm water management across Belize is both poor and under-resourced and requires expenditure for upgrades and routine maintenance. Projections of more intense rainfall associated with storms will place an additional stressor on the system.

In addition to the impacts of increased storm-water runoff already mentioned (including those related to surface water contamination and the source and cost of energy for pumping), other potential impacts of Climate Change on storm water infrastructure are:

- Increased run-off damaging roads and bridges.
- Increased risk of urban flooding as the current storm water systems reach and exceed their carrying capacity in more areas. Major secondary impacts include contamination of surface waters, disruption to daily life and business, and damage to infrastructure.
- Increased maintenance costs and/or increased risk of failure of infrastructure components such as road segments, bridges, and storm water management infrastructure.
- The failure of critical storm-water infrastructure and excessive run-off from poorly planned development. This will also likely have a wide ranging and broad knock-on effect on natural water quality, aquatic bio-diversity,

sanitation infrastructure, human health, roads/ bridges maintenance and other sectors whose resilience relies on the above.

WATER SUPPLY AND SANITATION

Primary responsibility for water supply and sanitation at the municipal implementation level is the Belize Water Services Ltd. (BWSL). The BWSL mainly caters to water and sanitation users within the major municipal boundaries and villages serving about 60% of the population. Most of the areas not served by BWSL are served by rudimentary water systems managed by the villages that they serve. There are still a few communities that are served by hand pumps and household water wells.

Water in Belize urban communities is primarily sourced from rivers though some ground water is used as well. In most rural areas, the potable water supply comes from ground water though a number of rural communities still rely on above ground water courses which make them susceptible to waterborne disease. Most communities in Belize are settled adjacent to surface water courses such as rivers or streams.

The municipal water systems experiences high levels of leaks although this is being reduced substantially each year. In terms of sanitation, only Belize City and Belmopan have a sewer system, and in each case, not the entire municipality is served. Septic tanks are the primary means for sewer disposal in most other communities though pit latrines are still in use in some rural communities, particularly those with limited potable water supply. Contamination of surface water is possible with septic system when they are not built using the right designs. In Belize City, failure or overloading of the storm water system (due to heavy rain events and urban floods) results in excess water entering the sanitation system, causing burst sewage pipes and backflow of untreated sewage.

Where reticulated systems are present they are prone to occasional failure largely due to a lack of maintenance. This results in untreated wastewater entering natural water courses, causing significant contamination, increasing the potential for waterborne diseases and threatening riverine and/or marine ecology.

Some potential impacts of climate change with respect to water supply and sanitation are:

- Higher temperatures will increase water demand e.g. for energy production, cooling systems and irrigation, leading to and increased strain on water supply networks.

- Higher temperatures and increased drought risk will result in lower levels of water in the Belize dams and reservoirs. This will create water scarcity for irrigation, and energy production.

- The increased flood risk in urban areas may result in additional damage to potable water supply and/or sanitation infrastructure, and cause flooding of one into another.

TRANSPORT

This sub-sector includes roads-bridges, airports (including coastal airport), ports as the Belize territory and economy extends over marine, coastal and terrestrial landscapes. The key stakeholders in this are the Ministry of Works and Transport, the Civil Aviation Authority, and the Port Authority.

In terms of road infrastructure Belize has over 1,500 km of primary and secondary roads and several times more of tertiary road. The communities/settlements remain scattered and Belize has a low per-capita road access. Due to growth in heavy truck transport on some routes and poor design and maintenance of its roads and bridges, many sections of the road network are under pressure and can become impassable during heavy rains and flooding. There are significant road works underway or required across all the major road stretches at present. The MoWT are responsible for all national roads across Belize.

The Government of Belize has mobilized substantial bilateral and multi-lateral financing for infrastructure improvement, particularly transport investments, and there continues to be need for more such investments. Given the financial constraints that the Belizean economy faces a strategic prioritization process (MCE analysis) is underway informed by a solid information base (exposure database) to enable the identification of the critical assets with highest vulnerabilities located in areas of increased hazard level.

Following storm warning, recent attempts at evacuations by road and boat have proved worrisome as people have reported 'queues of traffic stretching between Belize City and Belmopan', 'bottle-neck bridges on evacuation routes' and 'no shoulders for emergency vehicles to pass'. In terms of criticality, the stakeholders in Belize have identified 'evacuation' as one of the key criteria for establishing which roads are critical.

Public transport in Belize (public buses on the mainland and boats between the coast and the cayes) remains unreliable and/or expensive. In poor weather the public transport is often unusable. This makes movement of the poor and vulnerable extremely difficult.

The existing marine transportation network to cayes is also considered inadequate for moving large numbers of persons, particularly if the coastal airport is flooded which it can be during rains. The facilities to operate or safe-keep boats (transport and fishing) during adverse weather are also missing or inadequate.

Belize has some coastal airports; in particular, the municipal airport at Belize City which is a vital link with popular tourist destinations across the country. The airport is often subject to disruption from coastal flooding.

Belize is currently exploring the creation of a transport master plan to comprehensively examine all modes of transport serving the economy.

Some potential impacts of the climate change on the transport infrastructure are:

- An increased deterioration of infrastructure, an increase in road accidents, worsening road traffic conditions, and increased disruption of public transport due to increased flood and storm risk.

- Increased maintenance costs for transport infrastructure due to higher temperatures.

- Increased discomfort levels in public transport.
- Growing inadequacy of evacuation and emergency routes and procedures.
- Disruptions of airport (particularly coastal airport) and port traffic due a combination of climate risks.

ENERGY, ELECTRICAL AND TELECOMMUNICATIONS

The sub-sector includes electrical supply, infrastructure, power plants, liquid and gas supply infrastructure and bulk IT/ Telecoms infrastructure. In Belize demand side annual energy consumption is dominated by transportation, primarily in the form of petrol, diesel and other fuels. Domestic sector energy consumption is mostly in the form of electricity used for cooling and lighting, and LP Gas for cooking, supplemented by some reliance on wood in rural communities.

Electricity coverage within Belize is estimated at 75% of households supplied via Belize Electricity Limited (BEL) with hydroelectric power generation in Western Belize and co-generation from biomass in northern Belize. This is supplemented with expensive and sometimes unreliable power supply from The Federal Electricity Commission (CFE) of Mexico. Belize is discussing the possibility of joining a regional electricity grid which will build some redundancy into the system. Only a small percentage of electricity in Belize comes from solar owing to the widespread belief that the ‘cost of installations is prohibitive’.

One of the biggest consumers of energy in Belize (after transport) is Belize City and the tourism sector along the coast. These are also the furthest away from the power generation facilities in the Western and northern Belize and the CFE supply from Mexico, leading to significant losses during transmission.

Fuel in Belize is expensive even though the country recently became an exporter of petroleum with the Belize Natural Energy’s discovery in 2006. The country does not have the infrastructure to process crude oil and produce fuel.

Some potential impacts of the climate change on energy infrastructure and energy consumption are:

- Higher temperatures will cause significant increase in energy consumption largely for cooling and refrigeration facilities. Potentially higher humidity levels in the future would also contribute to the need for additional cooling and comfort control adding to energy consumption. This will put significant pressure on energy supplies (and cost of energy if the power is sourced from diesel based fuels).
- Periods of reduced rainfall will deplete energy production from hydropower plants forcing energy production from costlier and high-carbon fossil fuels increasing the cost of business and affecting productivity. The above provides for increased stress on electric supply, with resultant power outages and loss of production and income during the hotter and/or drier weather.
- Higher temperatures may result in increased capital cost for cooling and refrigeration.

-Increased flood and storm risk may result in damaged infrastructure and unplanned outages. While a serious flood-induced electric and telecommunication outage is yet to occur in the last two decades smaller disruptions are increasingly common.

BUILT AND URBAN ENVIRONMENT

The built-environment for the purposes of this report includes all buildings and public spaces in urban and rural locations across Belize. Belize contains a large variety of such spaces and buildings, much of which is spread sparsely across the country, often with difficult access during adverse weather. The built-environment includes several major economic sectors including agriculture, forestry, research, tourism, markets, food processing and mining. There is a substantial disparity in the quality of the built-environment between the wealthy and the poor with the poor in particular needing access to safe-shelters in the event of a major tropical storm.

The responsibility for managing the built-environment falls under the Ministry of Housing and Urban Development, Ministry of Natural Resources and Agriculture [Physical Planning] and the Ministry of Transport and Works, with numerous private sector operators contributing significantly to the physical environment e.g. the Spanish look-out community that has a vast area under farm-land generating both livelihoods and almost 50% of staple food production in Belize. Belize does not yet have a comprehensive land-use or infrastructure plan, and building codes or planning control is rarely applied, thus making all parts of the built-environment disjointed in terms of basic services and resilience.

There is a significant programme underway in Belize to improve the quality and operation of municipal infrastructure across Belize, but much more work is still required, both in the built environment and in the planning capabilities.

Some potential impacts of the climate change in this sector are:

-Increased temperatures will result in a greater heat stress and discomfort, particularly in the relatively denser areas or for inadequately constructed existing structures.

-Increased drought risk will stress gravity fed water systems.

-Increased flood and storm risk will expose deficiencies in building codes and development planning.

-Bathymetric, river-flow, weather (wind, psychometric) and tidal information vital for planning and design of built-environment is likely to change under new climate regimes and new specifications may have to be developed.

-Increased flood and storm risk will increase damage to property resulting in increased maintenance, operation and financial protection costs.

ENVIRONMENT

NATURAL WATER RESOURCES

Surface water resources are relatively abundant in most parts of Belize, and have been quantified to some extent (see Box 3). Belize's water resource is vital to the economy. It provides domestic and industrial users with water supply and is the source of the country's hydropower. The total volume of freshwater available per capita in Belize in 1995 was 80.8 thousand cubic meters, the highest in Latin America (CCAD, 1998; Belize First National Communications COP/UNFCCC, 2000).

Hydrology of Belize

Belize has substantial surface and ground water resources. It has 18 major river catchments and another 16 sub-catchments, which drain the Maya Mountains and discharge into the Caribbean Sea. Boles (1999) grouped the watersheds in Belize into six main watershed regions based on general characteristics of topography, geology, soils, rainfall and land use. He defines a watershed region as a cluster of watersheds that share many structural, climatic and often impact characteristics.

The watershed regions include: the Northern Watershed Region, the North-eastern, the Central, the South-eastern, the South-western and the Southern Watershed Region. Numerous freshwater and brackish water lakes or lagoons are also scattered in the central and northern coastal and inland low-lying areas (National Meteorological and Hydrological Service).

Based on the CIA's Factbook, Belize has approximately 19 cubic kilometres of renewable water resources. This water comes from 18 major and 17 minor watersheds which are divided into six watershed regions. Belize's rivers discharge approximate 15 km³/yr. of water to the sea.

Information on groundwater resources is quite limited or non-existent. An initiative has begun through the Integrated Water Resources Management Authority to map ground water resources in Belize, starting with the Savannah Province in the Stann Creek District. What is known is that there is good groundwater yield in sections of the plains, but it is affected by geology and climatic conditions. Conversely, occurrences of poor quality groundwater do occur in coastal regions, primarily due to salt water intrusion. There have also been incidences of saline water originating from inland wells in the north, possible due to dissolution of calcareous sediments. There also exist heavy concentrations of hardness and sulphates, particularly the Corozal District.

The occurrences of poor groundwater quality increase during the dry season when aquifer recharge is insignificant – this is most evident in the coastal regions of the districts of Belize, Corozal and Orange Walk. Since climate change is likely to reduce the length of the rainy season, increase the number of consecutive dry days, increase the length of the dry season, and result in sea level rise, the likelihood of more saltwater intrusion into aquifers in the coastal regions, particularly in the northern part of the country is high.

Notwithstanding the above, due to its geographic location, low population, relatively high level of forest cover, and the abundance of rivers, Belize is said to have one of the highest volume of freshwater availability per capita in Latin America (National Meteorological Service, 2010). However the volume of renewable internal freshwater resources per capita (cubic meters) in Belize stood at 48,019 as of 2009. Over the past 22 years this indicator reached a maximum value of 91,324 in 1987 and a minimum value of 48,019 in 2009, indicating a steady decline over the years. Increases in demand due to expansion in the agricultural, industrial and tourism, sectors along with

a growing population and accompanying water pollution and watershed destruction make it imperative that urgent attention be given to the proper management, use and understanding of the freshwater resources. The National Integrated Water Resource Management Policy, 2008, highlights that there is a need to conduct a proper and comprehensive assessment of water resources and develop baseline of water quality for the various uses of water.

Some potential impacts of the climate change on natural water resources are:

-A reduction in surface water sources due to increased drought risk.

-Saline intrusion in coastal aquifers due to sea level rise.

MARINE AND FISHERIES

This sector is very important for food security and revenue generation. More than 12,000 people rely on fishery and many more on tourism, which itself is reliant on Belize's marine resources. An assessment focused on both capture fisheries and the aquaculture industry concluded that proper adaptation included building capacities which will help to better inform decisions and enable use of information that will lead to enhanced ability to cope with climate change. One important strategy that would help to build capacity is to take immediate action which would minimize stress to those ecosystems that support fisheries and aquaculture. Preserving the physical integrity of critical marine and fresh water environments is an essential first step towards the minimization of stress.

Stepping up the monitoring of selected environmental factors such as sea surface temperatures, inland temperature, rainfall or precipitation will, in the long term, improve our understanding of the dynamics of fisheries/aquaculture climate change issues and lead to a more efficient, effective planned strategy for sustainable development.

Some potential impacts of the climate change on marine resources are:

-An increased threat to livelihood to unfavourable climate conditions.

-Degradation of the physical integrity of critical marine and fresh water environments.

-Changes in fish supply in response to changes in breeding habitats or other stresses.

FLORA, FAUNA AND BIODIVERSITY

Belize displays as much habitat diversity at low altitude as any Mesoamerican country. The terrestrial flora is estimated at about 4,000 species. Belize boasts the highest overall percentage of forest cover of any of the Central American countries (Vreugdenhil et al., 2002). Although, Belize has approximately 62.7% of the total land area under some form of forest cover, only about 14% of the forests (about 303,000 hectares) are available or appropriate for sustainable forest management for timber production.

The loss of 17.4% of forest area over a 30 years (1980 to 2010) span represents an annual rate of deforestation of 0.6%. In absolute numbers this translates to 725,173 acres of forest cover loss with an average forest loss per year of 24, 835 acres (Cherrington et al., 2010). Presently one of the greatest threats and challenges to this sector is illegal logging, looting, hunting, and poaching from Guatemalan incursions into Belizean territory especially in the

Chiquibul National Park and Bladen Nature Reserve. Additionally, private forested lands are being converted to agricultural lands and/or being used for urban expansions or simply over exploitation; the rates however have not been fully quantified. Notwithstanding these challenges, the forestry sector can still be considered as healthy due to 62.7% of forest cover.

Some potential impacts of the climate change on terrestrial biodiversity are:

- An increased threat to due to livelihood diversification.
- Degradation of the physical integrity of critical marine and fresh water environments.
- Decrease in fish supply due to changes in sea surface temperatures.

COASTLINE

A vulnerability assessment conducted for the coastal zone of Belize for the INC utilized the Intergovernmental Panel on Climate Change (IPCC) Aerial Videotape Assisted Vulnerability Analysis (AVVR) methodology to map the coastline. The methodology was used to determine those areas most likely to be affected by sea level rise. A more comprehensive assessment was conducted for the Second National Communication that took into consideration the social, economic, and environmental impacts that would result from a rise in sea level and other climate change related phenomena.

Conclusions emerging from the vulnerability assessment indicated that Belize needs to focus on those actions that will reduce direct impact and help to build resilience within the natural environment. Since recommendations made in previous assessments have met with limited success due to lack of funding, lack of coordination and unavailability of personnel among other reasons, new recommendations seek to optimize the available time, human and financial resources. Based on the evaluation of capacity it is evident that many of the structures required for adaptation to climate change are already in place and what is needed is consistent implementation.

Some potential impacts of the climate change on the coastline are:

- Loss of coastline under increased sea level rise.
- Coral bleaching due to higher sea surface temperatures.

DISASTER MANAGEMENT

Disaster management within Belize is primarily co-ordinated by NEMO (National Emergency Management Organisation) within the Ministry of Labour, Local government, Rural Development, NEMO, and Immigration. Weather related issues particularly flooding, tropical storms are already a serious issue for NEMO while water and energy stress (disruption and cost) have resulted in additional stress to its management.

NEMO focuses on emergency preparation, operational disaster response and disaster management planning and mitigation. NEMO has local offices in each district and a country-wide staff of nearly 100 persons.

Notwithstanding, it is a challenge to reach scattered communities and get them to safe shelter if necessary. NEMO's work is complimented by the work of every other ministry of government. NEMO has 10 operational committees each headed by a different government ministry.

Increased flood, drought and storm risks along with rising temperatures and sea-levels will all influence the emergency response strategy of NEMO. The Red Cross in Belize works closely with NEMO and has already highlighted the inadequacies in evacuation routes, safe-shelter capacity and connections to warehouses.

Some potential impacts of climate change for disaster management in Belize are:

- Increased demand for disaster and emergency response services.
- Decreasing ability to deliver adequate emergency response due to the effects of enhanced climate risks on, for example, the transport sector e.g. increased stoppages, accidents, impediments on the transport network.
- Increased outages in energy, water and ICT infrastructure resulting in security concerns and disruption to emergency response.
- An overwhelming of emergency and medical facilities due to the intensity and scale of enhanced climate risks.

FINANCE AND ECONOMY

The Government of Belize recognised the highly weather sensitive economy in its latest budget pointing to the need to invest in resilient infrastructure. Table 5 below captures the contribution and weather sensitivity of different aspects of the Belize economy.

In 2010, Belize's agricultural, petroleum, and tourism exports registered 36 percent of GDP and 60 percent of exports of goods and services. Although Belize has the second highest per capita income in Central America, the average income figure masks a huge income disparity between rich and poor. The 2010 Poverty Assessment shows that more than 4 out of 10 people live in poverty. The sizable trade deficit and heavy foreign debt burden continue to be major concerns (Index Mundi 2012).

The Ministry of Finance and Economic Development (MoFED) have the key responsibility for managing the financial and economic well-being of Belize as well as steering the country through financial or economic adversity such as weather related disasters. In 2007 Belize joined the Caribbean Catastrophe Risk Insurance Facility (CCRIF) providing parametric cover for tropical storms which has been expanded to a rainfall product this year. Agriculture, forestry, food processing (particularly citrus and banana), tourism, energy production and demand, telecommunications, water and storm water are all major contributors to Belize economy and highly sensitive to weather events such as wind, heat, lightening, precipitation and flooding. Cost of living (inflation) and business are thus highly sensitive to weather adversities.

TOURISM

The tourism industry has become the largest revenue generator for Belize, directly and indirectly involving the greatest proportion of the labour force, and affecting all other sectors. The assessment of the tourism sector highlighted several areas of supply and demand based economic vulnerability to climate change, including the risks to coastal land and infrastructure, exposure to resource damages such as coral bleaching, and an associated reduction in demand because of resource changes or risks to personal health and safety.

A preliminary assessment of Belize's tourism sector suggests that it is highly vulnerable to the effects of climate change through both its exposure to climate impacts and its weak capacity for adaptation. Adaptation measures that reflect these specific sources of vulnerability should be considered in light of the country's limited capacity to moderate the harmful effects of climate change. Such measures include diversifying the portfolio of tourism offerings to emphasize inland attractions, planning for coastal development with greater caution, and considering the feasibility of artificial reefs as underwater attractions to alleviate some of the existing pressures on Marine Protected Areas.

AGRICULTURE

Belize's economic growth and food security is highly dependent on agricultural activity. There is only moderate diversification in cultivation of crops, and so food security may be at risk from the impending impacts of climate change.

Rising sea levels pose a threat to agriculture in Belize (Ramirez et al 2012) continues to rise as predicted. For example, saltwater intrusion is already a big concern for most of the islands and for many communities in the coastal plains. Farmlands in the coastal plains could experience salinity problems, as well as a drop in the availability of fresh water for irrigation. Sea level also has effects on erosion. The floods in northern Belize in 1998 affected sugar cane quality and net sugar production.

Other negative effects that climate change will have on the agricultural sector will be due to variations in temperature and precipitation. Ramirez et al (2013) asserts that the temperature for maximum agricultural productivity in Belize is 32.8°C. The projected increase in temperature will likely increase day time temperatures above this, leading to reduction in agricultural productivity. Accumulated losses by 2100 in the agricultural sector as a whole could be approximately 35% of 2007 GDP, with the greatest economic losses caused by variations in precipitation. Given the importance that maize, bean, sugar cane and orange crops have to the economy, they will be the most affected by climate change. It is to be noted that the government of Belize has identified the agricultural sector as one of the priority areas to be attended to in terms of adaptation measures.

Some potential impacts of climate change for finance and economy in Belize are:

- Additional strain to a wide range of infrastructural sub-sectors including the energy production and supply and the transport sector due to enhanced climatic risks. These stressors will put additional burden on every economic sector.

- Increased cost in the construction, operation and financial protection for all sectors and communities.

- Greater stress on government expenditures, liquidity and budgets.
- Increase in non-productive expenditure associated with emergency response.
- The creation of climate ‘winners’ and ‘losers’ fundamentally challenging the duty of care that the state has.

COMMUNITY DEVELOPMENT & LIVELIHOODS

Belize’s Human Development Index ranking ranged from 67 to 99 over the 2002 to 2012 period. This places the country in the medium human development category. Notwithstanding, the Belize Country Report for the comparative study of Social Protection and Poverty Reduction in the Caribbean (CDB 2004) specifies a range of threats affecting the lives of the poorest and incipiently vulnerable population sectors, and the responses required to redress them. The Report stresses four key risks that influence vulnerability to poverty: economic, life cycle, employment and environmental. Economic risk is considered the major threat to livelihoods and standards of living because of Belize’s ‘openness’ and its vulnerability to globalisation. Where employment and life-cycle risks are concerned, the Social Security system offers basic benefits to the employed population and investment from SSB funds contribute to wider forms of social protection such as pensions for the uninsured who are over sixty years old. This still leave a significant proportion of the population without a safety net.

CLIMATE CHANGE AND THE MOST VULNERABLE PERSONS

It is the poor, the elderly, children and the mentally and physically impaired who are most at risk due to natural hazards. Under climate change, the vulnerability of these groups will likely increase and action needs to be taken to build the resilience of these groups and their families as part of the effort to build national resilience. At the 2010 Census under 6% of the population were over 60 years old while just less than 12% were under five years old and almost 30% were 14 years or younger. The population 19 years and younger stood at over 40% of the 2010 population.

The definition of poverty used in the Belize Country Poverty Assessment (2009) is adopted from the World Bank 2008, and states “—Poverty is hunger. Poverty is lack of shelter. Poverty is being sick and not being able to see a doctor. Poverty is not having access to school and not knowing how to read. Poverty is not having a job, is fear for the future, living one day at a time. Poverty is losing a child to illness brought about by unclean water. Poverty is powerlessness, lack of representation and freedom. (WB, 2008)”.

In discussing poverty the CPA identifies two underlying threads: The first is that poverty is essentially related to the notion of absence, lack or deprivation of factors which are necessary for an acceptable quality of life. The second is that income poverty is a sub-component of wellbeing, which also includes the notions of vulnerability and inequality. The CPA also defines the vulnerable as those groups, households, and individuals who may not be income poor but who could be if they were affected by particular shocks, e.g. natural disasters and sudden ill health. It defines inequality as the lack of wellbeing arising from the unequal distribution of income, consumption or other attributes across the population. From this perspective, poverty includes aspects such as:

-Lack of basic needs, e.g. water, roads, adequate housing, basic education and health services.

-Lack of wellbeing resulting from insecurity, vulnerability, and inequality, as well as basic needs.

-The country poverty assessment 2009 estimated that 10.40% of the population were indigent and 20.60% were poor but not indigent for a total of 31% of the population being poor. Another 12.9 percent were vulnerable to becoming poor if impacted by some sort of disaster.

THE CHALLENGE OF RESILIENCE

The challenge of adapting to climate changes implies knowing the climate risks and identifying the vulnerabilities that Belize faces. This section has generally attempted to do both thereby setting the stage for an exploration of a priority list of actions for supporting adaptation and resilience building.

It is to be noted that the government of Belize has established the following main objectives of Belize's adaptation policy:

Explore and utilize the opportunities being developed through the climate change negotiation process.

Prepare all sectors in Belize to face the challenges of global climate change.

Promote the development of economic incentives that encourage public and private investment in adaptation measures.

Develop Belize's negotiating position at a regional and international level in order to promote its economic and environmental interests.

Encourage the development of adequate institutional systems for the planning and response to climate change.

There is little doubt that allocating resources for interventions aimed at reducing the impact of already evident climate risks such as floods, droughts and storms is necessary. That climate change will make these risks more pronounced only makes for an even more compelling argument to do so. However, in the context of limited financial resources and pressing needs, priorities have to be determined with respect to the use of government resources to address development. The ensuing sections of this document identify both physical and non-physical interventions that take into account current and future risks posed by existing and future climate variability. Key investments are chosen which maximize the use of limited resources. In particular for infrastructure they are chosen after a multi-criteria evaluation (MCE) is used to prioritize the investments, taking into account the most important criteria, including social and environmental impacts.

APPENDIX 2 RISK AND RESILIENCE MEASURES

RISKS AND RESILIENCE MEASURES FOR CHANGES IN TEMPERATURE

Risks due to projected changes in temperature and temperature cycles within Belize and the three major ecological zones.

Table: Hazard parameters: Changes in temperature including mean temperatures and extreme temperatures

High Impact Risks ¹	Critical Institutions	Ecological Zone	Resilience Measures
T1 Increased heat related health deterioration and deaths	Health; NEMO; Human development; Rural development; Finance & Economic Development	Terrestrial/ Coastal	-Improved modelling and design of the built environment
T2 Increased energy demand and operational costs	Utilities, Finance and Economic Development; Private sector and trade; Agriculture; Tourism; Works and Transport	Terrestrial/ Coastal/ Marine	-Alternative renewable sources of energy; energy efficient design and energy conservation. -Improved specifications of equipment
T3 Water stress from increased demand	All sectors	Terrestrial/ Coastal/ Marine	-Improved water management measures across all sectors
T4 Degradation of sensitive eco-systems	Natural resources; Agriculture; Forestry; Fishing; Housing; Tourism	Terrestrial/ Coastal/ Marine	-Marine, forest and fisheries management procedures
T5 Disruption to transport and logistical facilities	Agriculture; Tourism; Works and Transport	Terrestrial/ Coastal/ Marine	-Improved modelling and design of the logistical and transport facilities and network -Improved specifications of rolling stock

¹ High-impact risks were documented through consultation with stakeholders and specialist advice in this area.

RISKS AND RESILIENCE MEASURES FOR CHANGES IN PRECIPITATION

Risks due to projected changes in precipitation and precipitation cycles within Belize and the three major ecological zones.

Table: Hazard parameters: Changes in precipitation including longer drier season and more intense precipitation.

High Impact Risks	Critical Institutions	Ecological Zone	Resilience Measures
P1 Flood and scour risk damaging or over-whelming infrastructure (Road/ IT/ Energy/ Water) and contaminating surface waters	Works and Transport; Health; NEMO; Human development; Rural development; Finance & Economic Development	Terrestrial/ Coastal	-Development controls on land-use to minimise run-off and flash-flooding. -Appropriate storm-water system design and maintenance ² -Improved location and design of critical infrastructure such as electrical sub-stations and roads.
P2 Flood risk disruption to business and mobility	Utilities, Finance and Economic Development; Private sector and trade; Agriculture; Tourism; Works and Transport	Terrestrial/ Coastal/ Marine	-Appropriate system design and maintenance of storm-water and road networks. -Improved weather monitoring and forecasts -Improved location of business facilities to improve access. -Improved emergency response capacity
P3 Environmental damage from storm water run-off	Forests, Agriculture, Housing; Private sector and trade; Tourism; Natural Resources; Utilities	Terrestrial/ Coastal/ Marine	-Development controls on land-use and resource management to minimise harmful run-off and flash-flooding.
P4 Reduced hydro-power production	Utilities, Finance and Economic Development; Private sector and trade; Agriculture; Housing; Tourism; Works and	Terrestrial/ Coastal/ Marine	-Alternative renewable sources of energy; energy efficient design and energy conservation.

² The surveys conducted as part of the GFDRR Exposure database/ MCE process confirm that poor design of drainage is playing major role in disruption of road network in Belize.

	Transport		
P5 Increased water-stress	All sectors	Terrestrial/ Coastal/ Marine	-Improved water management procedures

RISKS AND RESILIENCE MEASURES FOR CLIMATE INDUCED CHANGES OUTSIDE BELIZE BOUNDARIES

Table: Hazard parameters: Changes in sea-levels or consequences of climate change globally.

High Impact Risks	Critical Institutions	Ecological Zone	Resilience Measures
SL1 Rise in sea-levels leading to loss of coast	Housing; Natural Resources; Urban development; Transport; Utilities; Finance & Economic Development	Terrestrial/ Coastal/ Marine	- Improve monitoring and modelling of sea level changes. -Development controls on land-use to pre-empt sea-level impact on development.
SL2 Energy security as Belize is heavily dependent on energy imports	Utilities; Finance & Economic Development	Terrestrial/ Coastal	-Development controls on land-use to minimise run-off and flash-flooding. -Appropriate storm-water system design and maintenance -Improved location of critical infrastructure such as electrical sub-stations.
SL3 Water security	Utilities; Finance & Economic Development; water security; Agriculture; Tourism	Terrestrial/ Coastal/ Marine	-Sustainable farming practices and trials in Belize.
SL4 Food security	Utilities, Finance and Economic Development; Private sector and trade; Agriculture; Tourism	Terrestrial/ Coastal/ Marine	-Alternative export, commercial and livelihood opportunities in Belize
SL5 Disruptions in international trade and market	Private sector and trade; Finance & Economic Development	Terrestrial/ Coastal/ Marine	-Improved marine and fisheries management
SL6 Changes in marine eco-systems leading to depletion	Natural Resources; Tourism; Fisheries	Marine	-Livelihood and skills development opportunities in Belize.

of fisheries and corals			-Regional co-operation in climate resilience
SL7 International migration and displacement	National security, migration, Finance & Economic Development	Terrestrial/ Coastal/ Marine	

RISKS AND RESILIENCE MEASURES FOR CHANGES IN OTHER WEATHER ELEMENTS (WIND, HUMIDITY)

Risks due to projected changes in other climate variables in Belize and its major ecological zones.

Table: Hazard parameters: Changes in climate such as wind intensity, wind direction, humidity, clear days

High Impact Risks	Critical Institutions	Ecological Zone	Resilience Measures
V1 Degradation of bio-diversity	Natural resources, tourism;	Terrestrial/ Coastal	-Improved management of marine, coastal and terrestrial ecologies. Land-use planning.
V2 Water and energy stress	Utilities; Finance & Economic Development; Agriculture; Tourism	Terrestrial/ Coastal/ Marine	-Improved water management procedures. Co-ordination around water management -Alternative renewable sources of energy; energy efficient design and energy conservation.
V3 Deterioration of health and more communicable disease	Health, Housing	Terrestrial/ Coastal/ Marine	-Improved infrastructure design and maintenance -Improved modelling and design of built-environment -Improved access to health facilities
V4 Rising cost of business and operations	Private sector and trade; Finance & Economic Development	Terrestrial/ Coastal/ Marine	-Improved infrastructure design and maintenance and land-use for improved access to livelihoods facilities.

APPENDIX 3 TECHNICAL DATA-SHEETS

INTERVENTION 1.1a: HYDRO-METEOROLOGICAL, TOPOGRAPHIC AND BATHYMETRIC DATA ROADMAP

Name of Intervention (Component)	Analyses of Climate Change Detection Indices (Component 1 Data and Knowledge Transfer)
<p>Rationale or justification for intervention: <i>Climate monitoring is absolutely necessary to provide guidance in near real time as we attempt to adapt to those changes effectively, and in the most cost-effective manner.</i></p> <p><i>A core set of descriptive indices has been developed to be used to gain a uniform perspective on observed changes in weather and climate extremes. These indices describe particular characteristics of extremes in the climate, including frequency, amplitude and persistence in the temperature and precipitation variables.</i></p> <p><i>Work had been previously partially completed locally (Gonguez, 2008) on the calculation of climate detection indices. This work focused primarily on calculating the climate change detection indices for precipitation at few local stations. However, over the past five years activity had ceased. This intervention would increase the analyses to include more stations in the NMS observing network along with analyses of temperature change detection indices.</i></p> <p><i>Furthermore, model projections would be used to indicate future likely changes in these indices.</i></p> <p><i>Some of the climate change detection indices already studied at select local stations, are: i. Consecutive Dry Days, (CDD), ii. Consecutive Wet Days (CWD), iii. Highest 1-day rainfall amount, iv. Number of wet days, v. Monthly maximum consecutive 5-day precipitation, vi. Heavy precipitation days and vi. Very heavy precipitation days</i></p> <p><i>The intent is to extend the analyses to include temperature indices such as i. Extreme temperature range, ii. Number of cold days (warm nights), iii. Warm/cold spell days</i></p> <p><i>Continued monitoring of climate is absolutely necessary for adaptation to climate change. Analyses of these climate change indices and their trends/projections would greatly assist in future planning endeavours in all sectors particularly in energy generation, food security, water resources management, and health and disaster risk reduction.</i></p> <p><i>The results of this work can feed into the country's National Communications under the United Nations Framework Convention on Climate Change (UNFCCC)</i></p>	
Potential implementing entity and steering group	The National Meteorological Service (NMS); Belize Climate Change Office Ministry of Forestry, Fisheries and Sustainable Development;
Sector/ Sub-sector/ Co-sectors	All sectors of the economy will benefit but particularly energy generation, food security, water resources management, and health and disaster risk reduction.
Location	Most of the activities associated with this intervention would occur at the NMS. Some activities would be undertaken at modelling centres.
Addressing relevant government strategy and policy	National Hazard Mitigation Policy National Climate Change Adaptation Policy National Sustainable Development Policy (Under preparation)

Scope or list of activities	<p>Capital and Maintenance Works (CM):</p> <p>Management and Technical Assistance (MT): Collation of Historical climate data; Preliminary analysis of the data use the data to downscale model projections;</p> <p>Knowledge Transfer (KT): disseminate the indices and their implications</p> <p>Other (O):</p>
Beneficiaries	The results of the extremes analyses described in this intervention will support climate-policy related decisions at the local and national levels. Local authorities and national decision-makers will be able to utilize the extreme climate change indices analyses as input for climate change assessments and the formulation of adaptation and mitigation strategies.
Specific benefits to vulnerable populations	Because weather information is disseminated through every news media vulnerable populations are likely to be informed of impending weather related impacts
Gender-related considerations	It is important that weather information reaches all members of the community. Special efforts should be made to ensure that women have access to weather information and the kinds of actions that families need to take to protect themselves
Outcomes	<p>a catalogue of changes in temperature and rainfall patterns as indicated by the climate change detection indices</p> <p>Projections of changes in those indices based on results of the downscaled models</p>
Implementation period	3 years

INTERVENTION 1.1b: HYDRO-METEOROLOGICAL, TOPOGRAPHIC AND BATHYMETRIC DATA ROADMAP

Name of Intervention (Component)	Observation Station Network Upgrade for Hydrology and Meteorology (Component 1 Data and Knowledge Transfer)
<p>Rationale or justification for intervention: <i>The NMS maintains a network of observation stations dispersed around the country. At present, there are twenty weather observation stations and xy number of river gauging stations that are operational. The majority of these are conventional observation stations requiring an individual to make recordings once per day. Within the 24 hour period between readings much vital information is not being recorded. An automatic weather station and river gauging station has the advantage of recording data at fine time scales in digital formats on a continuous basis. This would provide more reliable data by removing the human input and source of uncertainty. The improved data provided by the automatic weather stations would then be more reliable to be used to discern changes in our climate.</i></p> <p><i>The intervention would increase the number of weather observation stations and river gauging station in Belize’s hydro meteorological network of observation station. It will to improve on, or automate to some extent, the network of observation stations operated by the NMS and the Hydrology Department.</i></p>	
Potential implementing entity and steering group	<p>The National Meteorological Service (NMS); The Hydrology Department</p> <p>National Emergency Management organization; Ministry of Forestry, Fisheries and Sustainable Development; Ministry of Natural Resources and Agriculture;</p>
Sector/ Sub-sector/ Co-sectors	All sectors of the economy will benefit
Location	This intervention will supplement the present coverage of observation stations. Some of these observation stations will collect an array weather and climate observations, while others will focus on river gauging. The exact location of each additional station will be based on analysis conducted by the NMS and Hydrology Department.
Addressing relevant government strategy and policy	<p>National Hazard Mitigation Policy National Climate Change Adaptation Policy National Sustainable Development Policy (Under preparation)</p>
Scope or list of activities	<p>Capital Works: Procurement of automatic weather stations through the bidding; Preparation of installation site; Installation of instruments Management & Technical Assistance: Identification and selection of installation sites Knowledge Transfer: Dissemination of information Other:</p>
Beneficiaries	Everyone residing in Belize and every sector of the economy

Specific benefits to vulnerable populations	Because weather information is disseminated through every news media vulnerable populations are likely to be informed of impending weather related impacts
Gender-related considerations	It is important that weather information reaches all genders. Special efforts should be made to ensure that women have access to weather information and the kinds of actions that families need to take to protect themselves
Outcomes	<p>The NMS and Hydrology Departments would have an improved network of observation stations to assist with collection and analysis of hydro-meteorological data</p> <p>NMS and Hydrology Department are undertaking analysis and providing information to support a climate resilient Belize</p>
Implementation period	1 -2 year

INTERVENTION 1.1c: HYDRO-METEOROLOGICAL, TOPOGRAPHIC AND BATHYMETRIC DATA ROADMAP

Name of Intervention (Component)	Suitable Topographic information for planning and engineering design (Component 1 Data and Knowledge Transfer)
<p>Rationale or justification for intervention: <i>This intervention addresses the most common request proposed by stakeholders, the requirement for suitable topographic information so that physical infrastructure (roads, drainage) and physical planning can be conducted suitably. It's a fundamental requirement for resilient design and planning.</i></p>	
Potential implementing entity and steering group	Ministry of Works and Transport Ministry of Natural Resources and Agriculture
Sector/ Sub-sector/ Co-sectors	All sectors of the economy will benefit including Private Sector
Location	This intervention will provide topographic data for the whole country at a suitable resolution and scale for planning and engineering design.
Addressing relevant government strategy and policy	National Planning Framework National Land Use Policy and Integrated Planning Framework National Spatial Data Infrastructure Policy Climate Change policy National Hazard Mitigation Policy National Tourism Policy
Scope or list of activities	Capital Works: Data collection and processing; Digital files with the requisite information. Management & Technical Assistance: Specifications and costing for topographic information. Knowledge Transfer: Dissemination of information Other:
Beneficiaries	Everyone residing in Belize and every sector of the economy
Specific benefits to vulnerable populations	Better ability to design for providing access and services to remote populations.
Gender related considerations	Will benefit both women and men equally.
Outcomes	Terms of Reference for topographic information Topographic information with the recommended specification
Implementation period	2-5 years

INTERVENTION 1.2: HYDRO-METEOROLOGICAL, TOPOGRAPHIC AND BATHYMETRIC DATA ROADMAP

Name of Intervention (Component)	National Spatial Data Infrastructure (NSDI) and Climate Project (Component 1 Data and Knowledge Transfer)
Rationale or justification for intervention: <i>Belize is currently developing a national spatial data infrastructure to support, among other things, assessment of climate change impacts and integration of disaster risk reduction into national development planning. At present, very little climatic and social statistics are currently available for inclusion in the NSDI. This intervention will develop capacity within the National Meteorological Service (NMS), Statistical Institute of Belize (SIB), the Belize Social Investment Fund (BSIF) and the Ministry of Human Development and Social Transformation (MHDST) in areas related to collection of spatial data and associated attributes and spatial analysis. In this way they will be able to compile spatial and attribute baseline data on climate and weather, the vulnerable populations, and on the services available to the vulnerable groups and communities and undertake spatial analysis to support development planning and identification of interventions that achieve the national development goals.</i>	
Potential implementing entity and steering group	The National Meteorological Service (NMS) and Statistical Institute of Belize (Co-leads); Belize Social Investment Fund Ministry of Human Development and Social Transformation (MHDST) National Emergency Management Organization; Ministry of Forestry, Fisheries and Sustainable Development; Ministry of Natural Resources and Agriculture;
Sector/ Sub-sector/ Co-sectors	All sectors of the economy will benefit
Location	Most of the named agencies are based in Belmopan. However, the work that they do will cover the entire country.
Addressing relevant government strategy and policy	National Hazard Mitigation Policy National Climate Change Adaptation Policy National Sustainable Development Policy (Under preparation) Belize Gender Policy National Youth Development Policy
Scope or list of activities	Capital Works: Procurement of hardware and software; Management and Technical Assistance: Development of data collection and analysis protocols Knowledge Transfer: Dissemination of information Other:
Beneficiaries	Everyone residing in Belize and every sector of the economy ;the vulnerable population
Specific benefits to	

vulnerable populations	
Gender related considerations	Gender-disaggregated data and analyses will be prepared and accessible to both men and women.
Outcomes	The implementing agencies will have the capacity to develop and analyse spatial data There is greater awareness of the available spatial data related weather, climate and vulnerable populations
Implementation period	3 to 5 years

INTERVENTION 2.1: UPGRADING AND ASSET MANAGEMENT OF CRITICAL ASSETS: BRIDGES, ROADS, DRAINAGE, PUBLIC BUILDINGS AND PUBLIC TRANSPORT

<p>Name of Intervention (Component)</p>	<p>Critical Assets: Roads, Public Transport, Drainage and Public Buildings (Component 2: Physical planning and built-environment)</p>
<p>Rationale or justification for intervention: <i>Critical Assets</i> are components of the national infrastructure that should retain their functionality during and after a major hazard - prevent loss of life and maintain an acceptable level of activity ranging from everyday business to emergency operations.</p> <p>This intervention is the most sizeable amongst all the other interventions proposed within the NCRIP. Firstly it aims to rank the ‘criticality of the various parts of the national infrastructure and understand which ones are particularly vulnerable to flooding as well as other hazards. This would include in particular</p> <ul style="list-style-type: none"> - life-line roads - public buildings (egg: shelters and) - public transport (such as on evacuation routes) - drainage infrastructure <p>Feasibility studies will be carried out in the most ‘critical’ of the infrastructure resulting in measures to improve their performance and reliability during adverse weather conditions. Such measures will be implemented alongside a comprehensive plan to manage and maintain these critical assets.</p> <p>Physical infrastructure is the life-line of Belize during and after hazards and visibly suffers from lack of investment and poor maintenance. Disruptions and losses result from even relatively minor weather events. The need for this investment and the fiscal shortfall in making such investment has been recognized within the 2013-14 budget of the Government of Belize.</p> <p>The process of identifying the ‘critical’ components is highly participatory and analytical. Known as the MCE (Multi-Criteria Evaluation) it has been described previously and has already been tested within Belize to identify ‘critical’ roads which are considered a priority for resilience related investments and improvements.³ A suitably adapted process can be applied to the identification of critical buildings, public transport routes and drainage segments. The MCE process draws upon an ‘exposure’ database of assets already near completion covering 1,400 Kilometres of road, drainage structures including 2,000 culverts and varied public buildings.</p>	
<p>Lead implementing entity and consultative group</p>	<p>Ministry of Works & Transport (Lead); Consultative group includes but not limited to: Ministry of Education, Youth and Sports; Ministry of Finance & Economic Development; Ministry of Health; Ministry of Labour, Local government, Rural development, NEMO, Immigration & Nationality; Ministry of Housing & Urban Development; Ministry of National Security; Ministry of Trade, Investment Promotion and Private Sector and Consumer Protection</p>

³ A list of roads identified through the MCE process will be added shortly.

Sector/ Sub-sector/ Co-sectors	Works, Transport, Education, Health, Economic Development, Disaster Management, Housing, Security, Private Sector
Location	Road Segments: Criticality of the road segments was assessed through the MCE process. Locations include... and cross-checked with priority roads identified by Ministry of Works and Transport. Public Buildings: TBC Drainage: TBC Public Transport Routes: TBC and co-ordinated with IADB masterplan
Which relevant government policy or strategy have been addressed	Government of Belize ‘Transport Masterplan’
Scope or list of activities	Capital works: Works to upgrade the assets identified as most ‘critical’ and apply exemplar and affordable resilience measures. This would include new construction, retrofitting as well as maintenance. Management and Technical Assistance: Multi-criteria evaluation process to identify the critical assets, hazard analysis to gauge the exposure of critical assets to hazards, feasibility studies to propose measures on improving resilience. Knowledge Transfer and Data: Training of Ministry of Works personnel and selected communities in design and supervision of retrofitting and asset management. Other: TBC
Beneficiaries	Benefits all sectors of Belize economy.
Specific benefits to vulnerable populations	The access to resilient roads, public transport routes and public buildings will improve resilience of the most vulnerable communities and reduce the disruption by improving access and quality of physical determinants to health and well-being.
Gender related considerations	Ensure all gender-specific feedback received during disaggregated consultations are incorporated to enhance the relevance and effectiveness of the intervention’s design and implementation.
Outcomes	Critical roads, drainage and public buildings identified through the participatory Multi-criteria evaluation process, a method already well tested amongst stakeholders within Belize. Feasibility studies identify measures to be applied to critical assets in making them resilient. Critical assets are resilient in the face of multiple weather related hazards. Co-benefits include livelihoods and skills improvements in the works and transport sectors.
Implementation period	10+ years
Links to related interventions	Belize Transport Sector Master plan

INTERVENTION 2.2: LAND-USE & INFRASTRUCTURE PLAN

Name of Intervention (Component)	Land-use and infrastructure plan (Component 2: Physical planning and built-environment)
<p>Rationale or justification for intervention: <i>Land-use planning seeks to order and regulate the appropriate use of land thus promoting appropriate development w.r.t. site conditions. Governments use land-use planning to manage the development of land within their jurisdictions. In doing so, the governmental unit can plan for the needs of the community while safeguarding natural resources. Land-use can be an effective tool for resilience by ensuring critical and life-line facilities as well as socio-economic activity are not built in areas prone to hazards. The infrastructure plan is a complimentary activity that ensures that appropriate and resilient infrastructure services the current and future land-use of Belize. Belize currently does not have a land-use plan and/or an infrastructure plan thus raising the risk of development on unsuitable land prone to hazards and infrastructure that cannot cope with multiple hazards in servicing a given piece of land.</i></p> <p>These two plans together will improve spatial development in areas at lower risk from hazards. It will enable development pressures on some locations in Belize with suitable infrastructure.</p>	
Lead implementing entity and consultative group	<p>Ministry of Natural Resources and Agriculture – Physical Planning Unit (Lead); Ministry of Works & Transport (Co-Lead); Consultative group includes but not limited to: Ministry of Finance & Economic Development; Ministry of public services, elections and boundaries Ministry of Forests, Fisheries and Sustainable Development; Ministry of Trade, Investment Promotion, Private sector and Investment Promotion ; Ministry of Health; Ministry of Labour, Local government, Rural development, NEMO, Immigration & Nationality; Ministry of Housing & Urban Development; Ministry of National Security</p>
Sector/ Sub-sector/ Co-sectors	Works, Transport, Education, Health, Economic Development, Disaster Management, Housing, Security, Private Sector
Location	A comprehensive plan of spatial development across all locations in Belize
Which relevant government policy or strategy have been addressed	Land-use Policy (Government of Belize, 2011)
Scope or list of activities	<p>Capital works: TBC Management and Technical Assistance: Land-use and infrastructure plan preparation; Cabinet approval of plan. Knowledge Transfer and Data: Community and stakeholder engagement on plan preparation. Other: TBC</p>

Beneficiaries	Benefits all sectors of Belize economy.
Specific benefits to vulnerable populations	The access to safe sites for social and economic development will improve resilience of the most vulnerable communities and reduce the disruption by improving access and quality of physical determinants to health and well-being.
Gender related considerations	Ensure all gender-specific feedback received during disaggregated consultations are incorporated to enhance the relevance and effectiveness of the intervention's design and implementation.
Outcomes	A statutory land-use plan to maintain order and efficiency in the future development in Belize.
Implementation period	1-2 years
Links to related interventions	Belize Agriculture Sector Masterplan Belize Transport Sector Masterplan Belize Tourism Sector Masterplan
Reviewed by (Date)	Ministry of Natural Resources and Agriculture – Physical Planning Unit (Date) Ministry of Works and Transport (Date)

INTERVENTION 2.2: COASTAL LOGISTICS: PORTS & MUNICIPAL AIRPORTS

Name of Intervention (Component)	Coastal Logistics: Ports and municipal airports - Resilience assessment (Component 2: Physical planning and built-environment)
<p>Rationale or justification for intervention: <i>Key logistical facilities such as ports and coastal airports in the low-lying areas in coastal zones were built without taking into consideration of climate change. Rising sea level rise, extreme weather events and changes weather patterns pose severe threats to these coastal facilities. Coastal airports such as the municipal airport in Belize City are one of the busiest in the country serving vital tourist revenue as well as a key facility for evacuation in the case of an emergency. Ports in Belize are vital for the tourist vessels, export of produce and processed food-items another important part of the Belizean economy. Many of these facilities are vulnerable to future sea level rise and storm surge. Sea level rise and storm surge would inundate these, interrupting operations and causing damage to infrastructure. Without adequate adaptation measures/interventions, climate change and its related impacts could effectively close these facilities. This would result in economic losses to the facility as well as the attached value chain.</i></p> <p><i>Therefore consideration will need to be given to protective works for key airports/ ports in the low-lying areas in coastal zones or assess other options such as identifying alternative sites.</i></p>	
Lead implementing entity and consultative group	Ministry of Works & Transport – Port Authority/ Aviation Authority (Co-Lead); Consultative group includes but not limited to: Ministry of Finance & Economic Development; Ministry of Trade, Investment Promotion, Private sector and Investment Promotion ; Ministry of Tourism and culture
Sector/ Sub-sector/ Co-sectors	Works, Transport, Economic Development, Disaster Management, Tourism, Trade, Private Sector
Location	Coastal ports and airports subject to sea-level rise
Which relevant government policy or strategy have been addressed	Land-use Policy (Government of Belize, 2011)
Scope or list of activities	Capital works: TBC after the feasibility and assessment is completed Management and Technical Assistance: Vulnerability assessment; Feasibility study of adaptation and design options; costed proposals. Knowledge Transfer and Data: TBC Other: TBC
Beneficiaries	Benefits all sectors of Belize economy particularly the tourism industry, Disaster management, trade and agriculture.
Specific benefits to vulnerable populations	Ports and coastal airports are vital for evacuation of vulnerable populations living on the cays and also vital to bring in supplies while the region is exposed to weather stress.
Gender related	Any gender-specific feedback received will be incorporated to enhance the relevance and

considerations	effectiveness of the intervention's design and implementation.
Outcomes	<p>Climate change risk considerations are mainstreamed into planning procedures of coastal logistics such as ports and airports.</p> <p>Fully costed plans for resilience: Raised airfields, all-weather docks or identification of other potential sites to increase the resilience of facilities in the low-lying areas in coastal zone.</p>
Implementation period	1-2 years for the initial study and 5-10 years for implementation
Links to related interventions	<p>Belize Transport Sector Masterplan</p> <p>Belize Tourism Sector Masterplan</p> <p>Belize Mid-Term Development Strategy</p>

INTERVENTION 2.4: UTILITIES: ENERGY, WATER & WASTEWATER

Name of Intervention (Component)	UTILITIES: Energy, Water and Wastewater - Assessment for improving the resilience of operations and reducing operational cost (Component 2: Physical planning and built-environment)
Rationale or justification for intervention: <i>Energy, water and waste-water are life-line facilities. In the context of Belize the operations and costs of operations are highly sensitive to weather change. The Belize Water Services (BWS) and Belize Electricity Limited (BEL) are finding that fluctuations in weather can disrupt services and add cost for instance pumping water during flooding requires reliable equipment in adverse conditions as well as undisrupted and affordable electricity. Future changes in precipitation, temperatures and sea-level will all impact on the reliability and cost of maintaining an acceptable level of service particularly during the event of weather stress. Robust specifications of the infrastructure, locating faults quickly to minimize downtime and affordable energy are all essential for resilience. The feasibility work proposed under this intervention will look at improving the reliability of energy/water supply, equipment and reduction in operational cost in particular from weather related stress. For instance ‘management of vegetation along transmission lines’ is envisaged to have a substantial impact on reducing power disruption from fires as well as falling trees. The feasibility work will indicate a range of solutions and alternatives for water/energy supply (during drier periods for instance) improved specification for equipment for reliability and value-for-money. It will look at which parts of the energy and water production network are most at risk from climate change and propose alternatives and resilience measures. The availability of life-line services to an acceptable level during hazard events will also be explored.</i>	
Lead implementing entity and consultative group	Ministry of Energy, science, technology and utilities – BWS/ BEL (Co-Leads); Consultative group includes but not limited to: Ministry of Works and Transport Ministry of Housing and Urban Development Ministry of Labour, Local government, Rural Development, NEMO, Immigration and Nationality
Sector/ Sub-sector/ Co-sectors	Utilities, Works, Economic Development, Disaster Management, Tourism, Trade, Private Sector, Housing
Location	Applies to a) energy and water generation sites and distribution network b) all inhabited parts of Belize particularly where end users such as populations and economic activity are prone to disruption from multiple hazards like flooding, storm-surge and sea-level rise.
Which relevant government policy or strategy have been addressed	Belize – National Energy Plan, 2001) Belize - National Adaptation Strategy to address climate change in the water sector (
Scope or list of activities	Capital works: TBC based on the proposal of the feasibility study Management and Technical Assistance: Vulnerability assessment; Feasibility study of adaptation and design options; costed proposals. Knowledge Transfer and Data: Education of consumers of water and energy Other: TBC
Beneficiaries	Benefits all sectors of Belize economy and society relying on reliable and cost-effective

	energy and water.
Specific benefits to vulnerable populations	Vulnerable populations are highly reliant on affordable and reliable life-line facilities such as water in particular. Appropriate management of waste water will ensure secondary impacts of hazards such as disease do not affect vulnerable people.
Gender related considerations	Consultations will take place with men and women separately in order to capture gender-specific needs related to water and sanitation. Gender-specific feedback will be incorporated to enhance the relevance and effectiveness of the intervention's design and implementation.
Outcomes	Climate change risk considerations are mainstreamed into utilities –water and energy which comprise some of the biggest cost to society and economy in Belize. Fully costed plans for resilience: Measures in generation, distribution and efficient consumption of energy and water.
Implementation period	1-2 years for the initial study and 5-10 years for implementation
Links to related interventions	Belize Transport Sector Masterplan Belize Tourism Sector Masterplan Belize Mid-Term Development Strategy

INTERVENTION 2.5: BUILT-ENVIRONMENT MODELLING AND TESTING FACILITIES

Name of Intervention (Component)	Built-environment modelling and testing facilities (Component 2: Physical planning and built-environment)
<p>Rationale or justification for intervention: <i>Variability in climate patterns and even micro-climates may require rethinking on the standards, codes and specifications to which the built-environment is built. Intense precipitation, rising temperatures, stronger winds, changes in wind direction and evapotranspiration are all issues that are forecast to affect Belize. Such variability elements requires materials and techniques to be able to resist natural forces and perform their designed purpose to the full designed life.</i></p> <p><i>Reducing life-cycle costs and maintaining the appropriate specifications is a substantial challenge for planning and works in Belize. Computer aided techniques now provide a cost-effective environment to test the impact of weather on the built-environment and select suitable specifications before it is built. This can provide enormous savings and value-for-money invested in repairs and revisions in specifications by trial and error. The implementation of quality built-environment (from buildings to drainage and roads) also requires materials to be adequately tested physically before it's applied. Belize has found that selection of the wrong material (such as lime based aggregates for road) can be a hazard in adverse weather as well as a costly material to replace. Thus modelling and testing facilities are essential to design the infrastructure in Belize to a resilient specification.</i></p> <p><i>A cluster of computer-aided and physical testing facilities will improve the specification and quality control on the buildings and infrastructure through better modelling and testing facilities for building and roads and drainage. Materials, structures and designs can be tested for their performance under various weather conditions and modelled fir future variability and extremes. Such facilities are essential to the propagation of green buildings as well.</i></p>	
Lead implementing entity and consultative group	Belize Bureau of Standards & Central Building Authority – (Co-Leads); Consultative group includes but not limited to: Ministry of Works and Transport Ministry of Housing and Urban Development Ministry of Energy, science, technology and utilities
Sector/ Sub-sector/ Co-sectors	Works, Disaster Management, Housing, Private Sector
Location	Applies to all locations in Belize.
Which relevant government policy or strategy have been addressed	
Scope or list of activities	Capital works: Modelling and testing facilities and building demonstration centre(s) Management and Technical Assistance: Training and capacity building of professionals and contractors in the built-environment Knowledge Transfer and Data: Dissemination of products and services amongst designers and contractors in the public and private sector

	Other: TBC
Beneficiaries	Provides support for testing and modelling facilities to improve performance and maximize designed life of infrastructure. It will benefit professionals with new skills. The potential for cost, energy and material saving is unlimited.
Specific benefits to vulnerable populations	It enables the built-environment to be tested well in advance and specify the most cost-effective and robust solution. It enables the testing for safety of material going into the construction. Thus it applies a number of pre-emptive measures to reduce the risk to the most vulnerable population and improve operations, safety and access during adverse weather.
Gender related considerations	Professional men and women will be invited to benefit from the skills training and capacity building. The establishment of a minimum percentage of admittance for women will be considered.
Outcomes	Facilities to model and test the quality of infrastructure for weather risk improving resilience. Improved training and skills amongst professionals. Improved facilities for building a low-Carbon environment.
Implementation period	1-2 years for setting up.
Links to related interventions	-

INTERVENTION 2.6: HEALTH FACILITIES

Name of Intervention (Component)	Health Facilities – Improved district hospital facilities (Component 2: Physical planning and built-environment)
<p>Rationale or justification for intervention: <i>Variability in climate patterns and even micro-climates may create significant shifts in the way communities are exposed to disease agents and disease. Belize is already experiencing More intense levels of demand for out-patient services related to vector borne disease for instance. The costs of medical care, both testing and pharmaceuticals are also prohibitive for many populations who primarily lead a subsistence based lifestyle. This intervention aims to improve the access and capacity of medical centres to deal with out-patient and emergency care related to outbreaks of various disease. It will cover the preparation on an action plan to respond to disease outbreaks (in line with public health and preventive measures) including testing, care and treatment facilities in each district. Nationally, it will also look at improved procurement of pharmaceuticals in order to make them more affordable to the population that requires them. Amongst the consultees were private sector who are interested in the development of partnering with the public sector in upgrading Health facilities as viable business but those that include the poor by providing affordable healthcare. The standardisation of medical practice and training of government/ independent medical practitioners for instance on standardised diagnostic and medical process is an important part of the intervention.</i></p>	
Lead implementing entity and consultative group	Ministry of Health – (Leads); Private Sector Consultative group includes but not limited to: Ministry of Labour, local government, rural development, NEMO, immigration and nationality Ministry of Housing and Urban Development Ministry of Trade, investment promotion, private sector and consumer protection Ministry of Human development and poverty alleviation
Sector/ Sub-sector/ Co-sectors	Health, NEMO, Housing, Human development, Private Sector
Location	Applies to all districts in Belize.
Which relevant government policy or strategy have been addressed	-
Scope or list of activities	<p>Capital works: Building testing and treatment facilities (outpatient and emergency) within District hospitals to be confirmed after feasibility studies</p> <p>Management and Technical Assistance: Action plan on measures to be undertaken at district level for improving health facilities; Feasibility and costing studies for improving district hospital facilities in-line with action plan; Private-public partnership assessment; Training of medical and para-medical staff</p> <p>Knowledge Transfer and Data: Dissemination of information amongst medical staff as well as communities; Develop of practice Training on standard medical business practices.</p> <p>Other: Framework agreements for cost-effective pharmaceuticals in Belize;</p>

Beneficiaries	Women and men who are currently vulnerable to weather related disease.
Specific benefits to vulnerable populations	Accessible and affordable treatment for disease. Particular benefit is for children and elderly.
Gender related considerations	The vulnerability assessment and the action plan will reflect differentiated priorities and needs by gender. Maternal and child health will be a priority focus area.
Outcomes	Gender differentiated vulnerability assessment from climate change followed by Action plan to deal with disease impacts of climate variability... Improved training and skills amongst medical professionals. Improved, accessible and affordable district level medical facilities. Public awareness. Affordable pharmaceuticals in Belize.
Implementation period	2-5 years for setting up.
Links to related interventions	-

INTERVENTION 2.7: PREVENTION OF COASTAL EROSION

Name of Intervention (Component)	Prevention of Coastal Erosion (Component 2: Physical planning and built-environment)
<p>Rationale or justification for intervention: <i>Highly populated areas lie along the cost of Belize, these include major towns such as Belize City, Punta Gorda, Corozal and Dangriga as well as economically significant tourism facilities such as those in the Cays. There are already signs of coastal erosion eating away for instance into the land and landmarks of Dangriga and the forecast is for such a trend to continue throughout the shoreline of Belize. Sea-level rise will bring further difficulty in the use and management of coastal habitats for instance making it much more difficult to plan the use of land and design of robust services.</i></p> <p><i>Therefore feasibility studies are required to identify locations of high-risk and propose structural, land-use and bio-ecological measures for preventing coastline erosion.</i></p>	
Lead implementing entity and consultative group	<p>Ministry of Works & Transport (Lead); Consultative group includes but not limited to: Coastal Zone Management Authority and Institute Ministry of Housing and Urban Development Ministry of Trade, Investment Promotion, Private sector and Investment Promotion ; Ministry of Tourism and culture</p>
Sector/ Sub-sector/ Co-sectors	Works, Housing, Urban development, Environment, Transport, Economic Development, Disaster Management, Tourism, Trade, Private Sector
Location	Coastal ports and airports subject to sea-level rise
Which relevant government policy or strategy have been addressed	National Coastal Zone Management Strategy
Scope or list of activities	<p>Capital works: TBC after the feasibility and assessment is completed Management and Technical Assistance: Vulnerability assessment; Feasibility study of adaptation and design options; costed proposals. Knowledge Transfer and Data: TBC Other: TBC</p>
Beneficiaries	Benefits all sectors of Belize economy particularly the tourism industry, fisheries, Disaster management, trade and agriculture.
Specific benefits to vulnerable populations	Coastal towns are integral to the socio-economic life of Belize and home to diverse communities that rely on the local economy.
Gender related considerations	Ensure that consultations consider the needs and perspectives of different members of the household, as the beneficiary industries mentioned often rely on the contributions of the men and women that compose each household.

Outcomes	<p>Climate change risk considerations are mainstreamed into management of the coastline and the habitat and economic activity along the coastline.</p> <p>Fully costed plans for resilience</p>
Implementation period	<p>1-2 years for the initial study and 5-15 years for implementation</p>
Links to related interventions	<p>Belize Transport Sector Masterplan</p> <p>Belize Tourism Sector Masterplan</p> <p>Belize Mid-Term Development Strategy</p>

INTERVENTION 3.1 BUILDING RESILIENCE IN SMALL FARMER AGRICULTURE AND FORESTRY PRACTICES

Name of Intervention (Component)	Building Resilience in small farmer agriculture and forestry practices (Component 3: Services and Non-Physical Interventions)
<p>Rationale or justification for intervention: <i>Climate change will affect agricultural production in many ways. Increased temperatures, extended dry periods, more intense rainfall and hurricanes are all in the projections. Each of these will lead to decreased productivity of farmers if adaptation measures are not taken.</i></p> <p><i>Belize is heavily reliant on small farmers for food self-sufficiency and in some export subsectors. Over the last two decades agricultural production by small farmers on steep slopes has been increasing. If left unabated this could lead to excessive erosion and landslides. Farmers will need to be encouraged to use land that is more suitable to agricultural production, and a reforestation effort on those exposed steep slopes will need to be undertaken.</i></p> <p><i>At the same time there is a need to increase the productivity of small farmers by helping them to identify suitable varieties for the crops that they produce and by promoting good agricultural practices that build resilience to the effects of adverse weather events (increased daytime and night time temperature, heavy rains and extended dry periods) and conserve soil. This intervention seeks to build the resilience of farmers and farming communities through adaptation measures such as identification of suitable varieties, promotion of good agricultural practices, identification of viable markets, promoting soil conservation practices, and increasing public awareness.</i></p>	
Potential implementing entity and steering group	The Ministry of Natural Resources and Agriculture; Ministry of Forestry, Fisheries and Sustainable Development Ministry of Rural Development National Emergency Management Organization Ministry of Human Development and Social Transformation (MHDST) Belize Trade and Investment Development Service (BELTRAIDE)
Sector/ Sub-sector/ Co-sectors	Agricultural, trade, rural development,
Location	The operational headquarters for this intervention will be in Belmopan. However the main activities will be in all six districts. The forest restoration activities will initially focus on steep slopes in the Cayo, Stann Creek, and Toledo Districts. Best practices will be tailored to the current and projected conditions in each district.
Addressing relevant government strategy and policy	National Agriculture Policy National Irrigation Policy National Forest Policy National Hazard Mitigation Policy National Climate Change Adaptation Policy National Sustainable Development Policy (Under preparation) Belize Gender Policy National Youth Development Policy

Scope or list of activities	<p>Capital Works: Procurement of hardware and software;</p> <p>Management and Technical Assistance: Identify slopes for reforestation efforts; work with farmers to access alternative farming locations; develop a menu of good practices that should be promoted in the various districts of Belize; undertake variety trials for selected crops; strengthen the agriculture extension service; strengthen the forest rehabilitation/sustainable forestry program of the Forest Department;</p> <p>Knowledge Transfer: Dissemination of information; public education; promotion of women farmers;</p> <p>Other:</p>
Beneficiaries	Everyone residing in Belize and every sector of the economy ;the vulnerable population
Specific benefits to vulnerable populations	Poor farmers will get access to agricultural land; the agricultural Extension Service will work with them to build their farming capacity.
Gender related considerations	This intervention will target women and men in farming households. Furthermore, it will also provide out-reach to specifically encourage women to participate, by providing technical assistance (agricultural extension service) needed to strengthen their capacities. Women will gain access to agricultural land as individuals or equal partners to male members of the family.
Outcomes	<p>The amount of steep slopes used for farming has reduced</p> <p>The capacities of the agriculture extension service to educate and support farmers has increased</p> <p>The capacities of the forest rehabilitation program degraded slopes through restoration efforts has increased</p> <p>Agriculture best practices are being promoted to women and men in rural Belize</p> <p>Suitable varieties for crops produced by farmers are identified</p>
Implementation period	3 to 5 years
Links to related interventions	

INTERVENTION 3.2 DIVERSIFYING FISHER FOLK INCOME

Name of Intervention (Component)	Diversifying fisher folk income (Component 3: Services and Non-Physical Interventions)
Rationale or justification for intervention: <i>Belize's fisheries are important to the myriad of small fishers and to the tourism sector in Belize. Climate change projections suggest that there will be a rise in sea surface temperature and in sea level. This could adversely impact both the tourism and the fisheries sectors. This intervention seeks to promote adaptation measures and improve the opportunities of the fisher folk to generation an acceptable income and thereby a good quality of live for themselves and their families.</i>	
Potential implementing entity and steering group	Ministry of Forestry, Fisheries and Sustainable Development; Ministry of Tourism and Culture; Ministry of Natural Resources and Agriculture; Ministry responsible for Rural Development The National Meteorological Service (NMS); Ministry of Human Development and Social Transformation (MHDST) National Emergency Management Organization;
Sector/ Sub-sector/ Co-sectors	Fisheries; Tourism; Trade;
Location	The headquarters for the intervention will be Belize City and most of the activities will be implemented at sea and in the fishing communities along Belize's coast and on the Cayes
Addressing relevant government strategy and policy	National Food and Agriculture Policy National Tourism Policy National Trade Policy National Hazard Mitigation Policy National Climate Change Adaptation Policy National Sustainable Development Policy (Under preparation) Belize Gender Policy National Youth Development Policy
Scope or list of activities	Capital Works: Develop production infrastructure capacity for seaweed cultivation in southern Belize and other support services within the value-chain; Management and Technical Assistance: Establish stock enhancement programs for important species through aquaculture; Reduce populations of invasive fish species within MPA's though export and establish niche markets for Lionfish; Develop certification programs for fishery products that are harvested utilizing best fishing practices and in compliance with the Fisheries Laws; Engage fisheries in agro-productive activities within fishing communities in northern Belize; Identify and establish a bridging fund to support the transition of fishers from fishing as a commercial activity to other income generating options. Knowledge Transfer: Dissemination of information

	Other:
Beneficiaries	Fishing communities, the tourism sector,
Specific benefits to vulnerable populations	Expansion of livelihood options,
Gender related considerations	Income generation options that target the women in fishing households will be given special attention
Outcomes	Fishers able to cope with economic losses due to natural disasters and having constant production year-round. Reduction in the number of fishers engaged in commercial fishing by 25% during a 10 year period.
Implementation period	3to 5 years
Links to related interventions	

INTERVENTION 3.3: MAINSTREAMING CLIMATE RESILIENCE IN THE TOURISM AND TRANSPORT MASTER PLANS

<p>Name of Intervention (Component)</p>	<p>Mainstreaming climate resilience in the tourism and transport master plans (Component 3: Services and Non-Physical Interventions)</p>
<p>Rationale or justification for intervention: <i>The transport infrastructure network is Belize’s single most expensive asset, which needs to be protected and maintained. This is a huge asset by any standard that requires adequate routine and periodic maintenance to keep it in a stable long-term condition and to enable it to play its role as a catalyst for socio-economic development. Despite notable progress in the last decade, the extent and quality of transport infrastructure in Belize is still lagging behind compared to other developing countries in the region. The Belize ports and airports are also important engines to the Belizean economy and they too are vulnerable to the vagaries of climate change. Improved transport infrastructure (roads, ports and airports) is needed to underpin the planned growth in Belize’s tourism sector and the country’s trade over the next two decades. The Government of Belize, with international support will be embarking on the preparation of a Transport Sector Master Plan whose implementation will seek to address the challenges of the transport sector and position it to support the socioeconomic development of Belize.</i></p> <p><i>At the same time, the GOB, is implementing the Sustainable Tourism Mater Plan that was prepared in 2011. At the time the Master plan did not fully take on board the issues associated with climate change and the associated impacts on the tourism sector.</i></p> <p><i>It is important that both the Tourism Master Plan that is under implementation and the Transport Sector Master Plan that is about to be prepared need to be made resilient to the effects of climate change for the benefit of the Belizean people and economy.</i></p>	
<p>Lead implementing entity and consultative group</p>	<p>Ministry of Works and Transport, Ministry of Tourism and Ministry of Energy; Consultative group includes but not limited to: Coastal Zone management Authority and Institute Ministry of Local Government and Rural Development Ministry of Forestry, Fisheries and Sustainable Development National Emergency Management Organization</p>
<p>Sector/ Sub-sector/ Co-sectors</p>	<p>Works, tourism, trade, rural development, environment, human development,</p>
<p>Location</p>	<p>The operational headquarters for the preparation of the Transport sector master plan will be Belmopan, but the plan will be for the entire country. The Tourism Master Plan is being implemented countrywide from operational headquarters in Belize City.</p>
<p>Which relevant government policy or strategy have been addressed</p>	<p>National Agriculture Policy Hazard Mitigation Policy National Land Use Policy Climate Change and Adaptation Policy</p>

	Tourism Master Plan
Scope or list of activities	Capital works: Management and Technical Assistance: Analysis; Plan preparation/revision; public consultations; Knowledge Transfer and Data: Socialization of the plans Other: TBC
Beneficiaries	All Belizeans can benefit. the tourism sector, trade, private sector generally, social sectors,
Specific benefits to vulnerable populations	The initiative will increase accessibility for the poor and vulnerable.
Gender related considerations	The plan preparation/revision will need to take into account the needs of women for jobs and mobility
Outcomes	The Tourism mater Plan has built in Climate Resilience The Transport Master Plan has taken into consideration and ensured the need for climate resilient roads.
Implementation period	2 – 3 yrs
Links to related interventions	-

INTERVENTION 3.4a: BUILDING COMPREHENSIVE DISASTER RISK MANAGEMENT CAPACITY IN THE PUBLIC AND PRIVATE SECTORS

<p>Name of Intervention (Component)</p>	<p>Building comprehensive disaster risk management capacity in the public and private sectors (Component 3: Services and Non-Physical Interventions)</p>
<p>Rationale or justification for intervention: <i>Despite the advances toward a more comprehensive approach to the management of disaster risk, Belize faces several challenges that it must address to achieve sustained disaster risk reduction, particularly in light of the forecasts for the effects of climate change which include more frequent and more intense hazard events, longer dry periods, and sea level rise. The focus of the disaster risk management system continues to be on preparedness and response with minimal attention given to disaster prevention and impact mitigation (Rogers, 2010 p. 162). One of the barriers to comprehensive disaster risk management is the limited extent to which disaster risk management is integrated into the operations of public and private sector organizations. It is imperative that disaster risk reduction is mainstreamed into the plans and operations of public agencies, private sector companies, and the society at large. Once that is done, NEMO will be better poised to place greater emphasis on ex-ante risk reduction, and incorporate Integrated Disaster Risk Management (IDRM) into the core operations of public sector institutions.</i></p> <p><i>Some critical actions that are required to achieve this integration include strengthening of the institutional capacity and the legal and regulatory framework for comprehensive disaster management (CDM); improving risk information and education to inform development decision making; and development and implementation of a comprehensive sector-wide program for prevention and mitigation as well as a strategy for the ex-ante financing of disaster risk mitigation. Urban and rural communities and their local governments will need to organize themselves to plan for and implement the disaster risk management cycle of prevention, mitigation, preparedness and response to increase resilience; both individual and family resilience. NEMO will likely need to work with the local governments to develop their capacity to lead this effort in the communities and with small and medium enterprises and their umbrella organizations in the private sector.</i></p>	
<p>Lead implementing entity and consultative group</p>	<p>National Emergency Management Organization & Belize Red Cross – (Co-Leads); Consultative group includes but not limited to: Ministry of Works and Transport Ministry of Housing and Urban Development Ministry of Energy, Science, Technology and Utilities Ministry of Human Development and Social Transformation Mennonite Community Disaster Risk Reduction Program</p>
<p>Sector/ Sub-sector/ Co-sectors</p>	<p>Works, Disaster Management, Housing, Private Sector</p>
<p>Location</p>	<p>The operational headquarters will be Belmopan, but activities will be carried out Applies to all locations in Belize.</p>
<p>Which relevant government policy or strategy have</p>	<p>Hazard Mitigation Policy National Land Use Policy Climate Change and Adaptation policy</p>

been addressed	
Scope or list of activities	<p>Capital works:</p> <p>Management and Technical Assistance: Develop GIS capacity at NEMO; Assessment of disaster risk and vulnerabilities in the various communities of Belize; Preparation of community level disaster mitigation, preparedness, and response plans;</p> <p>Knowledge Transfer and Data: Dissemination information about disaster preparedness planning to public sector, private sector and community entities public and private sector</p> <p>Other: TBC</p>
Beneficiaries	All Belizeans can benefit. The money that would need to be spent on recovery after a disaster could be spent on development instead
Specific benefits to vulnerable populations	Enables the identification of vulnerable groups and their needs; take their needs into consideration during planning; integrates the needs of vulnerable groups into the national development discussions
Gender related considerations	Women will be invited to lead efforts to prepare community-level disaster mitigation, preparedness and response plans (as best practice international examples have demonstrated that such interventions led by women have produced more favourable results for men, women and children as well as their wider communities).
Outcomes	<p>NEMO has a fully functioning data management unit with database and GIS capabilities</p> <p>Communities and their residents have the capacity to undertake community and livelihood vulnerability assessments</p> <p>Community disaster risk mitigation and reduction plans are in place and operational</p> <p>Private sector agencies are preparing Disaster Risk Reduction and Management Plans</p>
Implementation period	2 – 3 yrs. to complete the planning across Belize
Links to related interventions	-
Reviewed by	NEMO (Date)

INTERVENTION 3.4b: BUILDING EMERGENCY RESPONSE AND RECOVERY CAPACITY

<p>Name of Intervention (Component)</p>	<p>Building Emergency response and recovery capacity (Component 3: Services & non-physical)</p>
<p>Rationale or justification for intervention: <i>At present most of the responsibility for emergency response and recovery rests with NEMO though there are non-government agencies such as the Belize Red Cross, Belize Disaster and Response Rescue Team (BDART), and the Mennonite Communities that provide substantial support. Even so, the network of first responders is very thin and requires substantial development.</i></p> <p><i>At the same time, there is substantial experience in the country with response and recovery that could be used to develop the response network and develop stronger response capabilities in Belizean communities. This intervention will build on existing capabilities to develop a cadre of first responders to support emergency response and recovery efforts. It will also build relationships with the private sector to enable access to warehouse stock information during emergencies and facilitate quick transactions when materials are needed for response and recovery.</i></p>	
<p>Lead implementing entity and consultative group</p>	<p>National Emergency Management Organization & Belize Red Cross – (Co-Leads); Consultative group includes but not limited to: Ministry of Works and Transport Ministry of Local Government and Rural Development Ministry of Housing and Urban Development Ministry of Energy, Science, Technology and Utilities Ministry of Human Development and Social Transformation Mennonite Community Disaster Risk Reduction Program Belize Disaster and Response Team Belize Chamber of Commerce and Industry National Association of Village Councils Mayor’s Association of Belize</p>
<p>Sector/ Sub-sector/ Co-sectors</p>	<p>Works, Disaster Management, Housing, Private Sector, rural development,</p>
<p>Location</p>	<p>The operational headquarters will be Belmopan, but activities will be carried out in all districts in Belize.</p>
<p>Which relevant government policy or strategy have been addressed</p>	<p>Hazard Mitigation Policy National Land Use Policy Climate Change and Adaptation Policy</p>
<p>Scope or list of activities</p>	<p>Capital works: Management and Technical Assistance: Promote disaster response and recovery first responder concepts among tour guides, tour operators, sales representatives and other frontline workers; develop and operationalize the First Responders network; Develop community first responders associations; build relations among the major first responder</p>

	<p>agencies and NEMO; Develop MOUs and protocols with suppliers on the how to access inventory listing and how they can be accessed for response and recovery</p> <p>Knowledge Transfer and Data: organize regular meeting and trainings for first responders; promote the first responders concept to the general public</p> <p>Other: TBC</p>
Beneficiaries	All Belizeans can benefit. Any community impacted by a hazard
Specific benefits to vulnerable populations	Enables the identification of vulnerable groups and their needs; take their needs into consideration during planning; integrates the needs of vulnerable groups into the national development discussions
Gender related considerations	Proactively encourage women who currently work as first responders to join the training as well as to train women in relevant professions to become first responders.
Outcomes	<p>A first responders network is operational</p> <p>Communities have a mechanism for quick response before, during and after a hazard</p> <p>Protocols for first response are in place and in use</p>
Implementation period	2 – 3 yrs.
Links to related interventions	-
Reviewed by (Date)	<p>NEMO (Date)</p> <p>Red Cross</p> <p>Mennonite Community, Spanish Lookout</p>

INTERVENTION 4.1 GREEN REGULATIONS

Name of Intervention (Component)	Green Regulations for energy efficiency and renewable energy (Component 4 Policy and Regulatory Measures)
<p>Rationale or justification for intervention: <i>This intervention addresses the most concern amongst the stakeholders on the high costs of energy and weather variability posing further risk to their business. Regulatory measures that promote an enabling environment and incentivise energy efficiency as well as renewable energy need to be explored and operationalized. This is a fundamental requirement for financial resilience in Belize.</i></p>	
Potential implementing entity and steering group	Ministry of Finance and Economic Development Ministry of Energy, Science, technology and utilities
Sector/ Sub-sector/ Co-sectors	All sectors of the economy will benefit including Private Sector
Location	This intervention will be applied to the whole country
Addressing relevant government strategy and policy	National Energy Policy
Scope or list of activities	<p>Capital Works:</p> <p>Management & Technical Assistance: Stakeholder consultation and impact assessment of new policies and regulations</p> <p>Knowledge Transfer: Dissemination of information</p> <p>Other:</p>
Beneficiaries	Everyone residing in Belize and every sector of the economy
Specific benefits to vulnerable populations	Incentives and affordable renewables
Gender related populations	Consultations will target men and women separately in order to more effectively capture gender-specific needs related to energy markets and practices.
Outcomes	Policy and fiscal measures for promoting the energy efficiency and renewable energy markets and practices
Implementation period	2-5 years

INTERVENTION 4.2: MARINE REGULATIONS

Name of Intervention (Component)	Sustainable Marine Regulations (Component 4 Policy and Regulatory Measures)
<p>Rationale or justification for intervention: Climate variability poses substantial uncertainties for fishers and their livelihood as well as the marine eco-system itself. This intervention will seek to both regulate and inform the sector in monitoring and managing such uncertainties and implementing good practices through stronger institutions and education.</p>	
Potential implementing entity and steering group	Ministry of Forestry, Fisheries and Sustainable Development.
Sector/ Sub-sector/ Co-sectors	Fisheries and natural resources
Location	This intervention will benefit the coastal and marine communities
Addressing relevant government strategy and policy	National Food and Agriculture Policy. National Sustainable Development Policy.
Scope or list of activities	<p>Capital Works: -</p> <p>Management & Technical Assistance: Identify and implement support mechanisms for the implementation of the Draft Fisheries Resources Bill and the on-going revisions of the Fisheries regulations once enacted; Provide funding support for developing a comprehensive fisheries management plan which integrate climate change adaptation measures as it relate to maintaining ecosystem services and integrity; Identify funding to sustain the rights-based fisheries management program in the medium- to long-term basis.</p> <p>Knowledge Transfer: Develop formal training programs for Fisheries Officers in marine ecosystems assessments; Outline academic programs for Fisheries Officers leading to Graduate and Post Graduate Degrees in fisheries management, fish stock assessment, fishery development.</p> <p>Other:</p>
Beneficiaries	Fisheries department
Specific benefits to vulnerable populations	Fisher households
Gender related considerations	Ensure that both women and men are encouraged to participate in training programs and have access to academic programs in the fishery management.
Outcomes	<p>-Sustainable use and management of fishery resources established through the establishment of management and conservation principles and practices which provide for compliance with the international legal obligations of Belize with the end in view of improved stewardship and conservation of the fish stocks and the environment.</p> <p>-Rights-based fisheries management program established countrywide. This program will establish mechanisms to control fishing efforts and limit entry fishery.</p> <p>-Capacity building for Fisheries Staff in conducting proper assessments on the status of ecosystems and fishery resources.</p>
Implementation period	2-5 years

INTERVENTION 4.3: SUPPORT FOR THE DEVELOPMENT OF PRIORITIZATION TOOLS FOR THE PUBLIC SECTOR INVESTMENT PROGRAMME (PSIP)

<p>Name of Intervention (Component)</p>	<p>Support for the development of prioritization tools for the Public Sector Investment Programme (PSIP) (Component 4: Policy and Regulatory Measures)</p>
<p>Rationale or justification for intervention: The Ministry of Finance and Economic Development is responsible for managing all government revenue and expenditure, preparation of the national budgets, preparation and management of the public sector investment program (PSIP), and many other related activities. The Prime Minister, in speaking about Belize’s public finances with the private sector at one of their business forums said “one important task is still to be completed, and that is the full integration of the public sector investment programming processes with the budget processes. This would allow public finances management as a whole to become explicitly focused on country development; and recurrent budgetary operations to be guided by the country’s development needs, rather than being treated as a stand-alone annual exercise. This will require not only coordination between the Finance and Economic Development, but also close cooperation between Economic Development and all the line ministries”.</p> <p>This task is still incomplete but there is some progress. A new management information system is under development for the PSIP. The new system is taking advantage of advances in computing and database management and is taking into considerations the workflows of the national planning framework. It will attempt to integrate the planning processes within the line ministries into the national development and budgeting processes.</p> <p>This provides a good opportunity to integrate climate change adaptation and comprehensive disaster management into development planning, budgeting, and actions, alongside poverty reduction and economic growth for sustainable development. Optimizing the use of limited resources requires a generally accepted, open and transparent process that is clearly articulated. The Government with financial support from the European Union through the GFDRR and technical assistance from the World Bank has been using a multi criteria evaluation approach to prioritize road infrastructure. This this intervention, the methodology will be extended to other physical infrastructure investments, non-physical capacity building investments and other types of national development investments. The prioritization process will be applied through the National Planning Framework, thereby impacting on the PSIP and on the budget preparation process.</p>	
<p>Lead implementing entity and consultative group</p>	<p>Ministry of Finance and Economic Development (Lead); Consultative group includes but not limited to: Ministry of Education, Youth and Sports; Ministry of Forestry, Fisheries and Sustainable Development; Ministry of Health; Ministry of Tourism Ministry of Labour, Local Government, Rural development, NEMO, Immigration & Nationality; Ministry of Human Development, Social Transformation, and Poverty Alleviation Ministry of Housing & Urban Development;</p>

	Ministry of National Security; Ministry of Trade, Investment Promotion and Private Sector and Consumer Protection
Sector/ Sub-sector/ Co-sectors	All sectors of Government, Private Sector, Civil Society
Location	The operations will be based in Belmopan, but will impact the entire country
Which relevant government policy or strategy have been addressed	Poverty reduction, human development, tourism, climate change, land use planning, etc
Scope or list of activities	Capital works: Installation of servers and connectivity with the line ministries Management and Technical Assistance: Development of the array of prioritization tools; Integration of the PSIP and the budgeting processes Knowledge Transfer and Data: Training of planning personnel in the government Other: TBC
Beneficiaries	Benefits all sectors of Belize economy.
Specific benefits to vulnerable populations	Will build resilience among vulnerable groups, will support the creation of good quality sustainable jobs.
Gender	Ensure that men and women benefit from training opportunities and sustainable job creation.
Outcomes	Clearly articulated National Planning Framework Clearly articulated prioritization process for government investments
Implementation period	3 to 5 years
Links to related interventions	MIS for PSIP,
Reviewed by (Date)	

INTERVENTION 5.1: IMPLEMENTATION, MONITORING AND EVALUATION OF NCRIP

Name of Intervention (Component)	Implementation, Monitoring and Evaluation of NCRIP (Component 5 NCRIP Implementation and M&E)
<p>Rationale or justification for intervention: <i>The NCRIP requires a co-ordination and regular Monitoring and Evaluation in order to ensure progress and technical oversight. This will also ensure that the results can be monitored and the NCRIP and constituent interventions can be revised at regular intervals.</i></p>	
Potential implementing entity and steering group	Ministry of Finance and Economic Development
Sector/ Sub-sector/ Co-sectors	All sectors of the economy will benefit
Location	All Locations
Addressing relevant government strategy and policy	National Planning Framework National Land Use Policy and Integrated Planning Framework National Spatial Data Infrastructure Policy Climate Change policy Horizon 2030
Scope or list of activities	Capital Works: Management & Technical Assistance: Management, Oversight, Monitoring & Evaluation Knowledge Transfer: Dissemination of information Other: Regular steering meetings
Beneficiaries	NCRIP
Specific benefits to vulnerable populations	
Gender related considerations	Ensure that gender-related indicators are incorporated into the M&E framework.
Outcomes	Implementation and M&E reports Revisions to NCRIP
Implementation period	10 years

APPENDIX 4 LIST OF PERSONS AND INSTITUTIONS CONSULTED

NCRIP1 = NATIONAL STAKEHOLDER WORKSHOP JULY 2013

NCRIP2 = NATIONAL STAKEHOLDER WORKSHOP AUGUST 2013

MCE1 = MULTI-CRITERIA EVALUATION WORKSHOP MAY 2013

MCE2 = MULTI-CRITERIA EVALUATION WORKSHOP JULY 2013

JM = JOINT-MISSION REVIEW OF NCRIP OCTOBER 2013

1TO1MEET = ONE TO ONE MEETINGS JUNE-SEP 2013

Name	Title	NCRIP 1	NCRIP 2	MCE1	MCE2	JM	1to1 meet
Amanda Acosta	ED, Belize Audubon Society	✓			✓		
Nuemencio Acosta Jr.	Local Government Officer			✓			
Gerard Alleng	Inter-American Development Bank (IDB)					✓	✓
Simeon Alvarez	Supervisor, Belize City Council	✓					
Yvette Alvarez	Senior Advisor, Ministry of Finance and Economic Development (MoFED)			✓	✓	✓	
Enrique August	Help for Progress	✓	✓			✓	
Anthony Andrews	Urban development Planner, Housing and Planning Department	✓	✓	✓		✓	
Glenn Avilez	Director General, Statistical Institute of Belize		✓				
Mark Antrobus	Statistician, Ministry of Human Development, Social Transformation and Poverty Alleviation (MoHDSTPA)		✓			✓	
Marlene Bailey Martinez	Director, Belize Port Authority						✓
Lizett Bell	Health Planner, Ministry of Health (MoH)	✓		✓	✓	✓	✓

Name	Title	NCRIP 1	NCRIP 2	MCE1	MCE2	JM	1to1 meet
Vivian Belisle Ramnarace	Fisheries Department		✓	✓			
John Boden	Ministry of Health (MoH)			✓			✓
Nadia Bood	World Wide Fund for Nature (WWF)	✓				✓	
Kenrick Brackett	Councillor, San Pedro Town Council		✓				
Lennox Bradley	Chief Engineer, Ministry of Works and Transport (MoWT)	✓		✓		✓	✓
Celso Carcamo	Ministry of Labour, Local Government, Rural Development, NEMO, Immigration and Nationality (MoLGRDNIN)		✓				
Abil Casteñada	Tourism Officer	✓		✓			
Rafael Castillo	Corozal Town Council			✓			
Marion Cayetano	Government of Belize	✓	✓	✓	✓	✓	✓
Marcelino Choco	Ministry of Public Services, Elections and Boundaries (MoPSEB)						✓
Orla Coleman	Director, Ministry of Foreign Affairs (MoFA)					✓	
James Daly	Intern, Belize Chamber of Commerce and Industry (BCCI)						
Clarence Deuck	Spanish Look-Out Community Representative		✓				✓
Edgar Eck	Department of the Environment (DoE)						
Julio Escalante	Ministry of Natural Resources and Agriculture (MoNRA)		✓				

Name	Title	NCRIP 1	NCRIP 2	MCE1	MCE2	JM	1to1 meet
John Flowers	Planner, Ministry of Human Development, Social Transformation and Poverty Alleviation (MoHDSTPA)						✓
Jacqueline Franklin	Rural Development Officer			✓			
Antony Fuentes	Mayor, Punta Gorda			✓			
Carlos Fuller	Liaison Officer, CCCCC					✓	✓
Tirso Galvez	Operations Manager, Transport			✓	✓		
Rasheda Garcia	Forest Officer, Forest Department		✓				
Glen Gill	Mitigation Officer, NEMO						
Collin Gillet	Director, Coastal Zone Management Authority and Institute (CZMI)	✓		✓			
Ellajean Gillett	Ministry of Education, youth and sports			✓	✓		
Vincent Gillett	CEO, CZMI					✓	
Dennis Gonguez	Chief Meteorologist		✓			✓	
Ann Gordon	Coordinator, National Climate Change Office (NCCO)		✓		✓	✓	✓
Alberto Guerra	Administrator, Orange Walk Town Council			✓			
Daniel Guerrero	Mayor, San Pedro Town	✓					
Raquel Guerra	MoFED			✓	✓		
Alvan Haynes	ED, Belize Water Services (BWS)						✓
Keith Hardwick	Technical Service Manager, Belize Water Services (BWS)					✓	

Name	Title	NCRIP 1	NCRIP 2	MCE1	MCE2	JM	1to1 meet
Fred Hunter	DRR/CC Focal Point, Belize Red Cross		✓	✓		✓	✓
Yvonne Hyde	CEO, MoFED		✓	✓	✓	✓	✓
Yoonhee Kim	World Bank					✓	✓
Justin Locke	World Bank	✓					✓
Anneke Jessen	IDB	✓				✓	✓
Ripin Kalra	World Bank	✓	✓	✓	✓	✓	✓
Cosimo Lambech	EU Office, Belize					✓	✓
Kenrick Leslie	Executive Director, CCCCC	✓	✓			✓	
Marion Lewis	Rural Development			✓			
Victor Lewis	Association of Professional Engineers of Belize	✓		✓			
Jeffrey Locke	CEO, Belize Electricity Limited (BEL)					✓	✓
Manuel Lopez	Ministry of Labour, local government, rural development, NEMO, immigration and nationality				✓		
Juan Martinez	Rural Development Officer			✓			
Collin Mattis	National Climate Change Officer, NCCO	✓	✓	✓			✓
Graciano Medina	Senior Executive Engineer, MoWT			✓			
Jan Meerman	BTFS	✓					
Michelle Longsworth	MoFED					✓	
Howard Melendrez	Stann Creek		✓	✓			
Omar Mitchell	Association of Professional Engineers of Belize						✓
Valeriano Nal			✓	✓			

Name	Title	NCRIP 1	NCRIP 2	MCE1	MCE2	JM	1to1 meet
Dwight Neal	Civil Aviation Authority		✓	✓			
Fayne Nicasio	MoFED			✓	✓		
Sylvia Noralez	GIS Officer SIB			✓	✓	✓	
Javier Novelo			✓				
Sybille Nuenninghoff	IADB		✓			✓	✓
Jesus Orós	Head of Operations, EU Delegation					✓	
Ramon Pacheco	Technical Director, PFB		✓			✓	
Lemuel Palacio	BEST		✓				
Arreini Palacio Morgan	Belize Audubon Society	✓	✓	✓	✓	✓	
Wendel Parham	CEO, Ministry of Fisheries, Forestry and Sustainable Development			✓	✓	✓	
Weizsman Pat	Sustainable Development officer, MFFSD	✓		✓		✓	
Mito Paz	Councillor, San Pedro Town Council	✓					
Jose Perez	ED, APAMO		✓				
Carlos Pol	MoFED			✓			
Bernardino Pech	Planner MOEY		✓		✓		
Marilyn Pinelo-Lee	Analyst, BCCI		✓	✓			
Rigoberto Quintana	Fisheries Department	✓					
Ishmael Quiros	MIF/IDB Operations					✓	
Estella Requeña	ED, BTIA		✓				
Nicholas Ruiz	Ed, BELTRAIDE		✓				
Fredrick Sandiford	BWS	✓	✓			✓	✓
June Sanker	Tourism Officer		✓		✓	✓	

Name	Title	NCRIP 1	NCRIP 2	MCE1	MCE2	JM	1to1 meet
Tanya Santos	Forest Department	✓	✓		✓		
Pio Saqui	University of Belize		✓				
Raymond Shepard				✓			
Gilbert Swazo	Mayor, Dangriga Town			✓			
Ricardo Thompson	MoNRA		✓	✓			
Patricia Tillett	Administrator, San Pedro Town Council			✓			
Irving Thimbriel	Executive Engineer, MoWT			✓	✓	✓	✓
Fernado Tzib	MoNRA		✓	✓	✓		
Orlando Valencia	Rural Development						
Dr. Venugopal	CEO/ Surgeon, Belize Healthcare Partners Ltd.						✓
Kent Vital	Economist, CDB			✓			✓
Diane Wade	Operations Analyst, UNDP	✓					
Carren Williams	Principal Land Information Officer, LIC/MoNRA	✓	✓	✓		✓	✓
Philip Willoughby	Belize City Council		✓				
Christian Windsor	Environment Department		✓				
Marcelo Windsor	Forest Department						
Wilma Wright	University of Belize	✓					
Gina Young	Principal Planner, MNRA	✓		✓	✓	✓	✓

Professor John Agard
% Department of Life Sciences
University of the West Indies
St. Augustine
Trinidad and Tobago

October 20th, 2013

Mrs. Yvonne Hyde
Chief Executive Officer
Ministry of Finance and Economic Development
Sir Edney Caine Building
Belmopan
Belize

Dear Mrs. Hyde:

**Report of Review Consultant on *National Climate Resilience Investment Plan* [NCRIP],
Government of Belize**

This report is prepared and submitted in keeping with the objective of the Review Consultancy, *viz.*, to review the deliverables of the NCRIP –Belize and to give relevant feedback to the Disaster Risk Management & Urban Task Team Leader at the World Bank.

The Review Consultant has interpreted the task to mean:

- Review the deliverables of the NCRIP for consistency and compliance and to utilise their professional expertise to evaluate the technical quality of work submitted;
- Perform quality checks on the deliverables to ensure that they are presented in accordance with an acceptable format for a report of this kind, including checks that:
 - Policies and objectives are clearly stated and provide supporting information and explanation; and
 - Material is presented in a coherent, well structured manner, written in simple, jargon-free style.
- Produce accurate, high quality, well-written report that thoroughly assesses the deliverable outputs in accordance with the criteria indicated above, incorporating the concerns/ issues raised in the bilateral meetings between the Review Consultant and representatives of the The World Bank, Government of Belize and other relevant stakeholders.

The NCRIP presented appears to have successfully integrated both physical and non-physical climate change resilience intervention programmes into the investment portfolio being implemented under the Government of Belize *Public Service Investment Programme* (PSIP). The PSIP developed by the Ministry of Finance and Economic Development (MoFED) aims to strengthen infrastructure, social protection, economic services and public administration services. The NCRIP also identifies related projects and financing from multi-lateral sources including loans and grants from MDBs and other Development Partners working with the Government of Belize.

The expectation was that the NCRIP will collect and assemble all available plans, reports and relevant published data; review the data and identify key development strategies; analyse the strategies in terms of comprehensiveness and effectiveness in addressing climate change related development issues and problems; and identify gaps in strategy formulation, shortfalls and constraints in implementation, and finally propose a portfolio of projects to address the climate change related issues identified.

The *National Climate Resilient Investment Plan Report* was evaluated for compliance against these expectations. Overall, the report appears to meet these requirements, as all of the national-level development policies, plans and spatial planning instruments – as well as some regional plans – have been reviewed, the intervention points identified, and the required sub-projects outlined. The NCRIP technical sub-projects developed have had inputs through national stakeholder consultations and workshops with private and public sectors, as well as civil society and non-governmental organizations (NGOs). The process led by the Ministry of Finance and Economic Development (MoFED) appears to have also had significant support from many Government of Belize agencies including the Ministry of Natural Resources and Agriculture (NMRA); the Ministry of Forestry, Fisheries and Sustainable Development (MoFFSD); the Ministry of Works and Transport (MoWT); and the National Emergency Management Organization (NEMO).

The following portion of the current report is based on the Review Consultant's perception of the issues contained in the report under review. Some comments made at the review meetings

between Marion Cayetano (NCRIP National Focal Point -Belize) and Ripin Kalra (The World Bank) are also included. No comments are included on format and style as these have been dealt with by the NCRIP Team in an ongoing iterative process with the Review Consultant. The substantive document is divided into two major components which are each sub-divided into sections:

NCRIP PART A - Background and rationale

This section contains a comprehensive review of the physical environment, population structure and economy of Belize. It also provides some background to the NCRIP preparation process. It then presents the available information elaborating the climate vulnerability and risk to the country including its people and ecosystems.

The initial draft of this section was criticised for overreliance on “grey” literature sources for the climate projections and for not adequately emphasising data on biodiversity and critical ecosystems. This has however been corrected by the inclusion of better published peer reviewed sources. The climate section is now acceptable since it is noted that significant new material has been included and it was edited by an acknowledged climate expert (Professor Michael Taylor). Further, The Review Consultant is pleased to have been included in the conference call of the NCRIP team with him, so that concerns could be raised directly. Among other things, these included the need to always state the baseline years against which changes in temperature, rainfall and sea level rise are being compared, as well as the preference for stating climate projections as a range rather than an impossibly precise number.

The addition of Box 2 is a very useful 1 page summary of climate change trends and projections in Belize. The technical statements outlining the proposed sub-projects and institutional coordination arrangements are quite helpful. In summary PART A is a very good situational analysis which provides a platform for the proposed implementation and investment programme in PART B. This section can be improved in the future by updating the current climate change projections for Belize which in the present text rely on the PRECIS Regional Climate Model derived from the now 13 year old IPCC SRES scenarios. Updating projections to the new

Representative Concentration Pathways (RCP) scenarios that are being used in the IPCC 5th Assessment Reports would make the manuscript more state of the art as IPCC utilises 1986-2005 as the baseline for future climate projections rather than 1960-1990 as is in the current text. The authors can access new RCP scenarios projections for Central America and possibly Belize through the KNMI Climate Explorer at http://climexp.knmi.nl/plot_atlas_form.py

NCRIP PART B – Proposed investment and implementation

In this section, the Government of Belize has stated its strategic objective is to build resilience among its women/men and the economy and within the environment because the country as a whole is highly sensitive to the effects of intense weather events and to climate change. The review process at various stages has also emphasised that the NCRIP should be constructed so that it identifies and prioritises those interventions that simultaneously build resilience to climate related events while reducing poverty and building economic capacity. The expectation expressed in the review process is that climate change adaptation should not be regarded as a separate issue to development but should be fully integrated into national development planning, especially spatial planning in order to mitigate the potential effects of extreme weather events.

In this context, this review notes that the authors have substantially re-organised the text to evaluate a wide range of relevant government policies and the Vision 2030 Development Plan of Belize, in order to identify mainstreaming intervention points tied to Government policy and demonstrating additionality. This is then effectively elaborated in the subsequent sections detailing NCRIP component selection, description and financing, as well as implementation arrangements. The final section details a results framework.

The review consultant suggests that this section should continue to be discussed with The World Bank and The IDB with regard to agreeing on a set of core quantitative indicators connecting climate change and economic development. The results framework at present contains a long list of potential indicators some of which are quantitative, some qualitative and some possibly not feasible. The banks can probably give some guidance as to relevant indicators concordant to any existing template for PPCR country reporting.

Concluding remarks of review consultant

It is suggested that the Government of Belize National Climate Resilient Investment Plan is of high quality and meets the expectations outlined earlier, having adequately responded to the concerns raised during the iterative review and revision process. There is always room for improvement and some suggestions have been made which will continue to be discussed with the NCRIP team.

Sincerely,

A handwritten signature in blue ink that reads "John Agard". The signature is written in a cursive style with a prominent initial 'J'.

Professor John Agard

cc. Ripin Kalra The World Bank

cc. Mrs. Yvonne Hyde, Ministry of Finance and Economic Development

cc. Mr Marion Cayetano, National Focal Point -Belize