



ADAPTATION FUND

**REQUEST FOR PROJECT/PROGRAMME FUNDING FROM THE  
ADAPTATION FUND**

*Enhancing the Resilience of Belize's Coastal Communities to Climate  
Change Impacts*

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## PROJECT/PROGRAMME PROPOSAL TO THE ADAPTATION FUND

### PART I: PROJECT/PROGRAMME INFORMATION

Project/Programme Category:	Regular Project
Country:	Belize
Title of Project/Programme:	Enhancing the Resilience of Belize's Coastal Communities to Climate Change Impacts
Type of Implementing Entity:	National Implementing entity
Implementing Entity (NIE):	Protected Areas Conservation Trust (PACT)
Executing Entities:	National Climate Change Office (NCCO) Coastal Zone Management Authority and Institute (CZMAI)
Amount of Financing Requested:	US\$ 4,000,000

#### A. Project Background and Context:

Belize, located on the eastern coast of Central America, has a national territory that expands across 46,620 km<sup>2</sup>. The mainland of the country comprises 95% of the total territory and the remainder, approximately 1,060 km<sup>2</sup>, consists of small islands and offshore cayes. The country's coastline, which extends 386 km is noted for its extensive mangrove forests, seagrass beds, and the Belize Barrier Reef System. The Belize Barrier Reef Reserve System, the largest reef complex in the Atlantic-Caribbean region was inscribed as a UNESCO World Heritage Site in 1996 (UNESCO World Heritage Centre, n.d.).



*Figure 1: Map of Belize*

Figure 1 Map of Belize

Country	Rank	Score	Risk category
Haiti	1	0.58	extreme
Guatemala	2	0.75	extreme
El Salvador	3	0.79	extreme
Honduras	4	0.92	extreme
Dominican Republic	5	1.01	extreme
Nicaragua	6	1.19	extreme
Jamaica	7	1.50	extreme
Paraguay	8	1.58	extreme
Belize	9	2.25	extreme
Bolivia	10	2.48	extreme
Venezuela	11	3.64	high
Ecuador	12	3.76	high
Dominica	13	3.85	high
Cuba	14	3.90	high
Guyana	15	4.23	high
Colombia	16	4.30	high
Mexico	17	4.47	high
Peru	18	4.98	high
Panama	19	5.57	medium
Antigua and Barbuda	20	5.64	medium
Brazil	21	5.77	medium
Suriname	22	5.85	medium
Saint Kitts and Nevis	23	6.24	medium
Argentina	24	6.66	medium
Trinidad and Tobago	25	7.22	medium
Costa Rica	26	7.70	low
Saint Lucia	27	8.25	low
Uruguay	28	8.33	low
Bahamas	29	8.68	low
Chile	30	9.54	low
Grenada	31	9.58	low
Saint Vincent and The Grenadines	32	9.63	low
Barbados	33	9.77	low

Figure 2: Climate Change Vulnerability Index for the LAC region

Figure 3: Adaptive Capacity Index for the LAC region

Figure 2 Climate Change Vulnerability Index for the LAC region

Figure 3 Adaptive Capacity Index for the LAC region

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Throughout Belize and the Caribbean, the consequences of climate change are impacting communities and national economic sectors. Given current climate projections for the region and Belize, impacts will be exacerbated and have highly noticeable effects on Belize's society and sustainable development. Changes in the intensity, distribution, and frequency of extreme weather events, such as storms and hurricanes, sea-level rise (SLR), increased sea surface temperature, ocean acidification, coral bleaching, drought, wildfires, and changes in crop production are but some of the impacts of climate change Belize anticipates facing. These changes will have direct and indirect impacts on productive sectors in Belize and the environment, which will in turn affect Belize's sustainable economic and social development.

Belize's geographic location and low-lying coastal areas leave it highly susceptible to the impacts of climate change: rising sea level, increased temperature, and increased frequency of intense hurricanes with their associated hazards in the form of torrential rains, catastrophic winds, and destructive storm surge under warmer

environmental conditions. With a vulnerability score of 2.25, Belize is ranked 9th on the Climate Change Vulnerability Index for the Latin America and Caribbean region (Figure 2Figure-2). On the adaptive capacity index, Belize does not fare much better and ranks 10th (Figure 3Figure-3) (CAF, 2014). Much of Belize's northern half and a large portion of the southern third of the country, as well as the coastal areas and islands, are flat and low lying, being highly vulnerable to SLR, erosion, storm surges, and flooding. A 2014 assessment categorized Belize's vulnerability index to climate change as extremely high: ranking 9<sup>th</sup> on the list of 33 countries in Latin America and the Caribbean (Mapplecroft, 2014). Climate change impacts resulting from global warming are expected to threaten the sustainability of social, economic, and ecological systems.

## 1. Socio-economic context

A significant part of the population lives in the coastal zone of Belize, and it is also in this area where the bulk of economic activity (tourism, fishing, and agricultural production) takes place. The use of goods and services from different types of coastal and marine habitats including reefs, seagrasses, lagoons, and mangroves, among others plays an important role in the lives of Belizean coastal communities. Additionally, housing, urban, transportation, and recreational infrastructure have also been built along the coast and on the coastal plains, making them vulnerable to storms, hurricanes, and floods. Like coral reefs, mangroves, and coastal lagoons reduce the negative climate change impacts, they provide a key service to reduce vulnerability. The climate change impacts can be summarized as (a) increased air and ocean temperature; (b) sea-level rise and tidal influence on coastal and marine habitats; (c) Intensifying atmospheric pressures: stronger and more frequent hurricanes making landfall along the coast of Yucatan and Belize, provoking destructive storm surges and coastal flooding; (d) native fish species migration; (e) more frequent and intense coral bleaching events; (f) ocean acidification and saline contamination of coastal freshwater resources; and (g) extensive coastal erosion significantly impacting local communities (CATIE and TNC, 2012; MCCAP, 2020).

A recent [Marine Conservation and Climate Adaptation Project \(MCCAP\) Knowledge, Attitudes and Practices \(KAP\)](#) study, using a statistically representative survey sample of the Belize population (95% confidence level, 5% error margin, 2,422 interviewed households), has revealed that in urban areas, 6% of households are poor. Of the remaining 94% however, 13% are vulnerable to poverty (lower-middle class). In the rural areas, 18.3% are poor, of which 3.1% are extremely poor (indigent) and 81.7% are non-poor; of the non-poor however, 14.5% are vulnerable to poverty (near-poor). Relative to the 2015 Baseline, these poverty estimates revealed an overall increase both in the number of households living below the national poverty line as well as in the severity of poverty, with more households now living below the indigence line (MCCAP, 2020).

The MCCAP KAP findings are likely to have been exacerbated by the Covid-19 pandemic and the significant tourism reduction. Study results from Dangriga have indicated that most local community members lack appropriate training to survive in the industry. Local business start-ups have a hard time surviving due to a lack of requisite training and capital business expansion. Therefore, many locals take up low-paying jobs that are insufficient to properly support their families (Nana Asante Appah, 2018). The current covid-19 spiral (people have lost their jobs, businesses have had less revenue, and have less money to spend, thus decreasing business revenues even further and leading to more job losses), as well as the recent hurricane season, have likely exacerbated the situation. Thus, the vulnerable coastal communities have suffered from the pandemic, as well as climate change, which for example continues to have an indirect, negative impact on Belize's tourism sector through the degradation of coastal water quality, loss of beach, coral reef degradation, and subsequent decline in fish stocks (Caribsave et al., 2014).

[The main forms of livelihood in coastal areas are fisheries and tourism and due to their high reliance on natural resources and range of favourable climatic conditions, these sectors are highly vulnerable to the impacts of climate change.](#)

[The fisheries sector is comprised of commercial capture fisheries, commercial aquaculture, and freshwater inland fisheries. Capture fisheries operates off the coast of Belize in the Caribbean Sea and in 2006 generated BZ\\$24 million in export earnings, employing 2,131 licensed fishermen in that year \(Ricardson, 2009\). The aquaculture subsector operates in the coastal plains and is comprised of ten shrimp farms and two fish farms. Shrimp farms](#)

generated BZ\$62.5 million in export earnings in 2006, which placed the fisheries industry as the third largest sector in terms of foreign exchange earnings. The freshwater inland fisheries sub-sector operates throughout Belize's 16 major rivers and their tributaries; however, it is not well documented and is practiced for subsistence (Richardson, 2009).

Tourism in Belize is nature-based, and as such it is particularly vulnerable to climate change. Climate change will affect the availability of certain recreational activities, comfort and enjoyment of outdoor activities, and the ecological systems that are the foundation for these activities.

Travel and tourism accounted for 11.4% of GDP in 2007, the broader travel and tourism industry, including manufacturing, construction and government activity associated with tourism, accounted for 26.0%. Nearly 13,000 jobs were provided by tourism in 2007, and the broader industry employs about 28,000. For the past few years, travel and tourism has presented the largest component of GDP in Belize, as well as the largest foreign exchange earner (Richardson, 2009). The sector has continued to grow since then, however, with the recent pandemic the tourism industry has been drastically affected and many Belizeans have been left unemployed. This emphasizes the vulnerable nature of this sector and the need to increase resilience. Rising sea levels pose risks of flooding, inundation, saltwater intrusion, and erosion, which threaten water supplies, property and infrastructure, and coastal areas needed for the functioning of the travel and tourism industry, warmer sea waters also threaten coral reefs, which attract many tourists, and there is the increasing frequency and intensity of storms (Richardson, 2009); however with this project it is envisioned that community members will be able to better adapt to the impending changes and be better prepared. The table below provides annual data describing the economic impact of tourism in Belize between the period 1999 – 2006.

ECONOMIC IMPACT OF TOURISM	1999	2000	2001	2002	2003	2004	2005	2006
Tourist expenditures (BZ\$ millions)	222.9	240.4	241.0	265.6	311.4	345.3	349.4	398.8
Tourist expenditures (% of GDP)	15.2	14.5	13.9	14.3	15.9	16.7	15.8	16.8

Figure 4: Economic Impact of Tourism in Belize

Figure 43: Economic impact of tourism in Belize

It is clear that there is an urgent need to address the impending impacts of climate change in these coastal communities. The activities under this proposed project will consider the impacts of climate change and help to put in place the necessary measures to increase resilience, monitoring and knowledge.

Sustainable development and addressing climate change are also reliant upon a healthy environment being supported by its various cultures and ethnicities and expression of traditional practices. Thus, ensuring the active participation of indigenous groups is crucial for the success of this proposed project, as they are aware of what is occurring on the ground in the communities and have traditional knowledge. Several members of indigenous groups have been consulted for the formulation of this proposed project. During a meeting with the Belize National Indigenous Council held on 16 February 2021 members of the council commended the formulation of such a project and stated that they are willing to work along and provide support for its implementation. Thus, the proposed project will ensure to continue engaging the indigenous communities and groups through the Belize National Indigenous Council as the main contact, as they represent Mayan and Garifuna groups and are in constant communication with the different communities. Indigenous groups will benefit from the capacity building initiatives, as well as trainings to be held. Members of the indigenous council have also expressed interest in providing support for monitoring initiatives.

Country gender profile

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Belize's mid-year population estimate for 2020 is 209,603 males, 209,596 females, and 419,199 for the total population. The population estimates for the major administrative area and urban/rural figures are indicated in [Table 1](#). The 2013 Labor Force Survey recorded the labor force at 148,736, or 46.1% of the total population. Four out of every five men of working age were included in the labor force, compared to only one in two women of working age, revealing a distinctive sex-segregation in the formal labor market. Moreover, the unemployment rate for females far exceeded that of males, at 20.4% and 6.7% respectively.

According to the CDB 2016 Gender profile, Belize has a significantly sex-segregated and male-dominated labor force, demonstrated for example by male participation in the primary industries outnumbering female participation by nearly 19 to 1. The male to female employment ratio diminished from primary to secondary, to tertiary industries at 3.9 to 1 in secondary industries, and 1.2 to 1 in tertiary industries. Males earn more than females, with female (annual) average income estimated at \$4,475 and male (annual) estimated average income at \$10,317 (2016), at a ratio of 0.46:1. Tourism is significant to the Belizean economy, and the industry employs one in seven persons. Male to female participation in tourism was estimated at 55% to 45% (2016). Despite the effective integration of women in the tourism sector compared to the primary and secondary sectors, male and female labor is highly gender-segregated. The National Women's Commission estimated in 2016 that approximately 60% of female labor was concentrated in services, shop sales, clerical duties, and elementary occupations, further revealing the significance of the tourism sector to their labor and underscoring the nature of female employment opportunities. Females are highly concentrated in domestic services-related jobs such as cleaning, housekeeping, and other poorly paid service jobs, including hair-braiding and souvenir selling. Male employment is most prevalent in areas including resort ownership and management; building and grounds maintenance; and tour guiding, including taxi driving (CDB, 2016).

*Table 1 Midyear estimates Major Administrative Areas (SIB, 2020)*

Table 1: Midyear estimates Major Administrative Areas (SIB, 2020)

Area	Males	Females	Estimated Mid-Year Population 2020
Country Total	209,603	209,596	419,199
Urban	91,405	95,844	187,249
Rural	118,198	113,752	231,950
Corozal	25,163	25,327	50,490
Orange Walk	26,683	26,690	53,373
Belize	63,102	64,581	127,683
Cayo	51,028	51,086	102,115
Stann Creek	23,844	22,170	46,015
Toledo	19,783	19,742	39,525

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## 2. Development context

As a country, Belize is economically dependent on its natural resources and associated ecosystem services provided, magnifying the impending vulnerabilities to be faced because of climatic changes. The country's key development sectors are particularly vulnerable to the impacts of climate change, due to their high reliance on natural resources and the direct link to the social well-being of the citizens; sectors such as agriculture, fisheries, tourism, coastal zone, water, and forest. Likely effects of climate change include loss of beaches due to erosion, degradation of ecosystems (e.g., coral reefs and littoral forests), inundation, and damages to infrastructure.

Historically, Belize's coastal zone is highly vulnerable to hurricanes due to the presence of human communities, sensitive ecosystems, and low adaptive capacity. Although hurricanes affect the entire Central American region,

their effects differ. High and medium strength hurricanes converge in northern Belize and La Mosquitia (Honduras). This, together with soil quality, may explain why the predominant vegetation in these regions consists of pine savannah. Additionally, the recovery of mangrove forests from hurricane damage can take years (CATIE and TNC, 2012)

The impacts of Climate Change are felt in the productive sectors of Belize, affecting the livelihood of a large part of the population. Belize has a significant capacity to contribute to the mitigation of global climate change. due to its potential as a large carbon sink. The country contributes to the mitigation target to limit the increase of global average temperature to 1.5 °C compared to pre-industrial levels. Belize's Nationally Determined Contributions (NDCs) are guided by its commitment to purposefully transition to low carbon development while enhancing its resilience to the effects of Climate Change. An important contribution to carbon fixation is managed in Belize's REDD+ (reduce emissions from deforestation and forest degradation, and foster conservation, sustainable management of forests, and enhancement of forest carbon stocks) Readiness Project. Similar to other countries, Belize's REDD+ carbon accounting strategizes mangrove ecosystems like forests and is thus important for mitigation as well as adaptation (MCCAP, 2020).

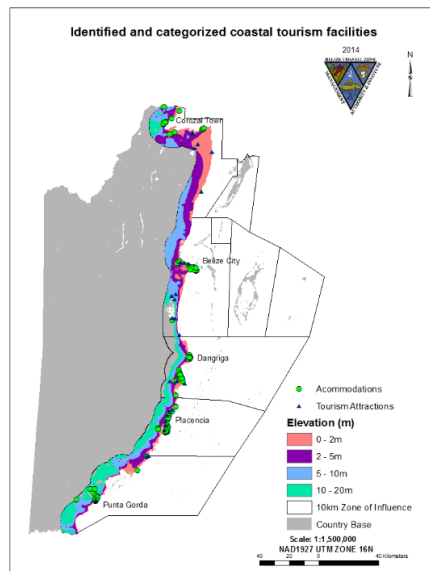


Figure 5: Locations of vulnerable tourism accommodations and attractions

Figure 4: Locations of vulnerable tourism accommodations and attractions

As indicated in Figure 5 Figure-4, the extensive coastal plain of Belize lies largely below 20m above sea level, with substantial areas below 10m and many denoted "subject to inundation" on hazard maps. Along the river valleys, notably Belize, Mopan, and Macal Rivers, there are vast areas below 10m which are also subject to inundation. Major roads are likely to be affected by inundation from sea level rise, including the New Phillip Goldson Highway and the Old Northern Highway. Additionally, much of the northern part of Belize City, the center of economic activities, is on land below 10m, and thus will potentially be affected by sea-level rise.

In Belize City, residential areas such as Vista del Mar, Bella Vista, Belama, and Fort George that are constructed on drained and reclaimed wetlands are extremely vulnerable to the projected sea-level rise. Similarly, the infrastructure developments in most of the other coastal communities like Dangriga, Corozal Town, the Placencia Peninsula, Ambergris Caye, and the other offshore islands are currently threatened by even a 20 cm rise in sea

level. For these communities to cope with rising sea-levels, a constant supply of large volumes of sediment would be required. The sources of supply of natural and alternative sediment to these areas have been significantly reduced. Protecting these urban areas might require the construction of seawalls and dikes that could withstand the impacts of the projected sea-level rise through the new century. Impacts on GDP in Belize are also important to note. The impacts of 1m of SLR are expected to lead to just over a 2% loss in GDP (Caribsave et al., 2014).

### 3. Environmental context

Over the past few years, Belize has experienced many effects linked to climatic changes and variation; such as drought, flooding, change in precipitation and temperature patterns, sea-level rise, and coastal erosion. The country is also seasonally affected by tropical storms and hurricanes, which on average, according to scientific reports, are becoming more intense each year due to the effects of human-induced global warming and higher sea surface temperatures. Belize is also highly exposed to other natural hazards such as flooding and drought. These can lead to infrastructure and economic losses, especially in agricultural and coastal areas during the hurricane season. There has also been evidence that the average annual temperature of Belize has been rising and is projected to rise further. Temperature projections carried out by experts from Cuba's Meteorological Institute showed that annual temperature changes from 2021 – 2080 versus 1961 – 1990 for four climate projection scenarios show a steady increase in mean temperature during the XXI century for Belize nationally (Figure 5 Figure 6).

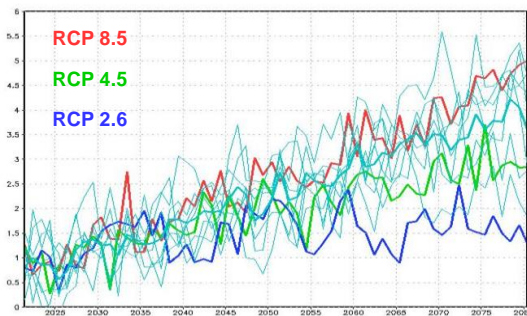


Figure 6: Interannual variations of mean temperature anomalies (°C) during the period 2021 until 2080 for four scenarios, with baseline period 1961-1990. (Centella & Benzanilla, 2019)

Climate Change projections suggest that under the worst-case scenario Belize's temperature will increase to approximately 2 °C by the 2050s and almost 4 °C by the 2080s, relative to the baseline period 1961 to 1990. Projected models for the 2050s indicate rainfall change of -20% to -30% from the reference period 1961 to 1990 under the worst-case scenario by the 2050s, and around -50% to -60% change by the 2080s. Projections of atmospheric moisture deficit/surplus (P-E) indicate that by the 2080s, dry months' deficits will decrease slightly, but the wet season months will see a decrease in moisture surpluses. This entails that the dry seasons will be slightly less intense around the 2080s, but the wet seasons will become drier (CaribSave, 2009).

Exposure to coastal hazards is defined by proximity to the coast and the topography (altitude to avoid exposure to sea-level rise). An exacerbating factor is that the population and infrastructure are concentrated within the first kilometers of the coast. Areas with greater exposure are the Districts of Corozal and Belize City (CATIE and TNC, 2012). The coastal lowlands in northern Belize will remain vulnerable to sea-level rise according to the global climate model projections. Between 2046 and 2065 the mean increase in sea levels for the different scenarios will range from 0.17 m to 0.3 m, with an extreme value of 0.38 m. During the period 2081 to 2100 this average increases and ranges between 0.4 m and 0.63 m, whereby 0.82 m is the extreme. Rising sea levels are expected to continue to threaten low-lying coastal areas, and exacerbate beach erosion, coastal flooding, inundation, and salinization of surface and groundwater resources (MCCAP, 2020).

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The coastal zone of Belize is for the most part below the high tide level. As a result, this places the coastal zone in a very risky position regarding climate-driven sea-level rise, especially when augmented by storm surges. Many Belizeans that live along the coast depend on the coastal resources for fishing and (eco-)tourism, therefore, impacts to these sectors would highly affect the livelihoods of many and hinder economic and social development. Belize's Third National Communication (NCCO, 2016) states that the area most susceptible to the effects of Climate Change is the coastal ecosystem. Anticipated increases in sea surface temperatures, salinity, pH, sea level, and intensity of tropical cyclone events have direct implications on the future state of the coastal zone and the ability of Belizean people to utilize the resources it provides.

In summary, the intensifying effects of global climate change that will impact Belize's nature, people, and production include:

- Increased ambient and sea surface temperatures, with associated heatwaves and more intense droughts;
- Sea level rise; and
- More frequent and more intense hurricanes (Cat III or stronger) (MCCAP, 2020).

To effectively address these issues, the threat of climate change requires multilateral action from policymakers, technical experts, the private sector, and the public, to seek solutions and make changes to reduce global emissions of greenhouse gases. However, even with mitigation efforts in place, communities are going to feel the effects of climate change. Therefore, the effects currently being experienced and those expected to take place in the near future require the country to find ways to adapt to the imminent changes to reduce vulnerability and enhance resilience to future climate risks and hazards.

## B. Project Objectives:

### The project area

Many cross-sectoral issues exist due to the impacts of climate change, increased coastal erosion and more extensive inundation are expected from rising sea levels, leading to loss of beaches; storm surges may flood larger areas than currently takes place, thereby impacting primary production, and may cause saline intrusion up estuaries and into groundwater aquifers. These biophysical impacts will lead to loss of coastal habitats, property damage, flooding, and loss of life, as well as have economic consequences for rural production and urban lifestyles and displacement of 27 coastal communities ([Table 2-Table 2](#)).

*Table 2-Coastal Communities and their Population*

Table 2: Coastal Communities and their Population

	City/Town/Village	Total	Males	Females	Households
Corozal District					
1	Corozal Town	10,287	4,932	5,355	2,696
2	Altamira	210	105	105	49
3	Chunox	1,375	705	670	234
4	Consejo	350	178	172	117
5	Copper Bank	470	237	233	104
6	Sarteneja	1,824	919	905	431
Belize District					
7	Belize City	57,169	27,655	29,514	16,162
8	San Pedro Town	11,765	6,051	5,714	3,769

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9	Caye Caulker	1,763	875	888	555
10	Gales Point	296	152	144	72
11	Ladyville	5,458	2,672	2,786	1,527
12	St. Georges Caye	656	319	337	204
Stann Creek District					
13	Dangriga	9,591	4,615	4,976	2,572
14	Hopkins	1,610	777	833	427
15	Independence	4,014	2,011	2,003	972
16	Maya Beach	229	132	97	99
17	Mullins River	235	155	80	102
18	Placencia	1,753	940	813	644
19	Riversdale	567	358	209	221
20	Seine Bight	1,310	669	641	324
21	Sittee River	439	245	194	140
Toledo District					
22	Punta Gorda Town	5,351	2,519	2,832	1,358
23	Barranco	157	80	77	54
24	Forest Home	479	245	234	120
25	Monkey River	196	98	98	37
26	Cattle Landing	226	121	105	63
27	Punta Negra	43	22	20	11
Total		<b>117,823</b>	<b>57,787</b>	<b>60,035</b>	<b>33,064</b>

Belize's 2020 midyear population estimate is 419,199 inhabitants, this includes 209,603 males and 209,596 females. This project has taken into consideration gender equality and equity by pursuing activities and measures that are beneficial to both genders and their families. The project will also be gender-responsive by ensuring that both men and women are adequately represented in employment, at all stakeholder consultations and that the opinions of all relevant stakeholders are considered during the development and implementation of project components.

Changes in climatic conditions and the effects are compounded by anthropogenic activities along the coast. Communities along the southern coast of Belize are being drastically affected by erosion; human activities and climatic changes and variations and other natural causes exacerbating the problem, leading to coastal line retreat.



Figure 7: Images depicting erosion in Dangriga and Hopkins, respectively (NCCO, 2019)

*Figure 6 Images depicting erosion in Dangriga and Hopkins, respectively (NCCO, 2019)*

It was assessed by Dr. Jose Luis Juanes and Miguel Izquierdo of the Ministry of Science, Technology, and Environment of Cuba that erosive processes in the coastal communities of Dangriga and Hopkins are very evident (Figure 7Figure-6). Beach scarp, dead trees, exposed roots, waves reaching building foundations, and some inefficient coastal protection structures, demonstrate the widespread character of this phenomenon in the coastal communities of Dangriga and Hopkins. According to local accounts, the shoreline has retreated around 20-25 feet in the last 5 years. Mining in the rivers and improper planning of built infrastructure have been augmenting the erosion taking place. The natural causes are also manifested in the whole region, and it may be noticed that they are related to a higher frequency and intensity of tropical storms, sea-level rise, and the deficit in the sand inputs to the coastal system (Juanes & Izquierdo, 2019). The recent experiences with Hurricanes Eta and Iota (November 2020) have depicted the extensive impact climate change has not only on Belize's coastal communities as a direct result of the intense storms (e.g. see Hopkins and Dangriga, Figure 8Figure-7), but also the severe devastation that can occur inland. Communities that were particularly affected by Eta and Iota were - along the Mopan River (e.g. Calla Creek, San Ignacio, Bullet Tree Falls, San Jose Succotz, Branch Mouth, Santa Familia), - along the Belize River (e.g. Esperanza Village, United Ville) and villages in the Belize District. The flooding in San Ignacio (Figure 9Figure-8) was exacerbated because of human activity. Despite the dam in San Ignacio serving a dual purpose: for hydroelectric power generation, as well as a flood control mechanism, the recent storms Eta and Iota caused severe local flooding. While the large lake behind the dam serves as a buffer and accumulates excess water that would otherwise have caused more flooding, human activity (such as deforestation - whether for urbanization or agriculture) has changed the landscape and limits proper groundwater infiltration for sufficient drainage. So, while the storms were responsible, their impact was more severe due to human activities.



Figure 8: Impact of Hurricane Eta in Dangriga and Hopkins (Nov. 2020)

*Figure 7 Impact of Hurricane Eta in Dangriga and Hopkins (Nov. 2020).*



Figure 9: Devastation by Hurricane Eta on the inland communities Bullet Tree Falls village and San Ignacio Town

*Figure 8 Devastation by Hurricane Eta on the inland communities Bullet Tree Falls village and San Ignacio Town.*

The village of Monkey River is another area that has suffered a significant land loss. This village has seen reduced sand delivery to the coast from upriver, this has been due to decades of intensive land use, water use and extraction, and river sand mining from the middle reaches of the Monkey River network. Climate change plays an important role in exacerbating this problem. A report by the Monkey River Watershed Association and Nilcia Xi (2019) stated that insufficient sand is being delivered to the river mouth to replace the sand being lost to natural shoreline erosion.

Several factors have played a role in the insufficiency of sand. Lower sand delivery has been affected by lower flood flows and less sand supply in the river channel. Due to water use and changes in hydrology, flood flows have been reduced causing sand to settle in the river channel, and not going past the river mouth into the sea. Mining in the area has also led to large amounts of silt in the river channel, displacing the amount of sand that can be transported because the smaller silt particles are more easily transported. Extraction of sand may also reduce the amount of sand supply available to feed the beach. Water extraction for irrigation of banana farms has also led to reduced river flow and the amount of sand that can be transported, especially during the dry season when flood flows are non-existent. These factors leave the village highly vulnerable and exposed to the impacts of a

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changing climate. Tropical storms and hurricanes have been associated with the fastest rates of beach erosion in the area. In 2001 Hurricane Iris cleared most of the trees in the village which led to the lowering of the land surface in the area. The Association and Xi (2019) noted that sea-level rise is a slow actor in the area, but it will exacerbate the sand delivery problem and increase risks in the area during future hurricanes.

These are only a few examples of the erosion crisis occurring in southern Belize. Thus, it is crucial to decrease the vulnerability of these communities and increase resilience against the impacts of climate change by increasing their adaptive capacity and ability to anticipate and absorb shocks and bounce back for them. Currently, residents in these areas have not been able to adapt to changes and have been drastically affected by impacts to the coast. Thus, investments need to be made in decreasing exposure, risk reduction, building capacity, and increasing resilience to reduce the impacts of future hazards and climate change.

The IPCC (2007) stated that the global sea level rose at an average of 1.8 mm per year from 1961 to 2003. Domingues et al. (2007) estimated a rise of  $1.5 \pm 0.4 \text{ mm yr}^{-1}$  for the same period. According to sea level rise projections for the Caribbean region, sea level will rise 0.18 – 0.59 m by 2099 (Cambers et al., 2007), while Rahmstorf (2007) projected that sea level could increase between 0.5 – 1.4 m above the 1990 level.

Large regional variations have been superimposed on the mean global sea-level rise rate. [Table 3](#) [Table 3](#) demonstrates observations from tidal gauges surrounding the Caribbean basin which indicate SLR in the Caribbean is broadly consistent with the global trend ([Table 3](#) [Table 3](#)).

*Table 3 Sea level rise rates at observation stations surrounding the Caribbean Basin (NOAA, 2009; CARIBSAVE, 2012)*  
**Table 3: Sea level rise rates at observation stations surrounding the Caribbean Basin (NOAA, 2009; CARIBSAVE, 2012)**

Tidal Gauge Station	Observed trend (mm yr <sup>-1</sup> )	Observation period
Bermuda	2.04 (+/- 0.47)	1932-2006
San Juan, Puerto Rico	1.65 (+/- 0.52)	1962-2006
Guantanamo Bay, Cuba	1.64 (+/- 0.80)	1973-1971
Miami Beach, Florida	2.39 (+/- 0.43)	1931-1981
Vaca Key, Florida	2.78 (+/- 0.60)	1971-2006

*Table 4 Projected increases in sea level rise from the IPCC AR4 (CARIBSAVE, 2012)*  
**Table 4: Projected increases in sea level rise from the IPCC AR4 (CARIBSAVE, 2012)**

Scenario	Global Mean SLR by 2100 relative to 1980-1999 (m)	Caribbean Mean SLR by 2100 relative to 1980-1999 (+/- 0.05 m relative to the global mean) (m)
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 1.45m

[Table 4](#) [Table 4](#) shows projections of sea-level rise from the IPCC's AR4 report, with projections spanning from 0.18 to 0.56 m by 2100 relative to 1980 – 1999 levels. However, these ranges were challenged by several authors as being too conservative (e.g. Rahmstorf, 2007; Rignot and Kanargaratnam, 2006; Horton et al., 2008) and have provided evidence that a larger upper limit for uncertainty should exist (CARIBSAVE, 2012).

According to a 2014 report "Analyzing Vulnerability of the Belize Coastal Tourism Sector" low lying areas in Belize, particularly those with elevations ranging from 0 – 5m, are the most vulnerable to sea-level rise. As shown in [Figure 9](#) [Figure 10](#), this accounts for a significant portion of Belize's coastal zone, especially when a 3 km inward

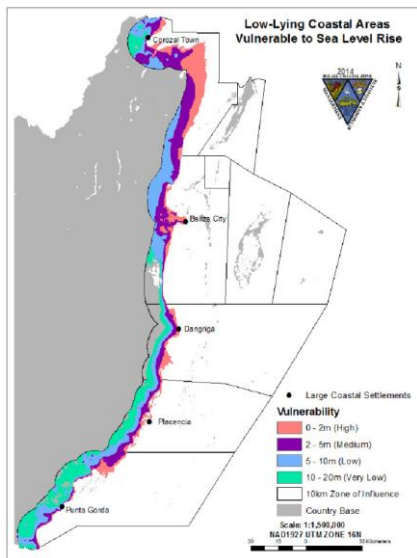
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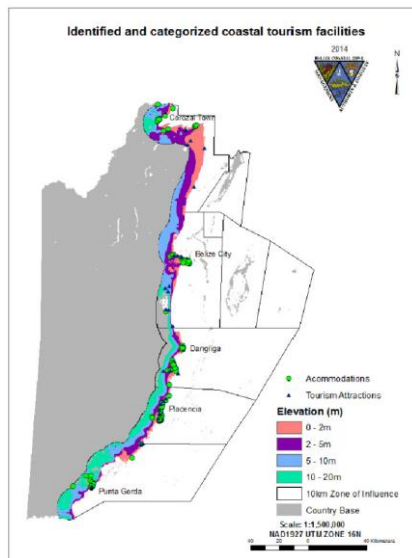
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extent along the coast is considered where most development activities occur. [Figure 10-Figure 1144](#), shows the location of tourism facilities (accommodations and attractions) that are in vulnerable low-lying areas. A total of 291 tourism facilities were identified along the coast, of which 263 were accommodations and 28 were attractions. Tourism facilities are located at different elevations, however, 94% of accommodations were found to be within the lower elevation (0 – 5 m) and 79% of attractions were found to be within the lower elevation (CARIBSAVE, WWF, CZMAI, ERI, BTB, BTIA, 2014). Tourism facilities and other infrastructure/ housing located within these low elevation classes are more at risk to inundation. They would also be at higher risk of erosion, soil, and aquifer contamination with salt water and other impacts of sea-level rise.



[Figure 10: Vulnerability of Coastal Areas relative to sea level rise \(CZMAI, 2014\)](#)



[Figure 11: Location of Tourism Facilities in Vulnerable Coastal Areas \(CZMAI, 2014\)](#)

[Figure 9 Vulnerability of Coastal Areas relative to sea level rise \(CZMAI, 2014\)](#)

[Figure 10 Location of Tourism Facilities in Vulnerable Coastal Areas \(CZMAI, 2014\)](#)

It should also be noted that the coastal plain of Belize largely lies below 20m above sea level, with many areas below 10m and subject to inundation, with much of Belize City on land below 10m. [The travel and tourism sector of Belize is particularly vulnerable because it depends on many of natural resources and services along the coast and is subject to climatic changes affecting activities and comfort levels of tourists. Climate change may reduce the appeal of tropical destinations, like Belize, to tourists due to heat stress, beach erosion, coral bleaching, and increased health risks. For Belize, the barrier reef and coastal areas attract the highest number of tourists: more than 70% tourists visit cayes and more than 12% visit the coastal village Placencia, with more than 80% participating in reef-based activities \(Richardson, 2009\). Tourism will be affected by sea level rise, which can lead to flooding, inundation, saltwater intrusion and erosion, impacting water supplies, property and infrastructure along the coast. Impacts to coral reefs will also affect the sustainability of the industry. Increased frequency and intensity of storms will also lead to storm surges, flooding, erosion, and loss of property.](#)

[The housing sector in these coastal communities are also at high risk of sea level rise and its associated impacts just as the tourism industry is, as well as storms. Although a Building Act exists within the country, many houses](#)

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[are built in coastal areas that are not suitable for housing. Thus, it is imperative do introduce a housing policy and building codes, which can inform where future housing should take place and standards for their construction.](#)

As can be seen from [Table 2](#) ~~Table-2~~ in the 27 coastal communities of Belize the male to female population does not vary greatly, therefore, both genders need to be consulted equally. The project will benefit 57,787 males and 60,035 females from the 27 coastal communities located in northern, central, and southern Belize. The proposed project will take into account the different challenges and risks that men and women face. Along the coast of Belize, most people rely on the fishing and tourism industries. In the fishing industry mostly males are present, facing challenges such as poor catch, decrease in fish stocks, pollution, lack of access to funds or loans, as well as others. For the tourism sector, both men and women are equally represented, facing challenges such as a decrease in tourist visits, changing climate, poor infrastructure, etc. Specific vulnerable groups in these sectors include fisherfolk, tour guides, hotel/resort owners, and hotel/resort workers. Other vulnerable groups include owners of residences, buildings, and other infrastructure along the coast.

Men, women, youth, and vulnerable groups in these communities are being drastically affected by changes in the climate. Residents in these communities rely heavily on the natural resources and services that the coast provides, thus ensuring that the coast is protected and that the shoreline is not further developed in an unsustainable manner is important for a thriving future in these communities. Ensuring protection of the coast depends heavily on the knowledge of the residents and users of the coast, thus component 4 of the project will strive to meet the needs of both men and women and will equally engage both genders in knowledge and outreach activities. Awareness-raising will be carried out in a gender-responsive manner that ensures that the attitudes, behaviors, and beliefs that reinforce inequalities between men and women are changed and that both genders are given equal opportunities.

### **Project Objectives**

The main objective of the proposed project is to increase the climate resilience of 27 coastal communities in Belize by improving coastal land use, habitation, and monitoring of climate impacts by increasing adaptive capacity and knowledge transfer. The project will achieve this through four main components:

- i) Improving Coastal Land Use for Resilient Habitation and Sectoral Activities
- ii) Coastal Vulnerability Monitoring
- iii) Beach Stabilization of High-Risk Coastal Areas
- iv) Awareness Raising, Knowledge Dissemination and National Capacity Strengthening

While all components benefit at least the 27 coastal communities, various sub-components have nation-wide benefits, such as the national housing policy and national building codes specification for the coastal zone (component 1.1) and awareness-raising, knowledge dissemination, and capacity-strengthening (component 4).

[Figure 12](#) ~~Figure 11~~ provides an overview of the Theory of Change of this project. The Theory of Change is elaborated throughout this project document.



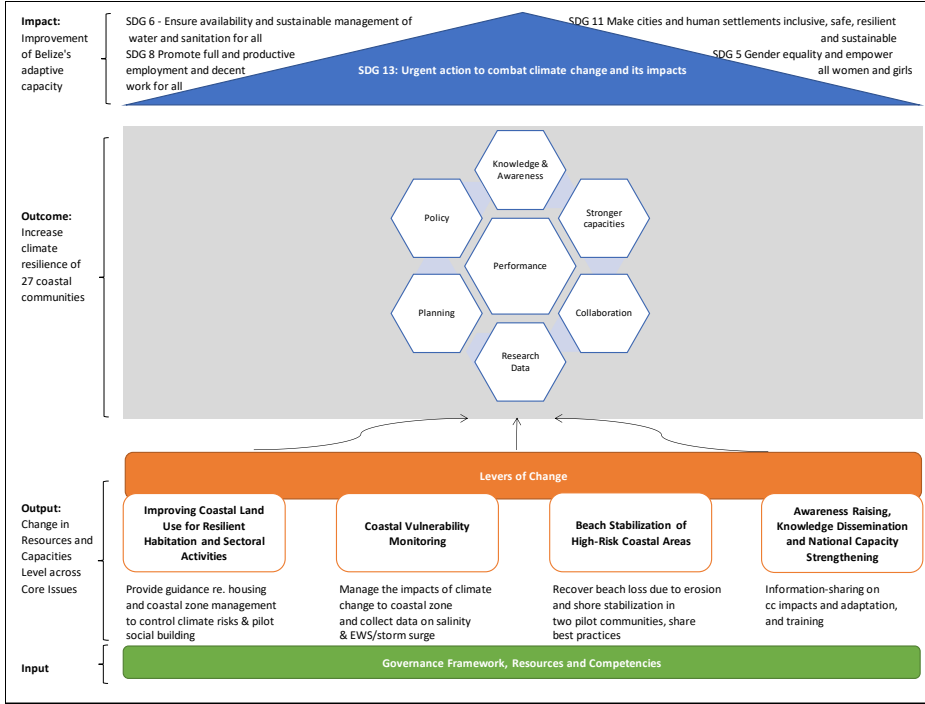


Figure 1249: Theory of Change

Figure 11 Theory of Change

The project will achieve this through four main components that are aligned with the Strategic Results Framework of the Adaptation Fund (Table 5-Table 5).

Table 5 Alignment with the Strategic Results Framework of the Adaptation Fund

Table 5: Alignment with the Strategic Results Framework of the Adaptation Fund

Component	AF Results Framework Linkage
1. Improving coastal land use for resilient habitation and sectoral activities	Outcome 7: Improved policies and regulations that promote and enforce resilience measures
2. Coastal Vulnerability Monitoring	Outcome 2: A strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses
3. Beach Stabilization of High-Risk Coastal Areas	Outcome 4: Increased adaptive capacity within relevant development sector services and infrastructure assets
4. Awareness Raising, Knowledge Dissemination and National Capacity Strengthening	Outcome 3: A strengthened awareness and ownership of adaptation and climate risk reduction
	Outcome 2: A strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses

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The goal of this project is to decrease vulnerabilities in coastal areas by improving planning and decision-making thus ensuring that country capacity is built to address future climate change impacts. In doing so, it encourages pro-environmental behaviors through communication and training, enhances the resilience of high-risk coastal areas, strengthens the public sector-community partnerships for data collection/monitoring, and overall makes life safer for Belizeans and visitors.

**Component 1**, Improving coastal land use for resilient habitation and sectoral activities, focuses on strengthening the governance and will provide a formal structure to address the challenges that arise due to continued growth in coastal areas. Component 1 consists of two subcomponents: 'Development of the National Housing Policy and Building Codes for resilient habitation based on vulnerabilities' and 'Strengthening the implementation of the Integrated Coastal Zone Management Plan and associated management guidelines for zonation'. The beneficiaries for the latter component are the coastal communities, while the housing policy and building codes extend to the national level.

**Component 2** consists of three subcomponents: 'Development of a national coastal saline intrusion program', 'Develop and implement a National Beach Erosion Monitoring Program', and 'Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge'.

Under **Component 3**, the National Climate Change Office (NCCO) seeks to recover beach areas lost due to coastal erosion in Dangriga and Hopkins. Recovery of beach area will allow for the development of a mechanism to recover areas lost to erosion which can be replicated in areas with similar attributes and modified to fit specific needs. It will also lead to the extension of storm and erosion protection in the selected areas, increasing their adaptive capacity and will decrease the probability of infrastructure being lost in the area in the future.

**Component 4** focuses on awareness raising, knowledge dissemination and national capacity strengthening. It will strengthen the capacities of local government officers, the private sector, and communities. The components consist of three subcomponents: 'Development of a National Climate Change Communication Strategy and Action Plan', 'Development of training modules for best coastal adaptation practices', and 'Strengthening of GIS capabilities within the CZMAI'.

The project components in this proposal are crucial for the proper management of vulnerable coastal areas in Belize, in the absence of proper planning, legislations, and policies unsustainable development will continue unchecked along the coast, increasing vulnerabilities and exacerbating the impacts of climate change. Knowledge transfer and capacity building are also necessary to ensure that relevant stakeholders can increase their adaptive and absorptive capacity and are willing to comply with the necessary adaptation actions to increase national resilience.

## Project Components and Financing:

Table 6: Project Components and Financing  
 Table 6: Project Components and Financing

Project Components	Expected Outcomes	Expected Concrete Outputs	Amount (US\$)
Component 1 <i>Improving coastal land use for resilient habitation and sectoral activities</i>	Outcome 1.1 Development of the National Housing Policy and Building Codes for resilient habitation based on vulnerabilities	Output 1.1.1 Development of the National Housing Policy with a clear specification for coastal habitation	143,249
		Output 1.1.2 Development of National Building Codes	241,751
		Output 1.1.3 Development of a social housing pilot	95,000
	Outcome 1.2 Strengthening the implementation of the Integrated Coastal Zone Management Plan and associated management guidelines in three coastal planning regions	Output 1.2.1 Procurement of necessary software and licenses for data collection	37,500
		Output 1.2.2  Conduct drone mapping and ground truthing exercise to update Coastal Land Use Inventory for 3 planning regions	150,000
		Output 1.2.3  Conduct site inspections, meetings with Community Wardens and Coastal Advisory Committees to monitor compliance with the Coastal Zone Management guidelines	37,500
<b>Total Component 1</b>			<b>667,000</b>
Component 2 <i>Coastal Vulnerability Monitoring</i>	Outcome 2.1 Strengthening data availability for the development of a national coastal saline intrusion program	Output 2.1.1 Enhance evidence-based knowledge to determine best use practices for freshwater supply for the coastal areas / Reducing probability of further saline intrusion	709,000
		Output 2.2.1 Analysis to assess best options and mechanism for beach erosion monitoring in Belize including a network for on the ground monitoring outlining chosen techniques, protocol and equipment needs	75,000
	Outcome 2.2 Develop and implement a National Beach Erosion Monitoring Program	2.2.2. Conduct procurement of equipment and implementation of necessary training to support the	75,000

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		implementation of the monitoring program	
		Output 2.2.3 Contract and maintain a designated Coastal Monitoring Officer to lead and implement project activities	75,000
	Outcome 2.3 Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge	Output 2.3.1 The implementation of Phase 1 – EWS development & Storm Surge modeling	140,000
		Output 2.3.2 The establishment of Weather Stations/Sensors along the coast	125,000
<b>Total Component 2</b>			<b>1,194,000</b>
Component 3 <i>Beach stabilization of High-Risk Coastal Areas</i>	Outcome 3.1 Increased adaptive capacity within Hopkins and Dangriga communities through infrastructure and/or soft structure assets	Output 3.1.1 Implementation of beach recovery and stabilization through a pilot project in the high-risk coastal communities Dangriga and Hopkins	1,030,000
		Output 3.1.2 Monitoring and evaluation of activities' effectiveness and documentation of lessons learnt	70,000
<b>Total Component 3</b>			<b>1,100,000</b>
Component 4 <i>Awareness raising, knowledge dissemination and capacity strengthening</i>	Outcome 4.1 Development of a National Climate Change Communication Strategy and Action Plan	Output 4.1.1 Implementation of the NCCSAP	125,000
	Outcome 4.2 Development of training modules for best coastal adaptation practices	Output 4.2.1 Conduct training needs assessment and development of training modules for best coastal adaptation practices	102,906
		Output 4.2.2 Implementation of training modules for best coastal adaptation practices	47,500
	Outcome 4.3 Strengthening of GIS capabilities of CZMAI and partners	Output 4.3.1 Identification and procurement of infrastructure and materials including computer hardware, software and data gathering equipment	86,500
		Output 4.3.2 Implementation of GIS training for risk mapping, collection of beach profile data and susceptibility to erosion	13,500
<b>Total Component 4</b>			<b>375,406</b>
<b>5. Total Components</b>			<b>3,336,406</b>
<b>6. Project/Programme Execution cost</b>			<b>350,230</b>
<b>7. Total Project/Programme Cost</b>			<b>3,686,636</b>

<b>8. Project/Programme Cycle Management Fee</b>		313,364
<b>Amount of Financing Requested</b>		<b>4,000,000</b>

*Table 7 Projected Calendar*  
*Table 7: Projected Calendar*

Milestones	Expected Dates
Start of Project/Programme Implementation	October 2021
Mid-term Review	November 2023
Project/Programme Closing	March 2026
Terminal Evaluation	April 2026

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## PART II: PROJECT / PROGRAMME JUSTIFICATION

### A. The Project Components

#### Component 1: Improving coastal land use for resilient habitation and sectoral activities

Component 1 will aid in the control of risks and prevention of continued infrastructure development in vulnerable coastal areas, which threatens the integrity of mangrove forests, seagrass beds, and coral ecosystems as well as native biodiversity. As infrastructure continues to be built in areas that are highly exposed and vulnerable to risks and future hazards, it is important to regulate and make recommendations for future construction in these areas in avoidance of negative economic and environmental impacts and enforce national guidelines for such activities to lower vulnerabilities. The completion of this component will result in the creation and implementation of a national policy for resilient habitation, with the associated building codes. Considering concerns that construction would become extremely expensive when adhering to building codes, it is also envisioned to establish a social housing pilot. This component has a nation-wide reach and will benefit the safety of citizens and the tourism sector. –The Integrated Coastal Zone Management Plan (ICZMP) and its associated guidelines for zonation will also be strengthened for implementation. This will be achieved by acquiring the necessary software and equipment for the CZMAI to collect and process data, conducting drone mapping and ground-truthing to update an inventory of 3 planning regions, and through a participatory approach - site inspections and meetings with Community Wardens, and Coastal Advisory Committees. This strategy is in line with the recommendation to enhance cost-effectiveness and ownership through strategic partnerships (Feasibility Study Part III).

#### 1.1 Development of the National Housing Policy and Building Codes for resilient habitation based on vulnerabilities

##### Rationale

In 2015 the member states of the United Nations Framework Convention of Climate Change (UNFCCC) adopted the Paris Agreement which was an agreement to steer the world towards sustainable development, aiming to limit global warming to 1.5 °C to 2 °C above pre-industrial levels. Parties also agreed to a long-term goal for adaptation, to foster climate resilience and low GHG emission development.

Buildings are the main energy consumers and are built using materials that emit greenhouse gases at the production stage. Expectations are that by 2060 the global building floor area will double and, therefore the building sector stakeholders need to consider the possibilities of how to reduce the world-building sector's GHG production. –Additionally, there is a demand to address the compounding needs of communities to adapt to the modified environment, which affects their way of life. Long-established construction methods and materials utilized require modification to deter the impacts of climate change being experienced in countries across the globe. Transforming the global building sector can contribute significantly to fighting climate change. Energy-efficient design of buildings can also contribute to reducing energy demand, GHG emissions, and to save money. The utilization of climate adequate construction materials can ensure the protection of infrastructure and lives during intensive storm events anticipated.

To meet its climate change commitments, the Ministry of Infrastructure Development and Housing (MIDH) in Belize is implementing the Building Sector Reform Project that aims to contribute to the betterment of the sector through ~~amongst others~~ the implementation of the amendments made to the Belize Building Act in 2017.

##### Project Activity

This Project activity has the following outcome which is aligned with the Adaptation Fund Results Framework (Part III – Section E): Improved National Housing Policy with a clear specification for coastal habitation.

The Lead Agency for this subcomponent is the Ministry of Infrastructure Development and Housing (MIDH).

*Table 8: Development of the National Housing Policy and Building Codes for resilient habitation based on vulnerabilities*

Components	Milestones/ Targets	Indicative activities
<i>Development of the National Housing Policy with clear a specification for coastal habitation</i>	National Housing Policy developed	<p>Conduct Review of Existing Legislation and regulations related to Housing in Belize (Town Planning Act, Town Council Act, Land Utilization Act, Land Subdivision Act, Energy Act, Coastal Zone Management, etc.) and report preparation with concrete recommendations on how to use the legislation through consolidation or amendments</p> <p>Prepare discussion paper</p> <p>Prepare draft Housing Policy taking into consideration economic, social, gender and climate factors</p> <p>Consult with stakeholders</p> <p>Raise awareness on the National Housing Policy</p>
<i>Development of National Building Codes</i>	National Building codes developed	<p>Prepare discussion paper</p> <p>Development of Draft National Building Codes with a specification for the coastal zone</p> <p>Consult with stakeholders</p>
<i>Development of a social housing pilot</i>	A pilothouse established	<p>Development of social housing pilot which takes into consideration climate factors (temperature, wind, humidity, etc.)</p> <p>Obtain land rights and construction permit</p> <p>Construct pilothouse</p> <p>Construction process and lessons learned captured for knowledge-sharing purposes</p>

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Climate change is considered an important guiding factor in the development of both the national housing policy and the building codes (with the specification for the coastal zone), and the Building Sector Reform is in line with the country's sustainable development goals. The envisioned project activities will aid in reducing instances of habitation in vulnerable areas, especially the flood-prone inland communities and coastal areas, and in decreasing social and infrastructure costs due to increased resilience. It will also prevent and reduce the effects of natural hazards and of climate change on vulnerable areas, which can be exacerbated and induced by human activities.

With the recent passing of the tropical storms, Eta and Iota over the Central American region and Belize not escaping the effects of these, the Ministry of Infrastructure Development and Housing (MIDH) recognizes that it is not only coastal communities being affected by climate change but also flood-prone

inland communities. The indirect project beneficiaries are nation-wide 419,199 persons: 209,603 males, 209,596 females (2020 est., SIB), as well as 260,000 visitors (annual est.). The direct beneficiaries are the 27 coastal communities: 117,823 persons: 57,787men; 60,035 women. Approximately 13 persons will be employed: 8 with tertiary education, 5 construction workers with secondary/primary education. Proper consideration will be provided to pursue a gender balance among staff/consultants/stakeholder beneficiaries (Gender Action Plan Annex 1 Gender and Social Assessment).

Currently, there is a widespread expansion of communities in vulnerable areas, especially flood-prone and coastal areas, as well as tourism infrastructure such as hotels and resorts, which is leading to the unsustainable development of the coast. While the coast is a desirable location for development, as many economic activities occur there, proper management of vulnerable and coastal areas, especially sensitive and vulnerable habitats is necessary, as they also provide high value for conservation and public enjoyment. This National Housing Policy will aid in regulating habitation in vulnerable areas, leading to more informed decision-making.

In the absence of an appropriate policy, human modification of the coastal zone for habitation and development will continue to increase, exacerbating existing threats, and future threats of a changing climate. Continued development in highly vulnerable areas increases the number of people and built an infrastructure that is exposed to the impacts of climate change and natural hazards [\(Please see Figure 13 for impacts to priority sectors\)](#). The National Housing Policy and building codes are necessary tools to guide the work of the MIDH and municipalities in addressing the housing needs of the country. The policy will address issues of land tenancy, land use planning, zoning, rentals, financial plans, subsidies, building codes, etc., and adhere to national sustainable development plans and initiatives. The National Housing Policy and codes will also serve to enhance the NDC under adaptation measures. The National Housing Policy will be in line with the international conventions to which Belize is a signatory, that are related to the right to proper housing, including The Universal Declaration on Human Rights, The Habitat III Declaration, and SDG 11 Sustainable cities and human settlements. Taking into consideration human rights, when developing the building codes, an assessment should be included on how the traditional housing structures (cultural heritage) of the Indigenous Maya/Garifuna peoples will be integrated. In this time, when the world is facing changes like climate change, the policy and building codes will serve as a guiding tool on how to make the national housing sector resilient.

Sector	Impacts
Coastal & Marine	<ul style="list-style-type: none"> <li>- Sea level rise will lead to, increased erosion, loss of beaches</li> <li>- Damage to valuable infrastructure, increased inundation, loss of agricultural lands and crops, coastal wetlands, mangroves sea grass beds and ecosystems, and displaced coastal communities.</li> <li>- Flooding and marine inundation</li> <li>- Saline intrusion into freshwater lenses</li> <li>- High temperature will result in loss of coral reefs and reduction in fish stock.</li> </ul>
Tourism	<ul style="list-style-type: none"> <li>- Climate change, along with sea level rise, would result in loss of beaches, properties and public infrastructure, and result in a decrease in aesthetics and a loss of attractiveness of the destination.</li> <li>- Coastal areas in Belize will experience high levels of saltwater intrusion and rising water tables, thereby reducing water quality, driving up the cost of water</li> <li>- Higher temperatures will discourage older visitors, because of their susceptibility to heat stress.</li> <li>- Tropical storms and hurricanes, compounded by sea level rise, are also likely to increase in intensity, size and duration, causing flooding and damage to transport and other infrastructure.</li> <li>- Decrease in tourism arrivals could ultimately result in loss of employment for large numbers of persons who are currently employed in the tourism sector.</li> </ul>
Human Settlements	<ul style="list-style-type: none"> <li>- Increase in frequency and intensity of storm surge will cause more flooding and disrupt or destroy coastal settlements.</li> <li>- Increase in frequency and intensity of storm surge and extreme rainfall will cause damages to infrastructure from flooding and erosion.</li> <li>- Damage to transport facilities (roads, ports, airports)</li> <li>- Damage to public facilities (water supply, energy generation)</li> <li>- Damage to health and safety infrastructure</li> <li>- Damage to cultural assets</li> </ul>
Water Resources	<ul style="list-style-type: none"> <li>- Less rainfall combined with increase in temperature will result in increased evapotranspiration and loss of available surface water.</li> <li>- Changes in the hydrological cycle will decrease water levels and adversely impact on the generation of hydropower.</li> <li>- Decrease in precipitation will reduce groundwater and aquifer recharge.</li> <li>- As an effect, available water resources will be reduced</li> </ul>

Figure 13-4: Impacts of Climate Change in Priority Sectors (Excerpt from NCCPSAP, 2014)

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## 1.2 Strengthening the implementation of the Integrated Coastal Zone Management Plan and associated management guidelines for zonation

### Rationale

As outlined in Part I, Belize's coastal zone plays a central role in the lives and livelihoods of its citizens. It features an environment of tremendous intrinsic and extrinsic value in terms of its assets and is under pressure due to climate change and anthropogenic causes. Management of this environment is a complex task, requiring the involvement of many organizations and individuals, requiring action at the local, national, and even regional and global scales. Integrated coastal management considers the synergistic effects of all coastal activities to seek a desirable outcome. ICM considers sustainable resource use, with environmental considerations underlying decision making in all sectors of activity and deals holistically with the coastal environment – coastal land, the foreshore, and inshore – and being forward-looking, as well as trying to resolve problems associated with current coastal use.

The Government of Belize passed the Coastal Zone Management (CZM) Act in 1998, which provided the Coastal Zone Management Authority and Institute (CZMAI) with the mandate to develop a National Integrated Coastal Zone Management (ICZM) Plan. The Plan was endorsed by the Government in 2016; however, CZMAI is currently updating the ICZM Plan and Guidelines and it is expected that this will be completed by the end of 2021. Under this subcomponent of the project, the CZMAI, will lead the implementation process of the updated Integrated Coastal Zone Management (ICZM) Plan and strengthen the associated management guidelines for zonation.

### Project Activities

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This activity has the following outcome which is aligned with the Adaptation Fund Results Framework (Part III – Section E): Improved Integrated Coastal Zone Management Plan and associated management guidelines for zonation to promote and enforce resilience measures.

The Lead Agency for this subcomponent is The Coastal Zone Management Authority & Institute (CZMAI).

*Table 9: Strengthening the implementation of the Integrated Coastal Zone Management Plan and associated management guidelines for zonation*

Table 9: Strengthening the implementation of the Integrated Coastal Zone Management Plan and associated management guidelines for zonation

Components	Milestones / Targets	Indicative activities
<i>Strengthening the implementation of the Integrated Coastal Zone Management Plan and associated management guidelines for zonation</i>	Drone mapping and ground-truthing conducted	Procure necessary software and equipment for data collection and processing  Utilize software and equipment for data collection and analysis
	Coastal Land Use Inventory updated	Continue drone mapping and ground-truthing exercise to update the Coastal Land Use Inventory to update the register for three planning regions in northern, central, and southern Belize.
	Integrated Coastal Zone Management Plan and associated management guidelines <del>for zonation</del> <u>updated/developed/implemented</u>	Collect information <u>on Implementation progress of to update</u> the ICZM Plan  Share updated recommendations with national stakeholders
<i>Collaborative approach for strengthening the implementation of the Integrated Coastal Zone Management Plan</i>	Regular site inspections and meetings with Community Wardens and Coastal Advisory Committees (CACs) will be conducted and recorded.	Conduct site inspections, meetings with Community Wardens, and Coastal Advisory Committees to monitor compliance with the Coastal Zone Management guidelines

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The updated Coastal Zone Management guidelines will take into consideration the analysis of coastal alignment and trends linked to habitation and vulnerabilities. These guidelines, which will be developed in a participatory manner with community stakeholders will, aim at ensuring supporting the sustainable use and management of Belize's coastal resources. The guidelines will result in protecting sensitive habitats that provide ecosystem services that communities benefit from. Successful implementation of the ICZMP will therefore have direct benefits to all community stakeholders in the coastal zone. The direct beneficiaries of this component are 27 coastal communities - 117,823 persons: 57,787 men; 60,035 women. Approximately 12 coastal wardens/advisors with secondary/primary education will be employed. Proper consideration will be provided to pursue a gender balance among staff/consultants/stakeholder beneficiaries targeted to participate in the program on a volunteer basis. CZMAI already has established wardens in three communities including Hopkins, Barranco and Punta Negra. These individuals have undergone training by CZMAI staff and are providing reports on infractions and issues affecting their community via a WhatsApp group established to facilitate ease in communication and to assist in sharing photos, etc.

CZMAI, as a key executing agency of the project will continue to use the Coastal Advisory Council (CACs) and community warden program to promote women and the involvement of young female students in the implementation of project activities by including this requirement in the criteria for selection.

Furthermore, the CAC and community warden program will also serve as a medium to support the knowledge transfer and lessons learned from the project as is currently being done with other projects and

initiatives that CZMAI is engaged in. The current Terms of Reference (ToR) for the CACs include the following objectives:

- To promote, monitor and report to the Coastal Zone Management Authority and Institute on the implementation and effectiveness of the Development Guidelines, and other policies and guidelines for coastal resource management for each coastal region
- To act as a forum for the discussion of coastal issues on a national scale

Additionally, the following can be done to introduce the project/ activities:

1. Insert an agenda item to socialize the project, objectives and activities for respective communities
2. Insert an agenda item to obtain feedback/ lessons learnt on activities being implemented to allow for continued updates and recommendations from the local level.

Through the CACs, the implementing agencies will be able to ensure knowledge dissemination and important feedback to allow for the effective implementation of the activities.

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The three planning regions selected for the updating of the coastal land use inventory is activity are the Northern Planning Region, Central Planning Region, and Southern Planning Regions. The Coastal Zone Management Act was recently reviewed and CZMAI is preparing to follow up on the recommendations. This update, together with the 2016 updated ICZM Plan, equip CZMAI with the necessary tools to effectively implement its mandate of 'sustainably managing coastal ecosystems use and development for the benefit of future generations'.

Past coastal alignment spatial data will be collected and analyzed to determine trends in coastal erosion, which is linked to component two, Coastal Vulnerability Monitoring. This activity intends to build mechanisms for to support informed and wise planning of Belize's coast for sustainable future development and shall propose and enforce goals and objectives to govern the use of land and water in Belize's coastal zone through the implementation of the ICZM Plan. The component will build on and support the implementation of the guidelines for zonation that already exist under the CZMAI.

#### Detail of Activities

- I. Procuring necessary software and equipment for data collection and processing
- II. Continuing drone mapping and ground-truthing exercise to update the Coastal Land Use Inventory to update the register for three planning regions in the northern, central, and southern Belize. This activity entails conducting the inventory of development sites and activities for coastal areas within three regions to gather baseline data to further analyze development best practices and recommendations outlined within the ICZMP region-specific guidelines. The inventory included building footprints of the regions to determine the human land uses by collecting drone imagery and validation via ground-truthing. The coastal area of Belize has been targeted by local and foreign investors for the development of the public and private sectors. Most Belizean livelihoods are linked to coastal resources, which makes the task of managing and allocating its usage much harder. The data collected serves as the baseline data for coastal development, furthermore, this data serves as an important dataset that can be used in spatial planning regarding disaster risk management, climate change adaptation, and sustainable building practices in Belize.
- III. Conducting site inspections, meetings with Community Wardens, and Coastal Advisory Committees to monitor compliance with the Coastal Zone Management guidelines. This activity entails conducting meetings with community groups known as Community Wardens as well as local level groups known as Coastal Advisory Committees (CAC's). These groups have participated in sessions where the contents and recommendations in the ICZM Plan which includes the recommendations on climate change were socialized. Therefore, by conducting meetings with these groups CZMAI will be able to promote the implementation of these recommendations in the ICZM Plan and further inform communities on the impacts of climate change and the importance

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of following these recommendations to increase adaptive capacities. One such recommendation would be to promote ecosystem-based adaptation in these communities. Community members can help with this by protecting local habitats that are known to provide coastal protection such as mangroves and coral reefs. Also, through these meetings, new community warden groups will be established in other communities which will ensure that more coastal communities are made aware of these impacts and recommendations to increase their local adaptive capacities.

IV. Lastly, the ICZM Plan was endorsed by the Cabinet in 2016 and is currently being revised. These meetings will be a medium to monitor and report on the implementation of the ICZM Plan and guidelines. The meetings will be used to collect information on new climate change issues that may have become evident in local communities since the passing of the 2016 ICZM Plan. This information will be used to develop updated recommendations to further increase these communities' adaptive capacities. These updated recommendations will be provided to national stakeholders to ensure these recommendations are implemented at a national level to increase the nation's adaptive capacity to climate change. Community Wardens and CAC's will be present in all of the coastal planning regions. If these meetings are completed, CZMAI will have completed the implementation of the plan in all the coastal planning regions and therefore increased the adaptive capacity to climate change nationally.

III. Procuring necessary software and equipment for data collection and processing

II. Continuing drone mapping and ground-truthing exercise to update the Coastal Land Use Inventory to update the register for three planning regions in the northern, central, and southern Belize. This activity entails conducting the inventory of development sites and activities for coastal areas within three regions to gather baseline data to further analyze development best practices and recommendations outlined within the ICZMP region-specific guidelines. The inventory included building footprints of the regions to determine the human land uses by collecting drone imagery and validation via ground-truthing. The coastal area of Belize has been targeted by local and foreign investors for the development of the public and private sectors. Most Belizean livelihoods are linked to coastal resources, which makes the task of managing and allocating its usage much harder. The data collected serves as the baseline data for coastal development, furthermore, this data serves as an important dataset that can be used in spatial planning regarding disaster risk management, climate change adaptation, and sustainable building practices in Belize.

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The implementation of the ICZMP and guidelines for zonation is crucial in decreasing climate change vulnerability, as it will allow the rational and orderly development of coastal land in an environmentally sound manner to ensure the sustainable development of human settlements and infrastructure that are resilient to climatic changes and its impacts. The latter is of high importance as the ICZMP indicates that six of the ten major residential centers in Belize are located on the coast. "Despite a stated policy to relocate housing inland due to sea-level rise and hurricane vulnerability, all coastal centers are experiencing growth to varying degrees, and frequently into flood-prone areas. Development is undertaken by both the public and private sectors, with the latter involved primarily in sub-divisions in several coastal locations, often targeting foreign markets and retirees" (CZMAI, 2016). Therefore, the Plan is a crucial tool to regulate coastal construction and protect nature, people, and investments. The utilization of zonation guidelines will allow the needs of the population, in terms of housing, infrastructure, tourism development, etc., to be met within areas that are suitable for each type of activity with minimal or no negative impacts on the terrestrial and/or marine environments. It will promote that areas vulnerable to natural hazards or disasters, areas with unsuitable terrain (such as swamps), or areas that endanger the health and safety of the population are not further developed. With proper implementation and enforcement, areas identified for different activities (residential, industrial, tourism, etc.) can be divided into zones in which specific land uses will be permitted or prohibited. It may also regulate the size and placement of buildings and other conditional uses of the land.

## **Component 2: Coastal Vulnerability Monitoring**

The Coastal Vulnerability Monitoring, Component 2, seeks to integrate the impacts of climate change to coastal zone management practices by carrying out critical assessments and monitoring. This component includes the assessment of saline intrusion and the development of a program to track its impacts. This component will also benefit the coastal communities and the agriculture and mariculture sectors. It is crucial to collect salinity data due to the implications of salinization to, amongst others, human health, agricultural production, water quality, and ecological health. A National Beach Erosion Monitoring Program will also be established to monitor coastal/beach erosion, utilizing a broad range of stakeholders including NGOs and academia within the national protected areas system for on the ground monitoring, with the CZMAI coordinating the related activities. Beach erosion monitoring is a first step in the maintenance of the coastal system (structures, land features, and ecosystems): ensuring optimal levels of serviceability and safety and minimizing costs and environmental impact. These two subcomponents in component II will aid in planning for climate-resilient infrastructure as they will examine vulnerabilities of saline intrusion and erosion, thus avoiding development in areas that may be highly impacted by these. The Monitoring component also includes strengthening the NMS to develop a coastal early warning system and model storm surge. This will be a first step (step 1 of 4) towards developing a system for observation (monitoring) and data collection to detect disaster risks/storm surge as soon as possible. Subsequent steps -for which financing will be sought from yet to identify sources- include wave modeling, coastal inundation & connection with a web-based management system, and EWS extension for offline analysis. The EWS will integrate existing sea-state monitoring technology, numerical ocean forecasting models, historical database and experiences, and computer science.

### **2.1 Strengthening data availability for the development of a national coastal saline intrusion program**

#### **Rationale**

Sea-level rise, in combination with increased groundwater pumping, can increase saltwater intrusion in groundwater aquifers. Saltwater intrusion, through surface or groundwater aquifers, increases treatment costs for drinking water facilities (decreased quality) or render groundwater wells unusable (decreased availability). As the sea levels rise, the "salt front" (location of the freshwater-saltwater line) can migrate upstream. This encroachment can be worsened by drought, reduced rainfall, or changes in water use and

demand. Saltwater intrusion can result in the need for water utilities to increase treatment, relocate water intakes, or development of alternate sources of freshwater.

There is no national program for groundwater data collection aimed at water quality or quantity in Belize, despite the increasing demand from informal village water supply systems and agricultural activity. The proposed project will address these knowledge gaps by providing data and information that can be used to form a component of a more comprehensive program of monitoring and investigation.

The National Hydrological Service will lead this monitoring program that is crucial to determine the saline intrusion zone for the country to support a sustainable water resources development plan for Belize's groundwater resources and key aquifers. This subcomponent will also determine the risk of future soil salinization to assist the agriculture sector in identifying crop cultivation zones with high potential for impact to production yields. It will result in the identification of the best uses for the land and the spectrum of activities that are appropriate for zones with high salinity. The study will provide vital information for Water Resource Management (WRM): the development of a National Water Master Plan, Water Quality Control Plan, and Water Vulnerability Profile. WRM is a necessary condition of the Growth and Sustainable Development Strategy; that envisioned the need for a Water Master Plan, a National Groundwater and Surface Water Assessment, and a Water Vulnerability Profile. Apart from Hydrology and Agriculture (e.g. production of food crops), this component also links to the health sector, because amongst others water and food shortages and contamination have a negative correlation to people's health and well-being.

**Project Activity**

This activity has the following outcome which is aligned with the Adaptation Fund Results Framework (Part III – Section E): Strengthened institutional capacity for saline data collection.

The Lead Agency for this subcomponent is the National Hydrological Service (NHS) within the Ministry of Natural Resources.

*Table 10: Strengthening data availability for the development of a national coastal saline intrusion program*  
Table 10: Strengthening data availability for the development of a national coastal saline intrusion program

Components	Milestones / Targets	Indicative activities
<i>Enhance evidence-based knowledge to determine best use practices for freshwater supply for the coastal areas / Reducing probability of further saline intrusion</i>	Existing data on groundwater in the country evaluated	Collate existing soils, geology, terrain, and groundwater information (where available) Consolidate into a common platform for visual assessment and mapping Complete preliminary groundwater flow assessment including directions, estimated rates of flow, and potential dynamics regarding the freshwater-saltwater front along with coastal areas.
	Soil salinities determined	Procure of equipment and other tools for research on groundwater, water quality, and soil salinity  Measure the electrical conductivity (EC) of the upper soil horizons
	Water quality analyses to determine the effect of water quality on coastal influences and agricultural activity conducted	Select areas to target for field investigation  Plan and execute a field program to assess and verify soil salinity conditions  Correlate soil salinity results to crop productivity by review of historical records, visual inspections, and/or interviews with local farmer operators

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		<p>Update GIS products to reflect newly acquired information</p> <p>Conduct saline intrusion risk mapping considering current and future conditions under various extreme weather and climate change scenarios</p>
	Geophysical Surveys being used	<p>Collate information on locations of various farming operations (crops and livestock)</p> <p>Review land application of fertilizers and agricultural wastes</p> <p>Develop a field program to assess the chemical quality of groundwater in high-risk areas</p> <p>Use the information gathered from the field program to assess the risk to groundwater</p> <p>Groundwater risk mapping considering current and future conditions (under various extreme weather and climate change scenarios)</p>
<i>Strong local presence through community partnerships</i>	Capacity Building of / Technology Transfer to stakeholders <sup>1</sup> process completed	<p>Develop training tools related to capacity building of / technology transfer are being developed</p> <p>Conduct workshop/field visit for training purposes</p>

Salinization of soils and water can have significant social, environmental, and financial impacts for communities because they depend on water for their sustenance, and also impact the viability of the primary sectors. Salinity can affect human health, agricultural production, water quality, the ecological health of streams, terrestrial biodiversity, soil erosion, flood risk and infrastructure, fixtures. Coastal communities are more susceptible to saltwater encroachments given the impacts of climate change with rising sea levels coupled with the coast being predominantly lowlands, increased drought, and changes in precipitation, be it less frequent with high intensity or the reverse. As was experienced in 2019, when there was a meteorological and hydrological drought that resulted in an agricultural drought, losses to farmers were so substantial that a State of emergency was declared.

This study can assist farmers in educating them as to the state of their water and soil resources, determining which crop to cultivate, and reduce negative financial losses.

The direct beneficiaries of this component are approximately 7,944 farmers per district, rural water system operators, 27 coastal communities: 117,823 persons: 57,787 men; 60,035 women (Table 2 Table 2), Belize Water Services Ltd, Purified Water bottlers. The mariculture sector will also benefit, considering that since gillnets are being banned, mariculture is another alternative source fisherfolk will need to rely on. Approximately 50 persons will be trained under this component. Proper consideration will be provided to pursue a gender balance among staff/consultants/stakeholder beneficiaries.

**Detail of Activities:**

**1. Evaluate existing data on groundwater in the country.**

Groundwater flow is driven by differences in hydraulic head across the aquifer. A review of existing groundwater level data will be used, in conjunction with hydrogeological principles, to provide an initial assessment of the groundwater flow regimes within the study area.

**2. Determine the salinity of soils.**

<sup>1</sup> This activity is linked to component 4 'Awareness Raising, Knowledge Dissemination and National Capacity Strengthening'.

Shallow soil salinity is determined by measuring the electrical conductivity (EC) of the upper soil horizons by preparing a soil-water mixture and assessing it using an EC probe. Large surficial areas can be assessed more broadly by the completion of terrain conductivity surveys using depth-integrated measurements of electromagnetic readings that can extend several meters to 10s of meters into the subsurface for deeper reconnaissance. The higher the salinity of the soil and associated porewater, the higher the ability of the soil to conduct an electrical current. Soil salinity negatively impacts crop yields; therefore, with limited knowledge in this subject area, it is challenging for farmers to ascertain whether soil salinity is the culprit responsible for the reduction of their crop yields. The goal of this task is to assess and map soil salinity and link this to current and future crop productivity vulnerability and risk.

**3. Conduct water quality analyses to determine the effect of water quality on coastal influences and agricultural activity.**

Measuring the EC, chloride (Cl<sup>-</sup>), and sodium (Na<sup>+</sup>) concentrations in shallow groundwater along coastal areas provides data on the extent of seawater intrusion (including the highest risk areas) and provides the basis for future projections regarding groundwater quality under various sea-level rise and groundwater use scenarios. This is also amenable to geophysical surveys (see the following section). Concerning agricultural influences, common sources of influence include nutrients related to fertilizers, sewage effluents, and animal and food processing wastes. Implementation of this task will include the following activities:

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~~Measuring the EC, chloride (Cl<sup>-</sup>), and sodium (Na<sup>+</sup>) concentrations in shallow groundwater along coastal areas provides data on the extent of seawater intrusion (including the highest risk areas) and provides the basis for future projections regarding groundwater quality under various sea-level rise and groundwater use scenarios. This is also amenable to geophysical surveys (see the following section). Concerning agricultural influences, common sources of influence include nutrients related to fertilizers, sewage effluents, and animal and food processing wastes. Implementation of this task will include the following activities:~~

- Select areas to target for field investigation
- Plan and execute a field program to assess and verify soil salinity conditions
  - Outline logistical considerations and program risks (health, safety, financial, schedule, etc.)
  - Identify water wells and potentially affected surface water features to sample
  - Execute sampling and comprehensive analytical program (field: pH, EC; laboratory: soluble ions)
  - Develop suitable QA/QC protocol to ensure data confidence (duplicates, blanks, spikes, etc.)
  - Complete the data evaluation process
- Correlate soil salinity results to crop productivity by review of historical records, visual inspections, and/or interviews with local farmer operators
- Update GIS products to reflect newly acquired information
- Saline intrusion risk mapping considering current and future conditions (under various extreme weather and climate change scenarios)

**4. Use of Geophysical Surveys.**

Completion of geophysical surveys will provide the spatial data density necessary to resolve the extent of saline water intrusion along with the coastal areas. This will be accomplished by electromagnetic (EM) mapping or processing of multispectral satellite imagery. Implementation of this task will include the following activities:

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~~Completion of geophysical surveys will provide the spatial data density necessary to resolve the extent of saline water intrusion along with the coastal areas. This will be accomplished by electromagnetic (EM) mapping or processing of multispectral satellite imagery. Implementation of this task will include the following activities:~~

- Collate information on locations of various farming operations (crops and livestock)
- Review land application of fertilizers and agricultural wastes

- Using the results from activities #1 and #2, develop a field program to assess the chemical quality of groundwater in high-risk areas
  - Outline logistical considerations and program risks (health, safety, financial, schedule, etc.)
  - Identify water wells and potentially affected surface water features to sample
  - Execute sampling and comprehensive analytical program (field: pH, EC, temperature, and possibly redox; laboratory: major ions, nutrients (C, N, P), metals and trace elements (e.g. As, Se))
  - Complete data evaluation process to assess groundwater quality conditions
- Use the information gathered from the field program to assess the risk to groundwater
- Groundwater risk mapping considering current and future conditions (under various extreme weather and climate change scenarios)

#### **5. Capacity Building of / Technology Transfer to stakeholders.**

To facilitate the transfer of knowledge and skills to in-country stakeholders a workshop/field visit will be executed to train personnel in the use of equipment, overall methodology, and results from evaluation to facilitate future assessments.

### **2.2 Develop and implement a National Beach Erosion Monitoring Program**

#### **Rationale**

Next to the reef and lush tropical forests, the beaches and shoreline of Belize are some of the most iconic features that characterize Belize. They embellish the notion of life in the tropics and serve as an attraction for tourists around the world. As a result of its multiple uses and prestige, beach and shoreline properties along the coast have become highly coveted.

When erosion affects beaches, they degrade at varying pace and the beach even may even disappear in several places. Erosion takes place at cliff slopes and beaches and also below the water. Water depths increase in front of existing coastal protection structures, which may lead to (extensive) damage during extreme storms.

In Belize, beach erosion is significant on and the mainland as well as (smaller offshore) cayes are affected. The national beach erosion program is urgent and crucial. Localized efforts, as are currently conducted will fail to have the required impact. The implementation of a national coastal Monitoring Program for Beach Erosion will be led by the Coastal Zone Management Authority and Institute (CZMAI) to monitor and shoreline change and develop a baseline for coastal erosion in key areas in Belize. Available techniques will be analyzed to determine suitability, and a participatory process is envisioned with partnerships with among others, including the Ministry of Natural Resources, Caribbean Community Climate Change Centre, NGO's (e.g. SEA, SACD, TIDE, TASA), University of Belize – Environmental Research Institute and municipalities/communities. Non-Government Organization's-NGOs (e.g., Southern Environmental Association (SEA), Sarteneja Alliance for Conservation and Development (SACD), Toledo Institute and Development for Environment (TIDE), Turneffe Atoll Sustainability Association (TASA)), University of Belize (Science and Technology Department), University of Belize - Environmental Research Institute, municipalities/communities, and private sector (tourism sites etc.).

The above local NGOs are already a part of established monitoring networks such as the National Coral Reef Monitoring Network (NCRMN) which is done on a voluntary basis to discuss monitoring data, trends etc. Each organization attracts and sustain funding for its own coral reef monitoring program, albeit there are some jointly funded national and regional programs. However, it is envisioned that the beach erosion monitoring program will be established based on key target sites to be identified during the assessment stage and as a result of these sites, the local NGOs in these areas would be identified and would become a part of the community network for on the ground monitoring. It is expected that beach erosion monitoring would become a part of the site's monitoring program and the NGO's, once capacity and equipment are



provided would be able to use this to leverage funding support for the continued implementation of the beach erosion monitoring at the sites.

Additionally, it is envisioned that the monitoring program would utilize cost effective methods such as beach profile monitoring apps that would not require a significant investment in equipment and training (See Figure 14). This approach also provides the opportunity for additional sites to be monitored on a voluntary basis by other beach users such as property owners and community members.

CZMAI would be responsible for coordination of the monitoring program with members of the network to analyze and report on trends as well as host the database with baseline information.

In terms of sustainability, CZMAI would take the lead in developing new projects, initiatives and partnerships to sustain and expand the national beach monitoring program established through this project.

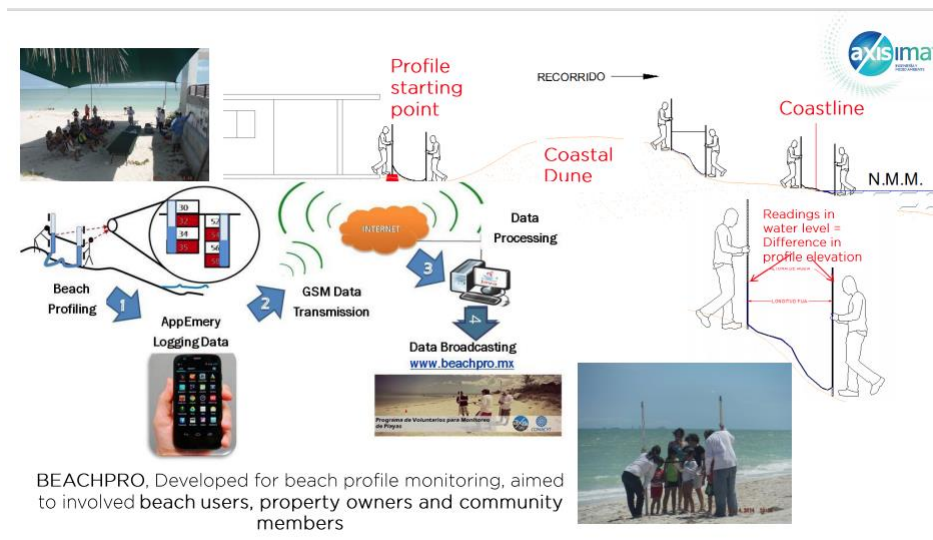
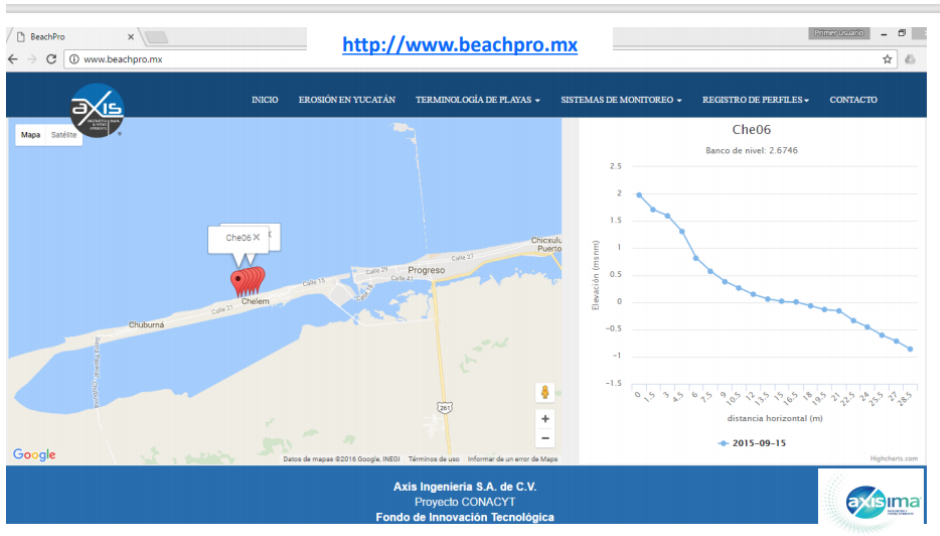


Figure 14-5: BeachPro Methodology

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Figure 1546: Sample of BeachPro Activity in Mexico

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**Project Activity**

This activity has the following outcome which is aligned with the Adaptation Fund Results Framework (Part III – Section E): Strengthened institutional capacity to reduce beach erosion risks.

The Lead Agency for this subcomponent is the CZMAI.

Table 11: Develop and implement a National Beach Erosion Monitoring Program

Table 11: Develop and implement a National Beach Erosion Monitoring Program

Components	Milestones / Targets	Indicative activities
Coastal Research and Monitoring	Assessment of methodology/techniques for monitoring beach erosion to determine best option for Belize	Conduct analysis on techniques available to quantify beach erosion to determine the most cost-effective option.  Conduct research on Techniques available to assess erosion to determine the best options analyzed
	A mechanism to ensure sustainability and funding for the community network	
	Database for the data collection and storage established	Identification of necessary equipment, hardware and software for data collection and database development  Hardware and software for database procured  Establish a database

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Strong local presence through community partnerships	A community network for on the ground monitoring established	Develop ToR and member profiles Select and recruit members
	<del>A mechanism to ensure sustainability and funding for the community network</del>	<del>Develop ToR to hire research consultant</del> <del>Advertise, select and hire</del> <del>Guide consultant</del>
Develop and implement training schedule and training programs	Training to the community network on protocols for monitoring and reporting provided	Develop a training program <u>to</u> <del>T</del> train community network <u>on data collection</u> Evaluate
	The capacity of the CZMAI to coordinate, maintain, conduct analysis, and do outreach for the monitoring program built <sup>2</sup>	<u>Development of a training program to train CZMAI staff on analysis and reporting</u> <del>Develop a training program</del> <del>Train CZMAI staff</del> Evaluate
	A designated Coastal monitoring officer recruited to assist with project implementation	Develop ToR, Advertise, Select and hire <u>Implementation of project activities</u>

#### Detail of Activities

**Coastal Research and Monitoring.** Conducting coastal research at the national level requires an integrated approach, which combines diverse efforts. Benefits of research and monitoring can be summarized as follows: Improving forecasting of future uses of the coastal zone by knowing the effects of events, processes, and activities; Maintaining ecosystem functions by understanding the relationships between and among its components; Effectively planning by monitoring the changes in use and interactions by coastal communities; and Providing sound data to incorporate into modeling programs, thus improving management. As a part of the implementation strategy for the Belize Integrated Coastal Zone Management Plan, ~~CZMAI will focus its efforts on establishing a beach erosion monitoring program that will include:~~

- ~~i. Analyzing techniques available to assess erosion to determine best options~~
- ~~Developing a database for data collection and storage-CZMAI will focus its efforts on establishing a beach erosion monitoring program that will include the hiring of a Consultant to:~~
  - ~~i. Analyze techniques/methodologies/applications available to monitor beach erosion to determine best cost-effective option for Belize~~
  - ~~ii. Identify necessary equipment, hardware and software for data collection and database development.~~
  - ~~iii. Develop a database for data collection and storage.~~
  - ~~iv. Conduct training for community network and CZMAI on data collection, analysis and reporting.~~
- ~~ii.~~

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**Strong local presence through community partnerships.** The ICZM Plan indicates the need for implementing strategies for promoting or improving community involvement in the management of the sites and promoting economic development strategies while ensuring environmental sustainability. This will result in diversified income generation options and reduce the number of people who rely on the coastal resource base to support their livelihoods. Deriving from best practices, such as improving the effectiveness of MPAs, CZMAI recognizes the importance of enlisting the support of local communities and stakeholders in research, education, and enforcement efforts, and offering incentives for them to do so. As such the analysis above under coastal research and monitoring will include the following: ~~the analysis above under coastal research and monitoring will include the following-~~ :

<sup>2</sup> This activity is linked to component 4 'Awareness Raising, Knowledge Dissemination and National Capacity Strengthening'.

- i. Establishing a community network for on the ground monitoring
- ii. Develop Terms of Reference and member profiles
- iii. Developing a mechanism to ensure sustainability and funding for the community network after the project has been completed. The development of a mechanism and identifying funding sources is key to ensuring the sustainability of this monitoring program. By identifying these sources CZMAI and partners will be able to work towards accessing funding for continued monitoring. It is also necessary to ensure that key personnel from the CZMAI are properly trained and have the necessary equipment to continue monitoring after the completion of the project.

**Develop and implement training schedules and training programs.** The ICZM Plan calls for enhancing the technical and management capacity of both management and co-management agencies to ensure sound management practices. This Plan strategizes providing training for monitoring officers and partner stakeholder groups to improve performance. In line with this intention the following interventions will be conducted ~~in an effort to establish the monitoring program: in an effort to establish the monitoring program:~~

- ~~i. Providing training to CZMAI and the CZMAI and the community network on protocols for monitoring and reporting~~
- ~~i-ii. Building capacity of the CZMAI to coordinate, maintain, conduct analysis, and do outreach for the monitoring program~~
  - ~~ii. Building capacity of the CZMAI to coordinate, maintain, conduct analysis, and do outreach for the monitoring program~~
- iii. Strengthening implementation capacity through the recruitment of a designated monitoring officer

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The direct beneficiaries of this component are the 27 coastal communities - 117,823 persons: 57,787 men; 60,035 women. Approximately 8 persons will be employed: 4 with tertiary education, 4 community members with secondary/primary education. Approximately 50 persons will be trained. Proper consideration will be provided to pursue a gender balance among staff/consultants/stakeholder beneficiaries.

### **2.3 Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge**

#### **Rationale**

The frequency of climate hazards is increasing. Their magnitude depends on the intensity of the natural hazard and the effectiveness of prevention/mitigation actions. Natural hazard events cannot be prevented from occurring, but their impacts on people and property can be reduced if accurate information can be provided to people on time. An early warning system is therefore critical to mitigating the loss of life and property from coastal flooding.

The purpose of this component is to take the first steps towards building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge (EWS)<sup>3</sup>. The EWS will integrate existing sea-state monitoring technology, numerical ocean forecasting models, historical database and experiences, and computer science. The envisioned system will possess the capability of offering data for the past, information for the present, and future. The system will be developed for the Belizean coast due to the threat posed by climate hazards.

Development of a full EWS requires four phases:

#### **Phase 1 – EWS development & Storm Surge modeling**

<sup>3</sup> An EWS is a preparedness measure that reduces the damages related to coastal flooding and storm surges. The development of a full EWS requires 4 phases. The AF proposal relates to implementation of Phase 1 – EWS development & Storm Surge modelling. This is a first step towards implementing Belize's vision for establishing a full EWS. Flooding (coastal, riverine, pluvial, etc. or any combination) is a function of Hydrological Services and the mandate of NHS. Storm surge EWS is a function of Meteorological Services and the mandate of NMS. NMS and NHS will collaborate to have a joint system where the data from the storm surge monitoring system and coastal flood warning system are incorporated.

This phase includes an initial set-up of the coastal EWS with Delft-FEWS. A Delft3D-FM storm surge model will be developed to run in operational mode. With the completion of phase 1, a Stand-Alone version of the EWS will be running operationally at NMS.

**Phase 2 – EWS extension: Wave modeling & WES**

The coastal EWS will be extended to include the effect of waves. There are various technical solutions available to introduce the effect of waves. Which solution is most appropriate depends (among others) on the position of the reef (barrier reef, fringing reef).

**Phase 3 – EWS extension: Coastal inundation & connection with web-based management system**

In this phase, the EWS can be extended from a stand-alone system to a client-server environment. A client-server system has several advantages regarding robustness, parallel execution of tasks, number of users, back-up and archiving facilities, etc. Whether or not the EWS will be migrated from Stand-Alone to client-server will be discussed at the start of phase 3.

**Phase 4 – EWS extension: Offline analysis & update of coastal models**

During this phase, a copy of the EWS will be configured to run offline scenarios to facilitate coastal risk analysis. If needed the existing coastal models will be extended to support water quality modeling, compound flooding, etc.

The establishment of Weather Stations/Sensors is important because real-time data is required to import into the system for assimilation purposes, and for their direct function of monitoring the coastal sea conditions.

**Project Activity**

Recognizing that the full EWS cannot be set up with available resources, this activity is limited to the following objectives which are aligned with the Adaptation Fund Results Framework (Part III – Section E): Strengthened the institutional capacity to reduce climate related risks such as coastal flooding<sup>4</sup> and storm surge.

The Lead Agency for this subcomponent is the National Meteorological Service (NMS).

*Table 12: Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge*  
**Table 12: Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge**

Components	Milestones / Targets	Indicative activities
<i>The implementation of Phase 1 – EWS development &amp; Storm Surge modeling</i>	User requirements of the EWS refined	Develop ToR and hire a consultancy firm  Meet to link with existing Early Warning procedures
	A Delft3D-FM storm surge model for Belize coastal area developed	Purchase physical server or workstation  Collect relevant geographic data sets for coastal model development  Collect data for model validation Storm surge model validation  Include regional/seasonal water level variations from ocean models (HYCOM)
	A Delft-FEWS based EWS set-up	Import of NWP (NOAA GFS, Local products Belize Meteorological Service) and integration of SURFACE/PLUVO

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<sup>4</sup> The mandate for flooding lies within the National Hydrological Service. Hence the institutional strengthening for the establishment of the system would extend to the NHS.

		<p>Import, validation, and visualization of real-time observations of wind, air pressure, water levels, wave parameters, etc.</p> <p>Run storm surge model in operational mode</p> <p>Discuss technical architecture (IT)</p>
	Early Warning Products Designed and Developed	<p>Develop threshold tables, maps, color-coded warnings, etc.</p> <p>Develop common Alerting Protocol (CAP) Meet with stakeholders</p>
	Staff trained	Train NMS staff in Delft-FEWS, coastal processes, and modeling
<i>The establishment of Weather Stations/Sensors along the coast</i>	Weather Stations/Sensors utilized for data collection	<p>Conduct stakeholder consultations to determine the number of weather stations and sensors required</p> <p>Select a site to establish weather stations</p> <p>Purchase one field vehicle</p> <p>Purchase and installation of weather monitoring stations and water level sensors</p> <p>Utilize of assets to strengthen weather data collection</p>

**Detail of Activities**

Training of NMS staff is considered an essential activity to be able to use the new technologies. Not only for the forecasters to be able to use the system, but also for experts to be able to make informed decisions about further extensions to the system in phase 2.

The technical specifications of these two project components are included in the Feasibility Study (Annex 2 – Part II, Section Research and Technologies)

The above activities will lead to an efficiently coordinated response that will protect human life and therefore ensure their wellbeing. These activities will enhance national capacities to provide early warning to residents in communities vulnerable to storm surge, coastal flooding, and wave action. The direct beneficiaries of this project component include the 27 coastal communities - 117,823 persons: 57,787 men; 60,035 women. Early warning to these vulnerable communities will help to prevent loss of lives and damage to property where possible. Residents will be able to evacuate hazardous areas promptly and be able to secure and protect some of their properties. Approximately 50 persons will be trained.

The above activities will lead to an efficiently coordinated response that will protect human life and therefore ensure their wellbeing. These activities will enhance national capacities to provide early warning to residents in communities vulnerable to storm surge, coastal flooding, and wave action. The beneficiaries of this project include all coastal communities of the country. Early warning to these vulnerable communities will help to prevent loss of lives and damage to property where possible. Residents will be able to evacuate hazardous areas promptly and be able to secure and protect some of their properties.

Phase 1 of The Belize Coastal Early Warning System will monitor and send alerts to communities along the coast of Belize which are vulnerable to storm surges. The system will monitor in real-time the conditions of coastal Belize with the use of automatic weather station equipment with either radar or pressure transducer water level sensors and will alert the targeted coastal communities to the potential hazards from Storm surges.

A physical workstation type PC or server will be purchased to run DELT FEWS and 3D model software. This activity will also be coordinated with the ERCAP project since DELT FEWS will be installed and run for the Macal River modeling portion of the ERCAP project. Under ERCAP a lower specified PC will be running FEWS however to add the 3D model capabilities a more powerful machine will be needed. The system will incorporate DELT FEWS, DELFT3D FM software applications along with leveraging the existing National Meteorological Service Climate data management System (SURFACE/PLUVO) which can import static geographic information files as well as a variety of Atmospheric and Oceanic model data to provide the necessary products and alerts to the targeted communities along the coast of Belize.

The ERCAP is providing 23 full weather stations 12 of which will be located along the coast of Belize as well as offshore. NMS will conduct consultations to determine the number of stations that would be needed and the number of sensors needed to upgrade stations that should be received via the ERCAP project.

The beneficiaries of this component are 27 coastal communities - 117,823 persons: 57,787 men; 60,035 women. A team of approximately 4 consultants with tertiary education is needed. Approximately 8 persons will be trained.

### Component 3: Beach Stabilization of High-Risk Coastal Areas

Component Three, Beach Stabilization of High-Risk Coastal Areas, will seek to recover beach loss due to erosion and reach shore stabilization in two communities of southern Belize. This component will directly benefit the members of the two selected coastal communities - Dangriga and Hopkins - via securing local infrastructure, increasing tourism, and recreation activities tied to beach use and intrinsic national value. Dangriga and Hopkins, the two target communities under this project component, fall under the highest category of the coastal hazard index. For each specific context, this choice must be based on solid research and analysis, including a thorough assessment of the alternatives. A pilot activity is planned to occur in January 2021 to identify engineering alternatives for erosion control and shore protection and establishing the technical and design parameters of the proposed solutions (phase 1). This is being financed under Belize's Fourth National Communication & First Biennial Update Report (FNC/BUR) Project. Under this AF project, co-financing is sought for Phase 2 – Implementation of proposed engineering solutions for beach recovery and stabilization in Dangriga and Hopkins and monitoring and evaluation and documentation of lessons learnt. It was expected that at the time of submission of this proposal Phase 1 would have been completed to better inform the proposed development but was delayed due to the COVID-19 pandemic, which prevented the consultants from traveling to Belize. At the national scale, lessons learned will be documented and reported for scaling up to other communities with similar coastal attributes. The second part of this component – which extends its benefits to all coastal communities and not just Dangriga and Hopkins – is the monitoring and evaluation of the activities and the documentation of lessons learned to scale up in the future. This is a critical component to increase the adaptive capacity of coastal communities that have suffered extensive erosion.

Communities were chosen based on discussions between technical staff from CCCCC and NCCO, where the criteria for communities were those with a high dependence on natural resources, high rate of erosion occurring, presence of vulnerable groups, growing population and sensitive ecosystems. While several other communities may fit this description their dependence on tourism and fisheries are not as significant as in these two communities.

Communications with members of the communities were started in early 2019, with a site and scoping visit taking place in March 2019. Two members of Cuba's Ministry of Science, Technology and Environment visited Belize and took part in field visits to Dangriga and Hopkins on March 13 and 14 respectively, along with staff from CCCCC, NCCO and CZMAI, to identify the various natural and human factors affecting coastal erosion in the communities. Based on their visit, observations, and speaking to community members, Dr. Jose Luis Juanes and Miguel Izquierdo, presented their preliminary assessment of the coastal erosion processes occurring in Dangriga and Hopkins. After which a proposal was submitted by Inversiones GAMMA S.A. to design a project for shoreline recovery and shore stabilization in Dangriga and Hopkins. After discussions, the proposal was accepted and the process to bring the experts into Belize

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began. It was planned for the consultants to be in country in March 2020, however, due to the pandemic that was not possible, which resulted in travel restrictions and so the assessment was postponed without a clear date as to when the consultants will be able to travel. Both countries' airports have recently re-opened, however, flights that can accommodate the consultants along with their required equipment to carry out the assessments are not available as yet. Therefore, while the assessment cannot be done in country yet, a review of available data has commenced in February 2021.

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A recent consultation with members of the Hopkins community on 15 February 2021 provided much insight into the needs of the community and proved their willingness to work along with the executing entities on this proposed project. Their biggest concern in the community is the unsustainable development that occurs in their village which often leads to unwanted impacts such as erosion. This was also a sentiment encountered in Dangriga when a consultation was held in that community.

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Risks to vulnerable groups will be avoided by ensuring that the village council and town council in both communities are actively engaged throughout the process, ensuring adequate stakeholder consultations with indigenous groups such as the National Garifuna Council and Maya Leaders Alliance, youth groups, as well as women's groups.

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~~Component Three, Beach Stabilization of High-Risk Coastal Areas, will seek to recover beach loss due to erosion and reach shore stabilization in two communities of southern Belize. This component will directly benefit the members of the two selected coastal communities – Dangriga and Hopkins – via securing local infrastructure, increasing tourism, and recreation activities tied to beach use and intrinsic national value. Dangriga and Hopkins, the two target communities under this project component, fall under the highest category of the coastal hazard index. For each specific context, this choice must be based on solid research and analysis, including a thorough assessment of the alternatives. A pilot activity is planned to occur in January 2021 to identify engineering alternatives for erosion control and shore protection and establishing the technical and design parameters of the proposed solutions (phase 1). This is being financed under Belize's Fourth National Communication (FNC) Project. Under this AF project, co-financing is sought for Phase 2 – Implementation of proposed engineering solutions for beach recovery and stabilization in Dangriga and Hopkins and monitoring and evaluation and documentation of lessons learnt. It was expected that at the time of submission of this proposal Phase 1 would have been completed to better inform the proposed development but was delayed due to the COVID-19 pandemic, which prevented the consultants from traveling to Belize. At the national scale, lessons learned will be documented and reported for scaling up to other communities with similar coastal attributes. The second part of this component – which extends its benefits to all coastal communities and not just Dangriga and Hopkins – is the monitoring and evaluation of the activities and documentation of lessons learned to scale up in the future. This is a critical component to increase the adaptive capacity of coastal communities that have suffered extensive erosion.~~

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#### **Rationale**

Beach stabilization consists of measures that can be utilized to protect public, private, and commercial investments, such as major roadways and beachfront hotels, from cycles of erosion and accretion. However, these measures are expensive and, in some cases, less effective in the long term. Moreover, because they can interfere with the natural longshore transport of sediment, the protection of one beach segment often results in the "starvation" and eventual loss of other beaches downstream. It is therefore imperative to choose the correct beach stabilization risk reduction measure. For each specific context, this choice must be based on solid research and analysis, including a thorough assessment of the alternatives, which will be done under phase 1.

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Dangriga and Hopkins, the two target communities under this project component, fall under the highest category of the coastal hazard index (Blue Carbon Working Group, 2020). Coastal erosion is very evident in Dangriga and Hopkins coastal areas. Beach scarp, dead trees, exposed roots, waves reaching building foundations, and inefficient coastal protection structures, validate the widespread character of coastal erosion in this area. According to local accounts, the shoreline has retreated around 20-25 feet in the last 5 years. The anthropogenic causes are river mining and the incorrect location of buildings in the coastal area and the construction of inefficient shore protection structures (GAMMA S.A., 2019; IHCantabria & IDB, 2020). Further studies are necessary to determine the natural causes of erosion in both areas, which will be determined by the assessments to be conducted by GAMMA S.A. In Table 33 Budget, it can be seen

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that \$655,000 has been allocated for Development and Implementation of engineering solutions, this figure came about after discussions with the team from GAMMA.

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This beach stabilization project component is crucial to these communities. Beach stabilization in Dangriga and Hopkins is envisioned to be achieved through two phases:

Phase 1 – Research on the coastal system functioning and design of recovery and stabilization project and planning actions. ~~Research on the coastal system functioning and design of recovery and stabilization project and planning actions.~~

This phase includes comprehensive research regarding the sea and land, and in the lab. Detail about this research is included in Annex 2 Feasibility Study, Part 2, Section Research, and Technologies.

Phase 2 – Implementation of proposed engineering solutions for beach recovery and stabilization in Dangriga and Hopkins and monitoring and evaluation.

~~Phase 2 – Implementation of proposed engineering solutions for beach recovery and stabilization in Dangriga and Hopkins and monitoring and evaluation.~~

During this phase, the selected engineering solutions will be executed using the technical and design parameters developed in phase 1.

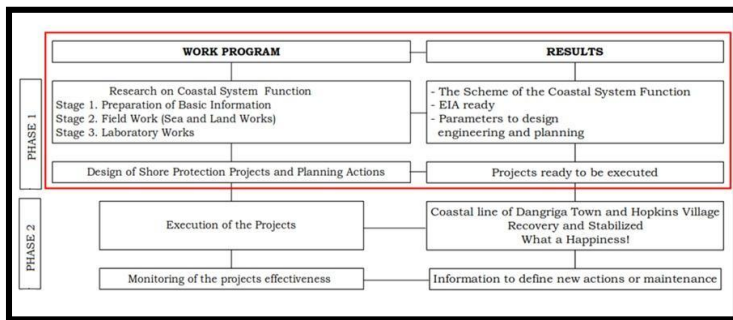
**Project Components**

Under this Component, financing is sought for Phase 2 – Implementation of proposed engineering solutions for beach recovery and stabilization in Dangriga and Hopkins and monitoring and evaluation. ~~Implementation of proposed engineering solutions for beach recovery and stabilization in Dangriga and Hopkins and monitoring and evaluation.~~

Phase 1 is currently in the planning stage, to be executed in January 2021, when the consultants arrive in Belize. The Cuban Engineering Firm GAMMA.S.A. has been hired to complete Phase 1 – Research on the coastal system functioning and design of recovery and stabilization project and planning actions. ~~Research on the coastal system functioning and design of recovery and stabilization project and planning actions.~~

The methodology consists of research on sea works, research on land works, laboratory work, and desk research. More about the specific technologies and research has been included in the Feasibility Study (Part II Research and Technologies). Figure 12 provides an overview of the envisioned methodology and expected results. The figure depicts the 2 phases, of which phase 1 will be carried out under the FNC. Phase 2 includes the execution of the project and monitoring of the project's effectiveness, which will depend on the results of their assessments.

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*Figure 16+7: Scheme of the work program and expected results*

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*Figure 12 Scheme of the work program and expected results*

Based on the research under phase 1 and its resulting recommendations, and using the technical and design parameters, NCCO will implement the selected engineering solutions for erosion control and shore protection, recovery and stabilization, ~~recovery and stabilization~~ (phase 2) under component III of this Adaptation Fund project.

GAMMA's assessment (Phase 1) is being co-financed under the Fourth National Report Communication (FNC) and First Biennial Update Report (FBUR) to UNFCCC project. It was expected that at the time of submission of this proposal Phase 1 would have been completed. However, due to the COVID-19 pandemic, the experts from GAMMA (located in Cuba) have not been able to travel to Belize, ~~as both countries' airports were closed~~. The Team has commenced initial assessments under Phase One (Stage 1) with further technical assessments slated for commencement in April 2021. The time planning for the Phase 1 Deliverables has been scheduled as shown below:

*Table 13 Proposed Time planning Phase 1 deliverables*

Table 13: Proposed Time Planning Phase 1 Deliverables

No.	Phase 1	Proposed Completion date	Entities involved
1	Preparation of basic information	17/23/21	GAMMA
2	Sea and Land research	27/43/21	GAMMA, NCCO, CZMAI, Dangriga Town council, Hopkins village council
3	Laboratory research	30/63/21	GAMMA
4	Desk research	5/64/21	GAMMA

As such, it iswe envisioned to commence with the implementation of Phase 2, financed under the Adaptation Fund proposal by the start date of this project. To ensure the sustainability of possible beach stabilization infrastructure that may be recommended and built to prevent erosion, research on possible sources of funding will also be done by GAMMA S.A. and a concept note for the maintenance of the possible structure will be developed. This will allow the NCCO to seek additional sources of funding to ensure sustainability of the activity.

This Adaptation Fund component, i.e. Implementation of proposed engineering solutions for beach recovery and stabilization in Dangriga and Hopkins and monitoring and evaluation, ~~Implementation of proposed engineering solutions for beach recovery and stabilization in Dangriga and Hopkins and monitoring and evaluation~~, has the following objectives which are aligned with the Adaptation Fund Results Framework (Part III – Section E).

The Lead Agency for this subcomponent is the NCCO.

*Table 14 Increased adaptive capacity within Hopkins and Dangriga communities through infrastructure assets*

Table 14: Increased adaptive capacity within Hopkins and Dangriga communities through infrastructure assets

Components	Milestones / Targets	Indicative activities
<u>Implementation of beach recovery and stabilization through a pilot project in the high-risk coastal communities Dangriga</u>	Engineering solutions in Dangriga successfully established	Develop ToR, Advertise, Select and hire firm to establish engineering solutions

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<i>and Hopkins to recover areas lost to erosion</i>		Secure land rights and obtain necessary permits Implement engineering solution Consult with stakeholders, with proper consideration to FPIC. Monitoring of effectiveness
	Engineering solutions in Hopkins successfully established	Develop ToR, Advertise, Select and hire firm to establish engineering solutions Secure land rights and obtain necessary permits Implement engineering solution Consult with stakeholders, with proper consideration to FPIC. Monitoring of effectiveness
<i>Monitoring and evaluation of activities' effectiveness and documentation of lessons learnt</i>	Report on lessons learned and a plan to scale up developed	Develop ToR, Advertise, Select and hire a consultant Develop a user-friendly report on lessons learned and a plan to scale up development Consult with stakeholders

Detail of Activities:

- Implementing beach recovery and stabilization through a pilot project in the high-risk coastal communities Dangriga and Hopkins to recover areas lost to erosion. It will be established, through a pilot in Dangriga and Hopkins, the best option to stabilize the beaches of the two selected communities Dangriga and Hopkins and carry out the necessary activities in a sustainable manner with minimum impacts on the environment and society.
- At the national scale, monitoring and evaluation of activities will be done and lessons learned will be documented and reported for possible scaling up to other communities with similar coastal attributes. Follow-up interventions to this project will enable this pilot mechanism to be replicated in areas with similar attributes.

This component – depending on the recommendations of Phase I – may require an EIA, if the recommendation is to establish an infrastructure project with hard coastal protection measures (e.g., Canalization or flood relief works). If the recommendations for the responses under Component III are nature-based or sand nourishment, it is recommended to conduct a limited level study.

This project component will improve the quality of life of local community members and protect their lives and assets. It will also create local employment and increased commerce during (e.g. construction workers) and after the project (e.g. tourists, investors). The direct beneficiaries of the subcomponent 3.1 are local entrepreneurs, 9,591 residents (4,615 men, 4,976 women) in Dangriga, and 1,610 residents (777 men, 833 women) in Hopkins. The direct beneficiaries of the subcomponent 3.2 are the other 25 coastal communities – 106,622 persons: 52,395 men; 54,226 women, through the documentation of lessons learned. Approximately 13 persons will be employed: 3 consultants (3 national/3 international) with tertiary education, 7 community workers with secondary/primary education.

[When looking at possible alternatives a Multicriteria analysis will be carried out of possible measures that can be implemented. Criterion for the analysis may include those such as in the table below.](#)

Criteria for coastal intervention alternatives MCA	
Criterion	Description
<b>1 Protection against erosion</b>	
1.1 Normal conditions	Protection against erosion in normal conditions
1.2 Cold fronts	Protection against erosion due to cold fronts - frequent event.
1.3 Hurricanes	Protection against erosion due to hurricanes - extreme event.
<b>2 Maintenance</b>	
2.1 Nourishment	Frequency of required periodic nourishments
2.2 Structural	Robustness of the structures, number of predictable weak spots
2.3 Nuisance	Impact on recreation during maintenance
2.4 Complexity	Required submerged works and need for heavy equipment
<b>3 Spatial quality</b>	
3.1 Visual	Ocean view and visibility of structures
3.2 Beach	Dimension, capacity and attractiveness of the beach
<b>4 Recreational quality</b>	
4.1 Swimming	Safety, comfort and dimensions of the swimming zone
4.2 Miscellaneous	Added value through extra recreation possibilities
<b>5 Construction</b>	
5.1 Execution	Complexity and local experience with construction method and design
5.2 Material availability	Local availability of required materials
<b>6 Environment</b>	
6.1 Longshore transport	Facilitation of uninterrupted longshore transport
6.2 Fabrication and transport	Ecological impact associated with logistics and prefabrication
6.3 Biodiversity	Impact on biodiversity and possibility to create new livelihoods
<b>7 Risks</b>	
7.1 Complexity	Risk due to design or fabrication complexity

Figure 17: Criteria for Coastal Intervention Alternatives

Figure 16: Criteria for coastal intervention

alternatives

Given that the full assessment of the erosion processes occurring in Dangriqa and Hopkins has not been carried out, it is not known at this time what recommendations will be made by the GAMMA team, however, it is deduced that a beach nourishment only scenario will not fulfill the needs and multidimensional requirements needed for the replenishment and sustainability of the beaches. Nourishment and an additional soft or hard engineering measure will be required, as sedimentation of the beach on its own will not alleviate the problem. A comparison some possible measures is described below.

**Nourishment:** nourishment is already planned to take place, however, with assessments not in place as yet, the volume of sand and where the sand can be obtained from with minimal risks is not known as yet. It is expected that sand will be easily available, however, if this is not the case other alternatives will be explored.

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Groyne: this alternative will interrupt water flow and limits the movement of sediment. The offshore length of the groyne would need to be determined, as well as the choice of element type that will be used for its construction. Natural elements, such as wavelength and crest width would also need to be determined.

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Submerged breakwater: this alternative dissipates wave energy and reduces sediment transport by inducing depth-induced breaking further offshore, to prevent waves from picking up sediment nearshore. For this alternative crest elevation and width, waves and other natural elements are also highly important.

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Artificial reef: this acts in the same way as the breakwater, by dissipating wave energy before sediment can be removed. The dissipation of wave energy in the reef is caused by both depth-induced breaking (which is the case for the offshore breakwater), but also by friction.

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Harder alternatives such as bulkheads and sea walls are not expected to be implemented, as they will incur too many negative consequences.

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#### **Component 4: Awareness Raising, Knowledge Dissemination and National Capacity Strengthening**

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Under Component 4, Awareness Raising, Knowledge Dissemination, and National Capacity Strengthening; information on climate change impacts to the coastal zone and appropriate mechanisms for climate change adaptation will be made easily accessible to the public. The goal is to encourage and enhance pro-environmental behaviors, i.e. ecologically responsible behaviors, to minimize the negative impact or have a positive impact on the environment (or a combination thereof). This will lead to increased adaptive capacity and knowledge, thus strengthening the institutional and local capacities to address the risks associated with climate-induced impacts on the coastal zone of Belize.

A National Climate Change Communication Strategy and Action Plan (NCCCSAP) is currently being developed (Step 1) by the NCCO and will be implemented under this project. The Strategy and Action Plan will aim at facilitating effective communication on climate change information at all levels to enhance the management of climate change impacts and explore measures for adaptation and mitigation and related opportunities. Under this project, Belize seeks financing for Phase 2 – Implementation of the NCCCSAP. The indirect beneficiaries of this component are nation-wide. The remaining 2 subcomponents under component 4 aim at equipping persons with the necessary knowledge and skills to make changes that will aid them to increase their resilience to climate change, to acquire techniques and behaviors that help them, and their organizations succeed in a more sustainable manner. The justification for capacity strengthening is reiterated in various policy documents. The availability of training documentation will benefit a wider range than just the trainees. Additionally, enhanced staff and community capacities to monitor, improve livelihoods, etc, will benefit the nation.

In the eventuality that the development of the National Climate Change Communication Strategy and Action Plan is delayed, which is not foreseen, existing structures and mechanisms can be used to disseminate knowledge and lessons learnt. Firstly, the NCCO and CZMAI have strong working relationships with stakeholders from the private and government sectors. Information can also be shared on websites, CZMAI and PACT have websites and the NCCO is currently working on one. Several committees are also already in place, which will aid in sharing knowledge and lessons learnt, these include the Coastal Advisory Committees, Community Warden Program and the Belize National Climate Change Committee.

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Although individual components will gather their own experiences and work with different groups of people, the overall responsibility for ensuring that experiences are well tracked, and an analysis of lessons learnt is periodically done will fall on the project management unit. The PMU is responsible for overseeing all project activities; thus they will be the best informed to keep track of all information regarding positive and negative experiences and ensuring it is documented.

~~A National Climate Change Communication Strategy and Action Plan (NCCCSAP) is currently being developed (Step 1) by the NCCO and will be implemented under this project. The Strategy and Action Plan will aim at facilitating effective communication on climate change information at all levels to enhance the management of climate change impacts and explore measures for adaptation and mitigation and related opportunities. Under this project, Belize seeks financing for Phase 2 – Implementation of the NCCCSAP. The indirect beneficiaries of this component are nation-wide. The remaining 2 subcomponents under component 4 aim at equipping persons with the necessary knowledge and skills to make changes that will aid them to increase their resilience to climate change, to acquire techniques and behaviors that help them, and their organizations succeed in a more sustainable manner. The justification for capacity strengthening is reiterated in various policy documents. The availability of training documentation will benefit a wider range than just the trainees. Additionally, enhanced staff and community capacities to monitor, improve livelihoods, etc. will benefit the nation.~~

#### **4.1 Implementation of a National Climate Change Communication Strategy and Action Plan**

##### **Rationale**

Since the consequences of a changing climate are both present and future, the solutions will not be found solely in the areas of technological innovation and improved legislation and policies. For long-term impacts, strategies also need to aim for cultural and behavioral shifts through pro-environmental behavior. Pro-environmental behaviors, i.e. ecologically responsible behaviors, will either minimize the negative impact or have a positive impact on the environment, or a combination thereof.

The purpose of this subcomponent is to promote ecologically responsible behaviors through climate change communication. This is in line with policy intentions:

- Planned adaptation is the result of a deliberate policy decision, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve the desired state.
- Develop and implement a Climate Change communications strategy and ensure it is updated every three years.
- To be effective, there must be an aggressive, innovative, and sustained Climate Change education and public awareness program that targets all sectors of Belizean society.
- Coordination of efforts in climate change communication is desired to ensure that there is a coherent national approach and avoid the duplication of efforts.

The NCCO will therefore implement an awareness program to draw attention to the impacts of Climate Change on the sectors and measures to adapt and mitigate those anticipated impacts through pro-environmental behaviors.

The recently concluded MCCAP project (Part II – Section F), aimed at raising awareness on ecosystem-based marine conservation and climate adaptation measures, is in line with this component. MCCAP also promoted measures to increase the livelihoods through an ecosystem approach with benefits to the fisheries sector. Under this project, a comprehensive Knowledge, Attitudes, and Practices (KAP) study was conducted that included a survey of households and fishers in twelve coastal fishing communities. The MCCAP study recommends the engagement of relevant local community members in the dissemination of information and public education programs within their communities (e.g. veteran fishers regarding fisheries communication). It also recommends more direct communication efforts at the Primary Education level to encourage pro-environmental behaviors at an early age.

Encouragement of pro-environmental behaviors under this component requires two phases:

##### **Phase 1 – Develop a National Climate Change Communication Strategy and Action Plan (NCCCSAP)**

The NCCO is developing a National Climate Change Communication Strategy and Action Plan (NCCCSAP) that links to the implementation of the updated National Climate Change Policy and Strategy while aiming to effectively communicate climate change adaptation and mitigation issues to the national audience. This is being financed under the UNDP implemented - Enabling Gender-Responsive Disaster Recovery, Climate and Environmental Resilience in the Caribbean (EnGenDER) Project. This is being financed under the UNDP - EnGenDER Project. The development process of the NCCCSAP will facilitate effective communication on climate change information at all levels to enhance the management of climate change impacts and explore measures for adaptation and mitigation and related opportunities. Using, amongst others, to the National Climate Change Policy, Strategy and Action Plan, Belize's Nationally Determined Contributions, Horizon 2030 and Growth, and Sustainable Development Strategy, MCCAP KAP Study and this project document will as inputs in the thorough study to identify the NCCCSAP design. The following steps are envisioned:

- Conduct KAP and Situational Assessment and Analysis
- Conduct Communication Needs Assessment
- Prepare NCCCSAP

◆ The NCCCSAP will provide proper consideration to communication and awareness on all project components of this AF proposal, the risks of building in the buffer area, and alternative livelihood opportunities (e.g. sargassum use/harvesting/farming). As such, the strategic framework for the KM, Advocacy & Communication Strategy (KMAS) for this project - based on aims, objectives, and best practices regarding knowledge management (KM), advocacy, and communications - will be integrated into the NCCCSAP. Considering this project (Annex 4 Env. & Social Mgt. Plan), the NCCCSAP needs to integrate communication in the following areas: i. the risk of building in the buffer area. ii. Dangriga and Hopkins pilot, and the pros and cons thereof. iii Model social home pilot. iv. A thorough explanation about EWS and that, when implemented in isolation, the climate risk remains. v. Awareness actions regarding river mining (Dangriga and Hopkins) and alternative livelihood opportunities.

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## Phase 2 – Implementation of the NCCCSAP

The implementation will be based on the insights and input document developed in Phase 1. By implementing the NCCCSAP, the NCCO and partners (e.g. MIDH, NMS, NHS, CZMAI, PACT) will catalyze positive behavioral changes through information-sharing and by promoting various sustainable livelihood opportunities (e.g. sargassum [harvesting and farming](#)).

### Project Activity

Under this activity, financing is sought for Phase 2 – Implementation of the NCCCSAP.

Phase 1 is financed under the 'Enabling Gender-Responsive Disaster Recovery, Climate and Environmental Resilience in the Caribbean (EnGenDER) project' and is currently in the procurement phase. The NCCCSAP will be available by July 2021.

The Lead Agency for this subcomponent is the NCCO. However, as the NCCCSAP will address communication and awareness on all project components of this AF proposal and key productive sectors,

implementation will be a collaborative effort among the AF proposal entities: NCCO, MIDH, NMS, NHS, CZMAI, PACT.

*Table 15 Development of a National Climate Change Communication Strategy and Action Plan*  
**Table 15: Development of a National Climate Change Communication Strategy and Action Plan**

Components	Milestones / Targets	Indicative activities
<i>Implementation of the NCCCSAP</i>	Communication consultant hired	Hire communication consultant
	Written, audio, and visual productions materials for publication developed	Prepare written, audio, and visual productions materials for publication
	Communications activities as envisioned in the NCCCSAP successfully implemented and verified	Carry out communications activities as envisioned in the NCCCSAP  Conduct working sessions with AF proposal entities  Conduct monitoring, verification, and information sharing of communications activities

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**Detail of Activities**

Public awareness and outreach will be carried out to increase knowledge on mechanisms that can be implemented and actions that can be taken for climate change adaptation, especially along the coast. Based on recommendations from the communication strategy, actions and activities will be implemented to improve communication about climate change. Lessons learned from the project will also be documented and form part of knowledge products to be disseminated. The indirect beneficiaries of this component are nation-wide 419,199 persons: 209,603 men, 209,596 women (SIB, 2020 est.) through the encouragement of pro-environmental behaviors. The direct beneficiaries are the 27 coastal communities: 117,823 persons: 57,787 men; 60,035 women as the NCCCSAP interventions will be geared towards strengthening all project components. Approximately 3 national consultants with a tertiary education will be employed. Proper consideration will be provided to pursue a gender balance among staff/consultants/stakeholder beneficiaries (Gender Action Plan Annex 1 Gender and Social Assessment).

One of the technical interventions that the entities envision under this component raising awareness and strengthening capacities related to alternative livelihood opportunities namely sargassum harvesting. Sargassum seaweed (is a species of brown algae), which is commonly washed up along the coastal regions throughout Belize. Although Sargassum poses no threat to human life, it is usually not a welcome sight, or smell on beaches and is affecting tourism negatively. It is traditionally disposed of by being integrated into dunes along the shoreline or into landfills. However, it contains potentially useful nutrients that could benefit plant growth on land. The seaweed when thoroughly cleaned and dried can be converted to fertilizer mulch. It can also be used to generate renewable energy through anaerobic digestion, as well as other uses (Feasibility Study Part II, Section Research, and Technologies).

The goals of this intervention are to:

1. Enhance awareness and capacities about the use of sargassum and the positive impact of this sargassum use on climate change mitigation
2. To provide a waste treatment solution for beached Sargassum
3. To encourage entrepreneurs and home gardeners interested in farming sargassum



Enhancing interest in the utilization of Sargassum will support national challenges relating to waste management of this product and has the potential to contribute to eco-friendly crop production and energy sustainability. This intervention is linked to component 4.1 Communication and 4.2 Capacity building.

Seaweed farming pilots have been established in Belize, this is under a new Seaweed Initiative for Belize, with partners including the Fisheries Department, The Nature Conservancy, Placencia Fishermen Producers Cooperative, BELTRAIDE, Belize Cooperative Department, Placencia Women's Seaweed Growers Association, and the Turneffe Atoll Sustainability Association. The partners form a working group, which are currently working developing a policy for sargassum harvesting. Therefore, this endeavor is at research stage at the moment and harvesting, processing and exporting are not being carried out as yet. Two farming designs have been piloted at Turneffe Atoll and in Placencia: floating rafts and submerged rafts, which submerged rafts yielding promising results.

Considering these efforts, the proposed project comes at an opportune time as it will be able to put into use the lessons learnt from the above endeavor and while it may be different as this is looking at farming of seaweed, it is believed that they are complementary.

#### 4.2 Development of training modules for best coastal adaptation practices

##### Rationale

While communication promotes pro-environmental behavior through ecological consciousness, capacity-building equips persons with the actual knowledge and skills to make a change. It will help gain new techniques and behaviors that help them, and their organizations succeed.

This activity is in accordance with the ICZM Plan, which emphasizes the importance of building bridges between and among various interest groups as a mechanism to improve public education and form functional linkages for effective coastal area management. Environmental education and public awareness are among the core activities of the CZMAI. ~~Providing special training for enforcement officers and partner stakeholder groups will improve performance and vigilance.~~

As identified in the Feasibility Study (Part III, Strategy IV), enhancing the capacities of local people and officials through training will be cost-efficient. Livelihoods of local people will be improved through enhancing capacities on sustainable livelihoods practices (e.g. Sargassum use/farming, aquaculture farming, harvesting of fishery sources in mangrove areas).

##### Project Activity

Under this activity, financing is sought for the development and implementation of training modules for best coastal adaptation practices.

The Lead Agency for this subcomponent is CZMAI and is supportive of the other AF Proposal entities, staff, and components as well. Several entities have indicated training needs, as well as through policy intentions (NDC, Horizon 2030, GSDS, NCCPSAP, ICZMP) and a specific recommendation made as a mitigation measure for component IIC (Feasibility Study Part II). 'Investing in national capacities for long-term in-house and national expertise' is also a recommended strategy resulting from the feasibility study.

*Table 16: Development of training modules for best coastal adaptation practices*

Components	Milestones / Targets	Indicative activities
Training needs assessment and <del>ed</del> <i>development of training modules for best coastal adaptation practices</i>	Training consultant hired	Hire a training consultant

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Sargassum cultivation and harvesting involves the two species of seaweed, *Eucheuma isiforme*, and *Gracilaria carassissima*. The process can only be conducted under a permitted system managed by the Belize Fisheries Department and monitored by the National Seaweed Working Group. The cultivation includes the construction of rafts using baboo which are suspended in the water column and anchored to temporarily seabed, using only prescribed construction materials. Maintenance, harvesting, and processing are completed by hand (Figure 18).

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### 4.3 Strengthening of GIS capabilities of CZMAI and partners

#### Rationale

Under this activity, direct beneficiaries will acquire enhanced skills on GIS techniques which will enhance their performance and contributions to organizational success. Belize's NDC explicitly indicates the need to enhance the capacity of the CZMAI and municipal authorities to ensure developments within the coastal and urban areas of Belize. As such, the country's effective contribution to climate change mitigation is directly influenced by this project component.

The use of GIS technologies is planned under Component IB for Coastal Zone Management and Component IIA for saline intrusion monitoring.

#### Project Activity

Under this activity, financing is sought for the strengthening of GIS capacities in-country to benefit staff and the community network.

*Table 17 Strengthening of GIS capabilities of CZMAI and partners*

*Table 17: Strengthening of GIS capabilities of CZMAI and partners*

Components	Milestones / Targets	Indicative activities
Procurement of computer hardware, software and data collection equipment	<i>Equipment needs identified</i>	Prepare equipment specification list
<i>Implementation of GIS training</i>	Training activities successfully implemented and verified	Carry out training interventions Conduct M&E and verification Share lessons learned

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The lead agency CZMAI's capabilities to utilize GIS will also be strengthened, building institutional capacity - also within partner agencies (e.g. NHS, NCCO/REDD+, Fisheries Dept.) and local communities. Learning from research experiences, an effective data collection strategy has been to employ and train local people to support data collection. The direct beneficiaries of this training include staff members CZMAI and partner agencies, and community members. The indirect beneficiaries extend nation-wide as increased capacities on coastal interventions/monitoring will benefit the nation's economy and adaptation: 419,199 persons: 209,603 men, 209,596 women (SIB, 2020 est.).

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#### Detail of Activities

1. Training of the community network carried out data collection for the operationalization of the project activities
2. Training and utilization of GIS equipment for national monitoring of erosion carried out with CZMAI and project partners -to be used for risk mapping, mapping coast susceptibility to erosion, erosion monitoring, and early warning - and examine the use of technologies: use of drone technology (images) for monitoring
3. identification and attainment of infrastructure and materials, including computer hardware and software and data gathering equipment for the CZMAI and partners

The indirect beneficiaries extend nation-wide as increased capacities on coastal interventions/monitoring will benefit the nation's economy and adaptation: 419,199 persons: 209,603 men, 209,596 women (SIB, 2020 est.). The direct beneficiaries are the 27 coastal communities: 117,823 persons: 57,787men; 60,035women as the training interventions will support coastal monitoring. Approximately 15 professionals will be trained. Approximately 1 national consultant with a tertiary education will be employed. Proper consideration will be provided to pursue a gender balance among staff/consultants/stakeholder/trainees beneficiaries (Gender Action Plan Annex 1 Gender and Social Assessment).

The Communication/Knowledge Management/Training Component (component 4) is crucial to this project. As derived from the Results Framework, building knowledge and awareness is significant for the success of each component of this project: the housing policy and building codes, the ICZMP with zonation guidelines, saline intrusion risks, coastal erosion risks, risks associated with coastal flooding, and storm surge, GIS technologies or alternative livelihood opportunities. The Project's contribution to climate change adaptation is invaluable. The housing component not only benefits the coastal communities but the nation. Citizens will be safer through the implementation of building standards, especially since they will incorporate minimizing the impacts of climate hazards. Coastal zone management guidelines will benefit all 27 coastal communities: 57,787 males and 60,035 females. This policy will discourage investments/housing in high-risk coastal areas, such as the 66-foot buffer. Monitoring storm surge, salinity risks, and beach erosion will also have a significant impact in safeguarding the coastal communities, and considering the importance of tourism in these areas, also tourists and business investments. In a similar line of thought, the communities must witness tangible results to enhance the credibility of disaster risk reduction measures. This will be achieved through component 3. The best practices and lessons learned will be shared and thus benefit the 25 other coastal communities, and possibly beyond the national borders. Thus this project will have a significant impact sharing benefits at a national level through components 1.1 and 4 (419,199 inhabitants: 209,603 males and 209,596 females & 260,000 visitors), in the coastal zone through components 1.2, 2, and 3. Lastly, the project is made feasible by several strategies related to cost-effectiveness: by building on existing structures and identified initiatives, by promoting the ownership and other long-term benefits through strategic partnerships, and long-term thinking, and building on existing interventions and further pursuing co-financing possibilities [to ensure sustainability of the activities after the project closes](#). The project contributes to the area of climate change (SDG 13), decent employment (SDG8), safe water (SDG 6), and resilient settlements (11) (Figure 11 Theory of Change).

## **B. Economic, Social, and Environmental Benefits of the Project**

Coastal and marine ecosystems provide substantial goods and services to Belize and the coastal zone is an area of high economic activity. The coastal area contains abundant natural resources, supporting several productive sectors, such as tourism and fisheries. Belize's coast is also home to about 40% of the population, its ports, and developments for the industries: tourism, agriculture, and aquaculture/mariculture (CZMAI, 2016). During the 2010 housing census, there were approximately 53,234 males and 55,039 females residing in the nine coastal planning zones across 27 coastal communities in the country. However, despite the importance of coastal ecosystems and the services they provide, they are often mismanaged and lack the proper investment and policy decisions. Belize's reefs, as well as other coastal habitats, are

threatened by unchecked coastal development, overfishing, tourism pressures, and climate-related changes (WRI, 2008).

The benefits and beneficiaries of this project are wide-ranging, distributed across institutions -inter and intra-institutional, across layers -national and community-levels, short and long-term.

As stated previously, direct beneficiaries include the 27 coastal communities. These will participate directly in the project and thus benefit from a comprehensive combination of pre-event risk management strategies: Prevention, Protection, Preparedness strategies. However, at the institutional level, direct beneficiaries of this project are the lead entities for each component and project management (PACT, NCCO, CZMAI, NMS, NHS, and MIDH) who will be strengthened to implement their mandates and policy priorities. Since collaborations/cost-effectiveness is the pursuit, the benefits extend to non-government institutions; including communities, NGOs, academia, private sector – particularly tourism and agriculture.

The second tier of direct beneficiaries are the individuals and experts – local and international – who will be employed under this project; an estimated number of 60 persons (full-time staff, consultants, wardens, trainers, workers). Approximately 175 persons will be trained. The training will have long-term benefits, considering that each trainee will use the acquired skills ranging from 5-10 years in contributing to adaptation efforts, before the knowledge becomes outdated or retired. During the recruitment/consultations/training process, consideration will be provided to maintain a gender balance.

Component 1.1 and 4 have an extended reach beyond the 27 coastal communities and nation-wide benefits. Considering both subcomponents, component 3 also benefits all coastal communities. (Feasibility Study Section III).

The project incorporates prevention, protection, and preparedness strategies to climate change risks. The components are important contributions in climate change preparedness and in line with government policies for effective adaptation, and there is a sufficient legislative policy base to facilitate implementation. The project has incorporated some excellent strategies to achieve cost-effectiveness:

**Piloting a social housing model.** This strategy will make affordable housing for low-income families more visible. The aim is to empower and benefit the most vulnerable communities and social groups while giving proper consideration to the integration of human rights (e.g. indigenous and tribal peoples, right to shelter) when designing the policy and building codes. Approximately 5 construction workers from local communities will be able to acquire first-hand knowledge and experience on how to construct the pilothouse.

**Investing in a combination of communication and training actions for a sustainable impact.** This will allow for institutional/individual beneficiaries to enhance pro-environmental behavior through ecological consciousness and crucial skills to make a change. Approximately 16 community wardens/advisors will be engaged under the project, acquire skills regarding innovative technologies that will be used to benefit monitoring activities to protect their communities against climate risks. It aims to minimize the negative impact (or even have a positive impact) on the environment and equips beneficiaries to respond rapidly to extreme weather events.

**Investing in disaster preparedness risk reduction measures** will allow for the use of innovative technologies for effective, long-term adaptation. Advancements towards various risk reduction measures have been integrated into the project (Feasibility Study – Part I) which will benefit vulnerable communities, households, individuals, and businesses. Approximately 7 workers from the local communities Dangriga and Hopkins will be employed and acquire practical experience to effectively manage the risk reduction measures under component III and will be able to share their insights with the other 25 coastal communities.

**Cost-effectiveness, ownership and other long-term benefits through strategic partnerships** (Part II Section C).

### **Economic Benefits**

As the coast provides highly economically valuable services to Belize and is an area of high economic activity (esp. tourism, agriculture, fisheries), the proper management, and protection of the coast is crucial to ensure sustainable economic development. Belize's Tourism Industry is highly focused within the coastal zone, with three-quarters of hotels found along the coast and the cayes. Tourism is a fast-growing sector in Belize. In 2017, the value of exports of non-business travel services, other than health and education reached an all-time high of 409 million USD, up by 50% from 2007. In this period, the sale of tourism services to non-residents increased at an annual average rate of 4%, outperforming other services exports (3%). The tourism sector grew from 21% in 2007 to 22% in 2017. Due to the important linkages of tourism with the rest of the economy (indirect and induced effects of tourism activities), the overall economic benefits of tourism in Belize are worth up to 700 USD billion, corresponding to roughly 40% of GDP. Indirect economic impacts of the Tourism sector, such as locally manufactured materials that support the industry, earn, and an additional 26 to 69 million USD a year. In April 2018, the tourism sector employed approximately 21,000 Belizeans, corresponding to 13% of national employment. The contribution of tourism to employment varies widely across districts, ranging from 7% in Corozal to 18% in Belize. In general, tourism absorbs a larger share of the employed population in coastal (14%) as opposed to continental (12%) districts (UNCTAD, 2018). The beach rehabilitation project will provide economic benefits by increasing tourism in Dangriga and Hopkins (*Table 2*) and by decreasing the probability of infrastructure loss due to erosion.

Agriculture is also important for the economy of Belize. Large-scale agriculture tends to be technically and commercially sophisticated and oriented toward both domestic and export markets to take advantage of economies of scale. While small-scale farms include farms that provide for subsistence and local markets, they also include many sugarcane and citrus producers (as well as, increasingly, producers of peppers and other non-traditional crops) that sell to processors and exporters. Primary agriculture (crops and horticulture, livestock, and forestry and logging, excluding fisheries and aquaculture) in 2014 accounted for about 10% of national GDP, and the primary sectors contributed to 18.6% of national employment. Belize is a net exporter of food products. In 2014, the country's food exports totaled 80.2% of total merchandise exports, while food imports were 11.3% of total merchandise imports. Economic performance in the agriculture sector is primarily dependent on traditional export crops such as sugar, citrus, and banana which currently account for about 60% of the earnings with citrus exports being the principal source of income followed by sugar and banana. Rice, corn, and beans are the main domestic food crops. With respect to land tenure, 32 percent of farmland is held by farmers with title, 7 percent is rented, and about 31 percent is under a long-term lease by the government; the remainder of the land is in informal and communal arrangements (IDB, 2017). Climate change is already affecting the agriculture sector: variability of yields/harvests for rainfed agriculture is already suffering from changes in the timing and amounts of rainfall and there is a widespread perturbation of the agricultural calendar. Intense rainfalls are causing problems of soil drainage and erosion and warmer temperatures are leading to the increased incidence of yield-reducing weeds, pests, and diseases (Climate Change Solutions, 2014).

The Fisheries Sector employs over 2,500 licensed fisherfolk, is similarly dependent on a healthy coastal ecosystem, and is also one of Belize's main industries. Artisanal fishing is carried out by about 500 boats operating in the shallow waters of the barrier reef and the three atolls, which provide habitats for many commercially valuable stocks of lobster, conch, and a variety of fish. There are about 2500 fishers licensed in Belize, indirectly employing 15,000 individuals and organized in four cooperatives. There were 34 vessels listed as active in 2016. This number increased to about 57 vessels in 2018 (UNCTAD, 2018). In 2016 the Fisheries sector contributed 5% of Belize's GDP. Between 2005 and 2015 lobster generated an average annual income of BZ\$15.13M from export; while conch averaged an annual income of approximately BZ\$8.32M from export (Belize Fisheries Department, 2015; Belize Fisheries Department, 2017). Thus, to keep this industry alive and prospering it is important to safeguard the coastal ecosystem and ensure that capacities are built so that adaptive measures can be put in place and better-informed decision-making occurs regarding the coastal communities. The project will aid in implementing necessary tools for coastal

planning and management as a method to effectively protect the lives of fishers that live within vulnerable coastal areas including the Creole, Mestizo, and Garifuna people. Fishers and their families will economically benefit as future development in areas that are unsuitable for habitation will be avoided, decreasing costs from exposure to climate risks.

Belize has an indefinite moratorium on all new oil exploration in its offshore waters, to safeguard the marine environment and further promote dive tourism. Belize is one of the first developing countries to turn away from offshore oil and seek to embrace environmentally sustainable development pathways by protecting the ocean environment.

The project will also provide economic benefits for the tourism and fisheries sector by avoiding unsustainable clearing of mangroves, which act as nurseries, protect the shoreline, and support other wildlife. Shoreline protection from reefs and mangroves prevents erosion and wave-induced damage, which accounts for about 231 to 347 million USD in avoided damages each year. However, without the proper measures in place, unsustainable development and clearance of mangroves will continue. The project will aid in the prevention of continued development in vulnerable coastal areas and ensure that future development and land use is appropriate and leads to minimizing negative impacts. It is crucial to prevent future deterioration of vulnerable habitats such as mangroves, seagrass beds, and reefs. The implementation of coastal guidelines and the institutionalization of a national housing policy and building codes with a clear specification for coastal habitation coupled with the coastal erosion monitoring program will contribute to the minimization of infrastructure and financial loss. The latter mechanisms will serve to protect financial investments by minimizing the probability of unwarranted development in vulnerable areas that would result in loss of coastal lands and/or infrastructure. The national beach erosion monitoring program – of which the first steps are included in this proposal - will also contribute to minimizing economic loss, by enabling national and local governments to devise proactive mechanisms to minimize the impacts of erosion that can result in the loss of beach areas as well as houses and hotels built on beach areas. The coastal early warning system will provide an additional monitoring mechanism, which will enable persons living in the 27 coastal communities to prepare for the negative impacts of intensified storms, including storm surges. The pilot beach stabilization components will benefit houses under threat of collapse due to extensive erosion. Extensive erosion has resulted in a portion of some homes being inches away from the water's edge, in coastal communities such as Hopkins and Dangriga (Figure 6). The saline intrusion assessment is vital for the production of potable water and the determination of suitable areas for farming. As an economic benefit for farmers, the assessment of soil salinity will provide information that can be used to deter the negative impacts of increased salinity which results in lower crop yield. This will result in the avoidance of areas with high salinity and reducing financial inputs into such areas thus improving financial gain. The goal of this task is to assess and map soil salinity and link this to current and future crop productivity vulnerability and risk.

#### ***Environmental Benefits***

The project will provide substantial environmental benefits to Belize's coast and communities. The project is consistent with Belize's development goals, needs, and guidelines and the country has a sufficient legal and policy base for the implementation of this project (Feasibility Study Part II). The project will lead to the protection of vulnerable coastal areas from future unsustainable and unregulated habitation, tourism, infrastructure, and industry development. The latter will in turn result in increased environmental protection as the implementation of nationally identified guidelines and corresponding regulations will minimize the detrimental effects of improper development. The guidelines include provisions that avoid development in areas of high ecological value and those particularly vulnerable to climatic changes, by negating development in these areas the natural environment should be protected. The project will contribute to maintaining shoreline access by regulating development in the immediate seafront area. Biodiversity in coastal areas will also benefit through the improved management and proper planning of coastal areas, habitation, and land use. The prevention of unsustainable clearance of mangrove forests will positively affect fish stocks and invertebrates as they provide nurseries for them, shoreline protection from storms, waves, floods, etc. will also be expected, which will help prevent erosion in other areas. Also, the proposed

rehabilitation project component will protect the shoreline of the chosen communities from storms and erosion. Beach restoration programs will also provide learning opportunities for students and community workers and integrate them into environmental education. This will indirectly benefit other communities, as the measures can be modified and replicated in other areas in need of beach rehabilitation. The saline intrusion and groundwater assessment will better enable the country to protect its vital groundwater resources. The activity will allow for an initial assessment of the groundwater flow regimes within the study area. It will also contribute to the minimization of potential saline water encroachment into freshwater systems caused by the unregulated use and over-extraction from groundwater aquifers. The study will also assess the quality of groundwater concerning agricultural influences. Proper consideration will be given to communication and training regarding sustainable livelihood opportunities, one of which is sargassum use/[harvestingfarming](#) for energy production and compost use, or other possible products.

### **Social Benefits**

Social benefits [from this proposed project](#) include reducing the vulnerability of the 27 coastal communities to climate change and decreasing the chances of infrastructure investment losses by preventing future development in vulnerable areas. This will protect the lives and livelihoods of Belizeans, by adhering to national coastal development guidelines thus minimizing unwarranted development in unsuitable areas. The implementation of coastal development guidelines also ensures the maintenance of ecosystems and the associated services they provide to the coastal communities, including regulating provisioning and protection services on which the communities are heavily dependent.

Coastal protection and stabilization activities will also have a positive effect on the welfare of communities by protecting their homes from potential losses due to erosion and storm damage. This will benefit the entire population living along the coastline by improving management. The provision of the habitation policy and the building codes can be scaled up for replication through-out the remainder of inland communities. Building codes with a strong emphasis on climatic factors will improve the ability of all communities to build climate-worthy infrastructure which can withstand the impending climatic factors such as extreme heat, drought, SLR, storm intensity and frequency, flooding increased wave action, and erosion.

Groundwater assessments enhance the long-term availability of water by ensuring that water is being utilized and extracted in a manner consistent with sustainability. In the absence of such periodic assessments, water extraction could threaten groundwater aquifers leading to saline encroachment and ultimately the loss of potable water extraction for specific sources.

Awareness and knowledge of the public will also be increased for mechanisms that can be implemented for climate change adaptation, thus decreasing their vulnerability to erosion and other negative impacts of climate change. The Early Warning System that will be enhanced will protect the essential household and community assets. It will also reduce exposure to storm surges and flooding events and increase the ability to prepare for and respond to these disasters. Reduced exposure to storm surges and flooding events will also decrease associated negative impacts on the health of the population in areas that are more vulnerable to these hazards by supporting efforts to fight outbreaks of waterborne diseases such as cholera.

### **Gender**

Gender balanced participation is crucial to the project and its partners. This section examines the integration of female participation (Social and Gender Assessment Section II). A Gender Action Plan for the project is presented in Annex 1 Gender and Social Assessment. The gender assessment conducted for the preparation of this project proposal highlighted the prominence of women in the management of natural resources and their active involvement in the social issues related to their communities. In Belize, women hold high positions. Women are in charge or are the primary contacts for several project lead agencies, stakeholder organizations, and NGOs. Of the 18 villages associated with this project, five have female chairpersons and all villages have at least two women in the village council. In the communities with women in leadership roles, the level of participation by women appeared to be in direct relationship to the position that was held. The women who were chairpersons, leaders of community-based organizations, business



owners, or heads of households appeared to be more vocal. This is an indication that women in the project's target communities have an active leadership role and appear to be more assertive. It also provides a platform on which to develop gender-sensitive collaboration with the communities during and after the implementation of the project. Women in some of the communities have expressed during our consultations that they want equal standing with men when it comes to land ownership, leadership roles, and decision-making.

Ministry of Education statistics indicate that while equal numbers of males and females enter the school system at primary school, by the time they graduate from high school there is an average of 25% attrition in males and 10% in females. It also shows that increasingly women are becoming better equipped to undertake the roles that are more academically biased. This is an indication that, of necessity, women will be required to undertake tasks that were traditionally reserved for men. It was pointed out during the consultations/discussions that there are no gender-specific roles within any of the project components. In that regard, the project provides a host of opportunities for anyone with the requisite training and skill. However, proper consideration will be provided to pursuing a gender balance among staff/consultants/stakeholder beneficiaries, and in all procurement processes, in line with the NIE's commitment to Gender Equality and Equity. Additionally, remuneration will be based on the work requirements, irrespective of gender.

### C. Analysis of Project's the cost-effectiveness

The direct beneficiaries<sup>5</sup> of this project are Belize's 27 coastal communities. These will participate directly in the project and thus benefit from a comprehensive combination of pre-event risk management strategies: Prevention, Protection, Preparedness strategies. Component 1.1 and 4 have nation-wide benefits. When considering both subcomponents, component 3 also benefits all coastal communities ([Table 18](#)Table 18) (Feasibility Study Part III).

*Table 18 Beneficiary overview*

*Table 18: Beneficiary overview*

Beneficiaries	Indirect	Direct	Human Resources				Cost/ Capital (In US\$)
			Staff/Consultants/workers				
			National			Int.	
			staff	tertiary	unskilled <sup>6</sup>		
<b>1. Improving coastal land use for resilient habitation and sectoral activities</b>	<b>Nationwide</b>	<b>Coastal Comm.</b>					
1.1. Development of the National Housing Policy and Building Codes for resilient habitation based on vulnerabilities	X & visitors	X		8	5		0.71
1.2. Strengthening the implementation of the Integrated Coastal Zone Management Plan		X			12		1.59

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<sup>5</sup> Please see Annex II Part III – Financial Considerations for a breakdown of the calculation of project beneficiaries and cost per beneficiary.

<sup>6</sup> Unskilled labor, measured by educational attainment, refers to jobs that require a high school diploma only, or could be filled by a high school dropout who masters specific skills. Skilled labor requires additional skills or education.

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and associated management guidelines for zonation							
<b>2. Coastal Vulnerability Monitoring</b>							
2.1. Strengthening data availability for the development of a national coastal saline intrusion program		X & agriculture	50 persons trained	1		1	6.02
2.2. Develop and implement a National Beach Erosion Monitoring Program		X	50 persons trained	4	4		1.86
2.3. Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge		X	10 persons trained			4	2.25
<b>3. Beach stabilization of High-Risk Coastal Areas</b>							
3.1 Implementation of beach recovery and stabilization through a pilot project in high risk coastal communities of Dangriga and Hopkins		Dangriga & Hopkins		2	7 <sup>7</sup>	3	9.36
3.2 Monitoring and evaluation of activities' effectiveness and documentation of lessons learnt		Other coastal communities		1			
<b>4. Awareness-raising, knowledge dissemination, and capacity strengthening</b>							
4.1. Implementation of a National Climate Change Communication Strategy and Action Plan	X	X		3			0.30
4.2 Development of training modules for best coastal adaptation practices for Belize	X	X	50 persons trained	3			0.36
4.3 Strengthening of GIS capabilities within the CZMAI and partners	X	X	15 persons trained	1			0.24
Project Management				3			
<b>Total</b>			<b>175</b>	<b>26</b>	<b>28</b>	<b>8</b>	

**Cost-effectiveness, ownership, and other long-term benefits through strategic partnerships** (Feasibility Study Part III). Throughout the project, cost efficiencies are envisioned to be realized by engaging with a local and/or external academic institution(s) by employing student partnership support in exchange for learning opportunities and professional development. This strategy requires proper supervision but will have long-term national benefits.

<sup>7</sup> As the RRM under comp. 3 are to be determined during phase 1 (ongoing), these figures are an estimate. The contractor will be encouraged to hire local community members.

The integration of strategic partnerships will enhance cost-effectiveness, ownership, and other long-term benefits. It will enable 6 government/statutory agencies (PACT, NCCO, CZMAI, NMS, NHS, MIDH), local leadership in 27 coastal communities, the University of Belize, and various NGOs (including, but not limited to SEA, SADC, TIDE, TASA) to contribute to the enhancement of national adaptive capacities according to their mandates and comparative advantage.

**Cost-effectiveness by building on existing structures and identified initiatives to ensure cost-effectiveness.** The enhancement of systems and mechanisms already in place (amongst others the utilization of Coastal Zone Management/GIS capacities within CZMAI and partners, the existing saline intrusion/groundwater data, the NCCCSAP (being developed), the existing SURFACE/PLUVO technologies within NMS, existing weather stations, utilization of maps from the Lands Information Centre, and the beach stabilization engineering alternatives that are being identified under Belize's Fourth National Communication), decrease the time and cost associated with the formulation of these systems from an initial concept. In avoidance of duplicated efforts, synergies will be formed with other ongoing and/or planned projects to maximize efficiency. Further enhancing the technical capacity of the entities involved in project implementation also provides for the long-term sustainability of national initiatives beyond the five-year timeframe of the Project and contributes to the realization of Belize's NDC commitments.

**Cost-effectiveness by building on existing interventions and further pursuing complimentary interventions under other initiatives ~~co-financing possibilities~~.** This project is strengthened by the lessons learned and ~~co-financing~~ already received under other initiatives which this proposed project will learn from and expand on, including the (Marine Conservation and Climate Adaptation Project (MCCAP) – component 4.1, Enabling Gender-Responsive Disaster Recovery, Climate and Environmental Resilience in the Caribbean (EnGenDER) – component 4.1, Belize Social Reform Project (BSR) – component 1, Fourth National Communication & First Biennial Update Report (FNC/BUR) – component 3, Capacity Building for Climate Vulnerability Reduction (CBCVR) – component 2.2, Energy Resilience for Climate Adaptation Project ((ERCAP) – component 2.3). The project also incorporates long-term planning and will pursue additional funding possibilities (Components 2.1 and 2.3). The project also takes into consideration other synergies with other complimentary pipeline projects, which contribute to the overall effectiveness of project interventions The National Hydrological Service (Component 2.1) is in the process of developing a National Adaptation Plan (NAPs) for the Water Sector under a potential GCF Readiness Project, including the completion of assessments in other parts of the country; valued at approximately USD \$700,000.

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The cost-effectiveness of Component One is seen in the utilization of existing institutional structures (technical groups) and identified sectoral needs to guide the development of a habitation policy and building codes. The Ministry of Infrastructure Development and Housing (MIDH) has incepted the initial process for the creation of a national policy and legislation, which enable adaptation to the impending climatic factors, via the completion of preliminary consultations and assessments as well as an initial analysis (discussion paper) of building requirements based on environmental changes. These preliminary activities will be built upon under Component One. Additionally, the activities linked to the initiative will incorporate the lessons and technical findings of similar policies and building codes from the region for sound climate proofing. Furthermore, the policy and associated building codes being developed under this proposed project can be modified for scaling up in the other regions of the country for climate adaptation. The development of a housing prototype will better enable the Ministry and municipal government to enforce stringent practices to ensure the safety of human life to climatic threats. The cost of this activity is US\$480,000. Please see Table 19 for alternative adaptation solutions to activities under Component 1.

The implementation of coastal guidelines for three planning regions based on coastal zone development guidelines, which are available, allows the country to make scientifically sound development decisions in coastal areas taking into consideration economic growth and environmental protection. As the guidelines have been developed for the sustainable development of the area in line with the principles of environmental protection and climatic changes, its implementation should improve the long-term adaptive capacity of coastal infrastructure by avoiding development in areas susceptible to climatic changes; thereby minimizing the financing needs to address the negative impacts of unsuitable development in climate-vulnerable areas.

Coastal Zone Management under this component is additionally supported by the legal requirement for a 66-foot buffer to be maintained next to all water bodies. [CZMAI will use the volunteer services provided by the local Community Wardens and Coastal Advisory Committees as a cost-efficient way to collect on the ground reports. The cost of this activity is US\\$187,000. Please see Table 19 for alternative adaptation solutions to activities under Component 1.](#)

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~~The CZMAI will integrate the services of local Community Wardens and Coastal Advisory Committees for cost-efficient field costs. The cost of this activity is US\$187,000.~~

This project intends to utilize existing monitoring activities of localized NGOs to carry out the national beach erosion monitoring program. Organizations within the various districts with reputable and strong working relationships with CZMAI will conduct periodic coastal monitoring assessments for analysis by the CZMAI. The utilization of existing monitoring activities of NGOs with a local presence in the areas of interest decreases costs related to transportation and human resources for conducting such activities by an outside source. Entities will be provided with training and equipment, thus enabling a smooth transition of the additional monitoring initiatives within already established protocols. Training will not need to be extensive as personnel already have experience in conducting period monitoring in the areas. The cost of this activity is US\$220,000. Similarly, building the infrastructural capacity of the NMS for the early warning monitoring system improvement will incur a minimal cost as most of the equipment and monitoring mechanisms are already in place and/or are being updated under other initiatives. The cost of this activity is US\$265,000. Initial capacity assessments of the Hydrology Department have also been completed, informing the department of viable mechanisms for strengthening. The procurement of materials and equipment under the national coastal saline intrusion program will minimize the long-term cost of hiring a consultancy firm to conduct periodic assessments within the program. The cost of this activity is US\$709,000. [Please see Table 19 for alternative adaptation solutions to activities under Component 2.](#)

During the initial assessments to be conducted for the beach nourishment under Belize's Fourth National Report to the UNFCCC, [reputable coastal engineers will provide viable alternatives options for shoreline stabilization and beach nourishment based on the analysis of available topographical and environmental data. The completion of preliminary assessments within the scope of the above-mentioned project, will decrease project cost and improve the scientific basis for the implementation of concrete adaptation actions for stabilizing beach areas susceptible to high wave impact, erosion, and SLR; thereby protecting coastal infrastructure. Additionally, the benefit of having this assessment done under a separate but related initiative is that the funds budgeted in this project would be used primarily for execution of the preferred intervention for these two sites. Additionally, capacity will be strengthened within the regulatory agencies who have some knowledge of the application of coastal protection works gained through a professional development program offered in 2019 through the University of Belize and funded by the Inter-American Development Bank. Furthermore, the possibility of scaling up the project in other areas with similar topographical characteristics is high; this pilot would also serve a case study for Belize as successes, challenges and lessons learned can be documented to share in country and in the region. The cost of implementing the pilot activity is US\\$1,100,000. The possibility of scaling up the project in other areas with similar topographical characteristics is high. The cost of implementing the pilot activity is US\\$1,100,000. Please see Table 19 for alternative adaptation solutions to activities under Component 3 and Part II A above.](#)

The engagement of communities and stakeholders within each of the proposed project components will significantly enhance the impact, sustainability, and cost-effectiveness of the project to achieve the desired outcomes under this project as well in the broader area of climate change. The latter will require the implementation of the communications/engagement strategy NCCCSAP. The NCCCSAP will serve as a guidance document for improving the knowledge of all communities across the country to climate change including adaptation, mitigation, and economic growth activities. The strategy will have a long-term focus

on climate change awareness, which can be applied during the implementation of other climate-related initiatives, making it sustainable. The cost of this activity is US\$375,406. [Please see Table 19 for alternative adaptation solutions to activities under Component 4.](#)

The multi-sector approach to Project design enables the harmonization of activities and the pooling of resources for the implementation of a comprehensive project, which addresses a multitude of coastal resiliency adaptation needs. ~~From A~~ the concept stage synergies between components provided a strong basis for the inclusion of activities within the proposal.

*Table 19: Identification of Alternative Adaptation Solutions*

<b>Project Activities</b>	<b>Identification of alternative adaptation scenarios</b>
<b>Component 1: Improving coastal land use for resilient habitation and sectoral activities</b>	
<b>Outcome 1.1</b> <u>Improved National Housing Policy with clear a specification for coastal habitation and National Building Code with specifications for the coastal zone</u>	<u>The alternative is to retain the status quo, that would result in citizens continuously suffering from climate hazards. Infrastructural development would also proceed in the absence of building codes, resulting in periodic economic losses, linked to intense storm events.</u>
<b>Outcome 1.2</b> <u>Improved Integrated Coastal Zone Management Plan and associated management guidelines for zonation to promote and enforce resilience measures</u>	<u>There are no alternative scenarios. The absence of implementation of the ICZM Plan will result in the unwarranted development on climate vulnerable areas resulting in loss of infrastructure and lives.</u>
<b>Component 2: Coastal Vulnerability Monitoring</b>	
<b>Outcome 2.1</b> <u>Strengthened institutional capacity for saline data collection</u>	<u>Alternative adaptation scenarios are the enhancement of rainwater harvesting. However, this is not feasible from a cost perspective and because there is insufficient rainfall to meet the needs of Belize's agriculture sector. Besides rainfall, it is unpredictable due to climate change patterns.</u>
<b>Outcome 2.2</b> <u>Strengthened institutional capacity to reduce beach erosion risks</u>	<u>The alternative to this prevention measure would be to invest in adopting more protection strategies, such as engineering solutions. These are more capital-intensive. Setting up an Early Warning System is generally a low-cost option for alerting people, giving advance notice of impending flood, storm surge, and other hazards, allowing emergency plans to be put into action to save guard lives and property with existing and adequate forecasting and monitoring services.</u>
<b>Outcome 2.3</b> <u>Strengthened institutional capacity to reduce coastal flooding and storm surge risks</u>	<u>The alternative to beach erosion monitoring, a prevention measure, would be to invest in adopting more protection strategies, such as engineering solutions. These are more capital-intensive.</u>
<b>Component 3. Beach stabilization of High-Risk Coastal Areas</b>	
<b>Outcome 3.1</b> <u>Increased adaptive capacity within Hopkins and Dangriga communities through infrastructure and /or soft structure assets</u>	<u>Alternative adaptation scenarios are resettlement or the construction of larger drainage channels, which are not feasible from a cost perspective and environmental and social risk point of view and will also not have the benefit of water supply. Due to the severe historical flood impacts, community-level flood reduction interventions won't reduce flood impacts enough.</u>  <u>Part II A Component 3 provides information on some of the possible interventions that have been identified to accompany the planned beach nourishment.</u>
<b>Component 4. Awareness raising, knowledge dissemination and capacity strengthening</b>	

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<p><b>Outcome 4.1</b> Strengthened awareness and ownership of adaptation and climate risk reduction at the national and subnational levels</p>	<p><u>An alternative adaptation scenario is to focus more on regulating behaviors. This will, however, cause undesirable conflicts with citizens. Additionally, the Government of Belize does not have adequate resources for policing destructive practices. Communication and education, on the other hand, will encourage pro-environmental behaviors.</u></p>
<p><b>Outcome 4.2</b> Strengthened institutional capacity of the Government of Belize and stakeholders to reduce climate risks</p>	<p><u>An alternative adaptation scenario is to focus more on regulating behaviors. This will, however, cause undesirable conflicts with citizens. Additionally, the Government of Belize does not have adequate resources for policing destructive practices. Communication and education, on the other hand, will encourage pro-environmental behaviors.</u></p>
<p><b>Outcome 4.3</b> Strengthened institutional capacity of CZMAI and partners to reduce climate risks</p>	<p><u>There is no alternative to GIS technologies training. This modern-day effective tool needs to be professionally and efficiently utilized in safeguarding the community.</u></p>

#### D. Project's Consistency with National or Sub-National Sustainable Development Strategies

The project integrates strategic alignment with national and sectoral development strategies as well as an obligation under international conventions to which the country is a Party (Table 20 and Feasibility Study Part II Section Policy and Legislation). In line with national priorities for development, the Project has been aligned to the **Growth and Sustainable Development Strategy (GSDS) 2016 – 2019**, which is the overarching strategy aimed to comprehensively guide national development. The GSDS utilizes an integrated, systemic approach for medium-term economic development, poverty reduction, and long-term climate-compatible sustainable development. The Growth and Sustainable Development Strategy utilize an integrated, systemic approach for medium-term economic development, poverty reduction, and long-term sustainable development. This planning document is in line with Horizon 2030. **The Horizon 2030 Vision (2010-2030)** is organized into seven thematic areas under four main pillars, amongst others responsible for environmental stewardship. A core value of this policy document is respect for the rule of law and human rights. It envisions Healthy Citizens and a Healthy Environment and emphasizes the need to put in place effective laws and regulations, information, and communication systems to protect the environment while promoting sustainable social and economic development. It strategizes that environmental protection laws will be enforced in a fair and just manner and, where needed, the legislation will be reformed (e.g. petroleum policy, mangrove legislation, and solid waste). The pillar also emphasized the need to strengthen national capacities, e.g. engineers, urban and regional planners, architects, social scientists, environmental scientists, environmental lawyers, marine biologists, and those trained in integrated coastal zone management (MED, n.d.)

This project is centered on the implementation of Belize's **National Climate Change Policy, Strategy and Action Plan (NCCPSAP)** which aims to guide the short, medium, and long-term processes of adaptation and mitigation of Climate Change and to ensure the mainstreaming and integration of Climate Change considerations at all levels of the development planning and operational processes of governance. The Vision outlined in the NCCPSAP stipulates: Leadership and commitment to fully address the challenges of Climate Change and sea-level rise and harness the necessary resources in support of the development of special programs that are effective, resilient, and sustainable (NCCPSAP, 2015). Necessary adaptive mechanisms identified in Belize's Third National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) and eight of Belize's adaptation targets from its **Nationally Determined Contributions (NDC)** to UNFCCC have been incorporated within the Project thereby to improve the countries resiliency. Belize's Nationally Determined Contribution (NDC) under the United Nations Framework Convention on Climate Change (UNFCCC). The NDC contains the following priority



<u>a national coastal saline intrusion program</u>		
<u>2.2 Develop and implement a National Beach Erosion Monitoring Program</u>	<u>NDC</u>	<u>Manage and regulate further development of the coastline, especially in vulnerable areas</u>
<u>2.3 Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge</u>	<u>NCCPSAP</u>	<u>Strengthen Climate Change resilience to prevent, reduce, or adapt to the negative impacts of Climate Change on key sectors, economic activity, society, and the environment through policies and strategic processes.</u>
<b><u>Component 3. Beach Stabilization of High-Risk Coastal Areas</u></b>		
-		
<u>3. Beach Stabilization of High-Risk Coastal Areas</u>	<u>NDC</u>	<u>Implement an adaptation strategy through mangrove restoration, sea, and river defense structures to prevent coastal and riverine erosion and ecosystem disruption</u>
	<u>NCCPSAP</u>	<u>Strengthening Climate Change resilience to prevent, reduce, or adapt to the negative impacts of Climate Change on key sectors, economic activity, society, and the environment through policies and strategic processes.</u>
	<u>ICZMP</u>	<u>Takes into consideration Blue Carbon sinks (mangroves and seagrass beds) initiatives / Mangrove restoration projects to mitigate the effects of climate change, and to ensure the delivery of coastal protection services especially in areas, such as the Central and Southern regions of Belize, which are highly prone to erosion and inundation.</u>
<b><u>Component 4. Awareness Raising, Knowledge Dissemination and National Capacity Strengthening</u></b>		
-		
<u>4.1 Development of a National Climate Change Communication Strategy and Action Plan</u>	<u>Horizon 2030</u>	<u>Put in place effective communication systems to protect the environment while promoting sustainable social and economic development.</u>
<u>4.2 Development of training modules for best coastal adaptation practices</u>	<u>NDC</u>	<u>Enhance the capacity of the CZMAI and municipal authorities to ensure developments within the coastal and urban areas of Belize.</u>
	<u>Horizon 2030</u>	<u>Need to strengthen national capacities, e.g. engineers, urban and regional planners, architects, social scientists, environmental scientists, environmental lawyers, marine biologists, and those trained in integrated coastal zone management.</u>
	<u>NCCPSAP</u>	<u>Capacity building and networking across all implementing agencies</u>
<u>4.3 Strengthening of GIS capabilities of CZMAI and partners</u>	<u>ICZMP</u>	<u>Increase the technical and management capacity of both management and co-management agencies to ensure sound management practices</u>
<u>Other relevant aspects</u>	<u>Horizon 2030</u>	<u>Respect for the rule of law and human rights. Environmental protection laws will be enforced in a fair and just manner and, where needed, the legislation will be reformed (e.g. petroleum policy, mangrove legislation, and solid waste).</u>
	<u>GSDS</u>	<u>Eradicate poverty by 2030 and achieve more equitable income distribution / Tourism and agriculture, crucial sectors for the Belizean economy, dependent for their sustainability on the care of the environment and the integrity of Belize's ecosystems.</u>



	ICZMP	<a href="#">Research to better capture the biomass, coverage, spatial distribution, and rates of change for mangroves in Belize and make this information available to support decisions on the issuing of mangrove alteration permits</a>
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Table 19: The lead institutions for the AF Project and Legislative Framework  
 Table 21: The lead institutions for the AF Project and Legislative Framework

Agencies	Portfolio Responsibility	Legislation
National Climate Change Office (NCCO)	Climate Change	National Climate Change Policy, Strategy and Action Plan
Coastal Zone Management Authority and Institute (CZMAI)	Integrated Coastal Zone Management	Coastal Zone Management Act Cap 329
Protected Areas Conservation Trust (PACT)	Protected Areas Conservation financing	Protected Areas Conservation Trust Act Cap 218
National Hydrological Service (NHS)	Management of Water resources	National Integrated Water Resources Act No. 19, 2010
National Meteorological Service	Meteorological and climate-based products and services	Support implementation of Disaster Preparedness and Response Act Chapter 145 and the Civil Aviation Act Chapter 239
Ministry of Infrastructure Development and Housing (MIDH)	Regulation of land use, housing, and infrastructural development Approve building plans Issue building permits	Housing and Planning Act

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- The Project also contributes to the achievement of Sustainable Development Goals (SDGs):
- SDG 13 Take urgent action to combat climate change and its impacts
  - SDG 11 Make cities and human settlements inclusive, safe, resilient and sustainable
  - SDG 6 - Ensure availability and sustainable management of water and sanitation for all
  - SDG 5 Achieve gender equality and empower all women and girls
  - SDG 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all

### E. Project’s Compliance with Relevant National Technical Standards

The project meets the standards of environmental assessment, which will be enforced by the Department of Environment via Environmental Impact Assessments (EIA). The criteria and procedure under the EIA Regulations of the Environmental Protection Act Cap 328 (2003) state that these Regulations and any procedures approved by the Minister shall be used to determine whether an activity is likely to significantly affect the environment and will therefore subject to an environmental impact assessment. All persons, agencies, institutions (whether public or private), unless exempted pursuant to these Regulations, shall, before embarking on a proposed project or activity, apply to the Department for a determination whether such project or activity would require an environmental impact assessment. (article 3).

The assessment of this project’s activities against the list of activities for which an EIA is required (ref. Schedule 1-regulation 7, Schedule II-regulation 8) has indicated that this project does not require an EIA. The pilot social house construction does require an EIA as it is not a large-scale housing development. Component III – depending on the recommendations of Phase I – may require an EIA if the recommendation

is to establish an infrastructure project (Canalization or flood relief works). As required by national laws, the comprehensive project proposal, which details all possible interventions, will be submitted to the Department of Environment for screening by the National Environmental Advisory Council (NEAC). After careful consideration the by NEAC the Department of Environment will advise if the project requires an EIA or a Limited Level Study (LLS) for implementation. Following the preparation of the required assessment, the Department of Environment may or may not grant Environmental Clearance of the implementation of the project activity. It is important to note that beach nourishment and land reclamation activities within the coastal zone have been conducted in country, in compliance with national regulations and technical standards. If the recommendations for the responses under Component III are nature-based or sand renourishment, it is recommended to conduct a limited level study.

A sargassum installation Sargassum cultivation farming and harvesting under component IV does not require an EIA, as harvesting sargassum is a fairly simple process with minimum invasiveness to the environment. It does not envision constructing any large installation to produce electricity, steam, or hot water or any large structure being required, as the harvested material can be transported to an existing power generating installation (See). Current initiatives for seaweed cultivation are regulated and closely monitored by the Belize Fisheries Department, any the Seaweed Working Group. Manuals for cultivating seaweed, with minimally invasive practices, and training has been provided to persons and associations in Belize<sup>8</sup>. The Department is in the process of developing a policy to further regulate the activities including the establishment of additional technical standards.

-Harvesting of the sargassum can be done manually or mechanically, however, to decrease environmental impacts, it is envisioned that manual harvesting will be undertaken. A prerequisite for this is the required human resources. Therefore, this provides a great opportunity for training and job creation for both genders, however, it must be noted that it is a time consuming and labour intensive activity. Manual cleaning has a low disruptive level and will less likely contribute to erosion. Mechanical cleaning can lead to erosion and disrupt the ecosystem, it is also not always practical, as heavy equipment may not be able to enter the beach, therefore, it is not ideal. However, if an installation to produce electricity, steam, or hot water is set up under this component — albeit small — it will be preceded by a limited level study. The EIA Regulations of the Environmental Protection Act Cap 328 (2003) does not specify the criteria of a 'large' installation nor of a 'small' installation. The use of sargassum for composting does not need a limited level of study. Also exempt from EIAs are educational projects and computer processing projects (article 9). All stipulated conditions will be met to ensure the project activities are in full compliance with its requirements.



Figure 19: Manual Harvesting of Seaweed (Obtained from Sustainable Seaweed Cultivation Training Manual - Belize)

<sup>8</sup> Further information on recommended practice can be obtained from Sustainable Seaweed Cultivation Training Manual, 2018, The Nature Conservancy (Belize).

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### Materials and Construction of Drying Rack



*Eucheuma isiforme* being dried on a well-designed and maintained drying rack at Little Water Cay, Belize. ©Wilbur Dobson

#### Materials for Two Racks

The materials used to construct the drying rack can be bamboo as in Asia, or can be the following as with the Placencia Cooperative's operation:

- ✓ 2 in. x 4 in. x 12 ft length pine lumber (11 lengths)
- ✓ Durable plastic mesh (1 roll)
- ✓ Galvanized nails (6 pounds)
- ✓ ½ in. PVC pipe with 4 elbows (3 lengths)
- ✓ Recycled 1 in. x 4 in. x 8 ft length (6 lengths)

*This rack allows for solar and wind-drying of seaweed.*

**Figure 20: Post Harvesting Drying of Seaweed (Obtained from Sustainable Seaweed Cultivation Training Manual - Belize)**

The project will also obtain all necessary permits for specific activities requested by the different sector authorities for the development and execution of the proposed activities (a.o. building permit from the MIDH). Activities that do not require an EIA or limited level study will have high standards of environmental management to avoid negative impacts on coastal ecosystems, biodiversity, and people's health. The project adheres to the Environmental and Social Policy and devises mechanisms to be in full compliance with all human rights including those of marginalized and vulnerable groups and indigenous peoples. The aim of the pilot social house under component I is to empower and benefit the most vulnerable communities and social groups while giving proper consideration to the integration of human rights (e.g. indigenous and tribal peoples, right to shelter) when designing the policy and building codes. The training needs assessment and develops a training plan under component 4.2 will provide sufficient consideration to female/persons-with-disabilities/youth/ITP education. During consultations with stakeholders with proper consideration to Free Prior and Informed Consent (FPIC).

Under Component One of the Project, national mechanisms to address habitation will involve the formulation of building codes for infrastructure within coastal areas, which are currently nonexistent in country. These innovative codes will be the first of their kind in the country, to take into consideration the anticipated impacts posed by climate change and variability, inclusive of increased temperature, storm intensity, and sea-level rise.

Lack of and contested land rights are often a critical cause of conflicts. The project will ensure that the project activities - Under Component One - Pilot Social House, Component Two – weather monitoring stations, and Component Three - Beach renourishment – have been secured before any investments are made. Involuntary resettlements will not be pursued. However, if grievances do arise, national stakeholders have 15 grievance redress mechanisms available for conflict resolution lined to various areas of conflict (Part III Implementation Arrangements).

The project has also been prepared following some of the stated sectorial intentions to adapt to climate change from the Nationally Determined Contributions, Belize's Third National Communication, the Integrated Coastal Zone Management Plan, and the National Climate Change Policy, Strategy and Action Plan, as stated previously in Part II D.

## F. Potential Duplication with Other Funding Sources

There is no duplication of efforts from other funding sources at the time of concept development. Rather the project creates synergies with other projects and implements actions that will complement and enhance other projects further contributing to Belize's resiliency. Relevant projects include:

The National Climate Change Communication Strategy and Action Plan (NCCCSAP) and the baseline for coastal inventory will utilize the insights and experiences accumulated during the **'Marine Conservation and Climate Adaptation Project' (MCCAP)**. The **Adaptation Fund**-funded MCCAP, which was concluded in September 2020, aided the CZMAI to implement components of the Integrated Coastal Zone Management Plan (ICZMP) to increase the protection of coastal ecosystems: mangroves, seagrasses, and tidal marshes. The MCCAP supported the implementation of mechanisms to improve the adaptive capacity

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of communities dependent on fragile marine resources by reducing the local community's dependence on fishing stocks via alternative livelihoods and educational campaigns. This Project also enhanced the execution of the Plan via the implementation of newly developed regulations and coastal development guidelines for zonation outlined within the Plan and to enhance education and awareness on climate change adaptation. The MCCAP KAP study will be a valuable input document for the development of the NCCCSAP.

Technical assistance has been provided for the development of a climate change communications strategy and action plan ~~for the which takes into consideration the gender equality for the~~ development of behavioral change ~~strategies in relation to~~ national climate change. This support has been provided under the Enabling Gender-Responsive Disaster Recovery, Climate and Environmental Resilience in the Caribbean **(EnGenDER) project, funded by Global Affairs Canada (GAC), the Department of International Development (DFID), and co-financing from UN Women, Caribbean Disaster Emergency Management Agency (CDEMA) and UNDP, and implementation by UNDP,** that aims at supporting improved climate resilience for women and girls and key vulnerable populations and future generations in the nine Caribbean countries. ~~Financial support is provided by Canada (GAC) and UK (DFID) and UN Women, Caribbean Disaster Emergency Management Agency (CDEMA) and UNDP. The project~~ ~~it~~ envisions achieving the integration of gender equality and human-rights based approaches into disaster risk-reduction (DDR), climate change adaptation and environmental management frameworks to address current gaps. Total financial allocation for Belize is approximately USD \$851,000. this ~~v~~ via sustainable action embedded in national and regional decision-making processes, the project intends ~~. This will be done by~~ strengthening capacities for gender-responsive climate change action and disaster recovery and ensuring that governance and decision-making are accessible to women, and address gender equality. There are various entry points currently being identified under the project for Belize.

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The **Building Sector Reform Project** within the Ministry of Infrastructure Development and Housing financed by the Government of Belize, with an approximated financing of BZD \$96,000, has as its main objective the implementation of the amendments made to the Belize Building Act in 2017. This Act mandates the development of national housing policy and building codes. The reform project complements the development of the National Housing Policy. Climate change is considered an important guiding factor in the development of both codes and policy, for the reform to be in line with the Country's sustainable development goals and initiatives. Climate change is considered an important guiding factor in the development of both codes and policy, for the reform to be in line with the Country's sustainable development goals and initiatives. The human capacities established under the Building Sector Reform project were utilized for developing component 1 Outcome1.

The **UNDP Fourth National Communication and First Biennial Update Report Project** valued at USD \$50,000, funded by the Global Environment Facility (GEF) and implemented by UNDP, aims at assisting the country in deepening the integration and mainstreaming of climate change into national development goals, coordinating efforts among different actors and sectors to address climate change. The project will enable Belize to respond to international environmental obligations by strengthening the institutional and technical capacity of government agencies, NGOs, and the private sector. The project is supporting the availability of quality information on topics that are in line with UNFCCC decisions included in the National Communications by Non-Annex I Parties: (a) national inventory of anthropogenic emissions by sources and removal by sinks of all greenhouse gases not controlled by the Montreal Protocol, to the extent its capacities permit, using comparable methodologies promoted and agreed upon by the COP; (b) a general description of steps taken or envisaged by the Non-Annex I Party to implement the Convention; and (c) any other information that the Non-Annex I Party considers relevant to the achievement of the objective of the Convention and suitable for inclusion in its communication, including, if feasible, materials relevant for calculations of global emission trends. In addition to producing the Fourth National Communication report, the project along with the EnGenDer (USD 79,870) is financing Phase 1 under Component III – Research on the coastal system functioning and design of recovery and stabilization project and planning actions for the identification of engineering alternatives for erosion control and shore protection and establishing the technical and design parameters of the proposed solutions. Valued at USD \$50,000 in support. Research on the coastal system functioning and design of recovery and stabilization project and planning actions for the identification of engineering alternatives for erosion control and shore protection and establishing the

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~~technical and design parameters of the proposed solutions.~~ Extended assessments under the FNC will consider socioeconomic and biophysical aspects of vulnerability.

Another initiative with which the project can create synergies is the ‘**Capacity Building for Climate Vulnerability Reduction**’ in Belize being funded by the Inter-American Development Bank (IADB). Through this project, studies ~~were~~ will be carried out to develop a coastal risk profile for erosion and flooding and to recommend risk management actions for Belize’s coastal zone. The project, which commenced in July 2019, was completed in early 2020 covering assessments of hazards, exposures, vulnerabilities, and identification of high-risk-hotspots as well as recommendations of mainly nature-based solutions to address natural hazards. Results from components under the IDB project will be directly linked to this Project and aid in the provision of necessary baseline data and mechanisms for improvement. Outputs will directly complement this project and aid in informing decisions.

The **Energy Resilience for Climate Adaptation Project (ERCAP)**, ~~funded by the Global Environment Facility via The World Bank~~, will strengthen the National Meteorological Service for 1: Long Term Planning and Capacity Building for Adaptation in the Energy Sector: the NMS will receive six hydro-meteorological automatic stations and six automatic rain gauges to be placed in the Macal River basin for the monitoring of rainfall and water inputs to the Chalillo dam; 2: Measures to Enhance Resilience of the Energy Sector: the NMS has requested fourteen automatic weather stations, (ii) two field vehicles, (iii) a lightning detection system, (iv) training in radar image interpretation, (v) calibration of the radar to provide more accurate data and (f) updated software for the manipulation and display of radar data. The ERCAP is providing 23 full weather stations 12 of which will be located along the coast of Belize as well as offshore. Under component 2.2, a physical workstation type PC or server will be purchased to run DELT FEWS and 3D model software. This activity will also be coordinated with the ERCAP project since DELT FEWS will be installed and run for the Macal River modeling portion of the ERCAP project. Under ERCAP a lower specified PC will be running FEWS however to add the 3D model capabilities a more powerful machine will be needed. ~~The ERCAP Project is funded by the World Bank and Global Environment Facility’s Special Climate Change Fund and is implemented by the Belize Electricity Limited and the Ministry of Public Service, Energy and Public Utilities. The project has approximately USD \$836,000, with USD \$200,000 allocated for support to the National Meteorological Service.~~ Another complementary project with the NMS involvement is the **Climate Risk Vulnerability Reduction Program** ~~financed by the Inter-American Development Bank (IDB)~~. This project will strengthen data collection mechanisms to feed into its system; i.e. enhance the operation of the climate risk information system.

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There is also the possibility of creating synergies between the concept note that was submitted to [the Green Climate Fund \(GCF\)](#), “**Mainstreaming Coral Reef Resilience and Restoration as an Ecosystem-based Adaptation Strategy to Climate Change in the Caribbean Region**” (MaCREAS). This is a regional concept, which includes Belize, Dominican Republic, Jamaica, Saint Vincent and the Grenadines, Saint Lucia, and Barbados. The project will focus on rehabilitation through reef restoration activities in areas of ecological significance in the region. Strengthening of the reef system will directly benefit this AF project concept as reef systems provide substantial shoreline protection, which ties in directly to resilient habitation and decreasing vulnerability of the coast. While both projects are focusing on decreasing the impacts of climate change there is no duplication of efforts.

Another concept note, “**Enhancing Coastal Resilience Against Climate Change**” is also in the pipeline with GCF, to be implemented in Antigua and Barbuda, Barbados, Belize, Grenada, Jamaica, Saint Lucia, and Saint Vincent and the Grenadines. This concept focuses on three main areas for adaptation; it will focus on enhancing livelihoods of the most vulnerable people and communities, increase the resilience of health and well-being, and food and water security, and enhance coastal protection, and improve the resilience of ecosystems. Synergies with this pipeline project can be created in their objective to enhance coastal protection. This may be achieved by coastal stabilization through mangrove rehabilitation, coral reef restoration, and integrated coastal stabilization, and integrated watershed management and coastal area management. These will be achieved by identifying and selecting initiatives and subprojects that are consistent with the criteria that they will set. Although the initiatives are not in place yet, it is possible to note that synergies can be established to increase resilience in vulnerable coastal communities and duplication

can be avoided through the communication of efforts. The proposal for this concept is now being developed for submission.

## **G. Project's Learning and Knowledge Management Component to Capture and Disseminate Lessons Learned.**

The project will follow AF standards for Knowledge Management (KM) and advocacy. The strategic framework for the KM, Advocacy & Communication Strategy (KMAS) for this project - based on aims, objectives, and best practices regarding knowledge management (KM), advocacy, and communications – will be integrated into the National Climate Change Communication Strategy and Action Plan (NCCCSAP). Throughout this project, a wealth of data, information, and valuable knowledge concerning community vulnerabilities, and especially those of women, youth, and indigenous peoples (in line with the AF gender policy) and resilience to climate change will be generated at the community and national levels. To ensure that useful lessons and experiences gained are successfully captured, retained, utilized, and shared throughout the project, a clear KM, Advocacy & Communication Strategy (KMAS) accompanying actionable work plan will be formulated as a point of reference for all project staff and implementing partners. The use of this strategic framework and work plan will facilitate the effective coordination of resources and efforts at all implementation stages, monitoring, and evaluation. Knowledge Management at the project level will be achieved through the development of appropriate actions (gathering data; analyzing processes, results, and personal experiences; generating and disseminating knowledge products and lessons learned, etc.) so that the knowledge captured is shared to reach the largest number of stakeholders swiftly. A strong and actionable work plan allows effective knowledge sharing, advocacy, and communications. Once knowledge products and lessons learned have been generated and developed, they will be effectively communicated and shared with specific target groups and audiences as well as the public.

The core benefits of a successful KMAS/NCCCSAP are: a) Improves visibility of project activities and results to raise awareness on climate change impacts and adaptation at multiple levels and especially for women and youth; b) Enhances capacity for knowledge retention and reuse (at community, national and international level, including specific focus on women and youth); c) Enhances knowledge sharing and increases collaboration (within and across communities, relevant institutions, and organisations, including specific focus on women and youth); d) Improves learning (organizationally, locally, and globally); e) Strengthens accountability vis-à-vis project delivery and compliance with environmental, social, gender, youth, and human rights standards; f) Increases project impact through learning and access to information, including specific focus on women and youth; g) Avoids duplication; h) Facilitates modification of current and future projects based on lessons learned; i) Strengthens stakeholder/knowledge networks, including specific focus on women and youth J) Contributes to normative work of the national-level Government agencies, local government (e.g. NAVCO/DAVCO/town councils/village councils), and other stakeholders.

Implementation of KMAS/NCCCSAP will support the component and activities of this project to capture and share lessons and promote pro-environmental behaviors. Project results and lessons learned can be, depending on the strategy set out in the NCCCSAP, disseminated at national and international levels through conferences, symposia, meetings, workshops, various publications in peer-reviewed journals. Furthermore, other means such as radio, TV, newspapers, YouTube, Facebook, and video documentaries will be used as well to share and communicate project results, outcomes, and lessons learned. Learning and knowledge management will also be an integral part of the M& E framework. Therefore, the Project Management Unit (PMU) will be required to collect, document, and facilitate the dissemination of the project results and lessons learned.

Component Four focuses on awareness-raising and knowledge dissemination. The NCCCSAP/KMAS will be implemented under this component. This will be a key part of ensuring the sustainability of the project by building local capacity. Before implementation, lessons learned from similar projects/activities will be integrated. All lessons learned during the project development and implementation phases will be documented and shared to ensure wide dissemination of results, best practices, and lessons. The KMAS/NCCCSAP will boost climate change awareness within sectors and all coastal communities for

improved coastal planning, habitation, and monitoring. As the effects of climate change are visible in some communities and sectors, but the linkage to climate change and its future effects are not clearly understood, awareness-raising initiatives are important to build the resilience of local communities to adapt to imminent threats and promote ownership of initiatives.

There are provisions for knowledge management within each component. Under Component One the development of a habitation policy and the formulation of regulations for Belize's coastal guidelines will be heavily reliant on active stakeholder consultations in coastal communities. The entities undertaking the activities will provide the public with information via national media houses and social media platforms. Information obtained from the implementation of Component Two will be linked to existing web-based platforms as well. Data collected from tidal gauges and the National Meteorological Service's automated stations will be linked to the Service's web-based data management system providing real-time data for Belize. The web-based system will inform other initiatives of the Service such as the common alert protocol and the early warning system alerting protocols thereby protecting the lives of Belizeans. Similarly, the Beach Erosion Monitoring Program, which will be spearheaded by the CZMAI, will provide data for analysis at periodic intervals for the proactive formulation of mitigation and adaptation mechanisms to coastal erosion. Lines of communication will be open during the implementation of Component Three in the two selected coastal communities. This will keep communities abreast of activities and ensure active participation, transparency, and knowledge sharing.

The gender action plan of the project (Annex 1 Gender and Social Assessment) aims to ensure equal participation of men and women and to integrate the gender-related needs of the local communities into the technical design and the way the project is implemented. The Gender Action Plan describes the proposed measures to be included in the project design and implementation to promote gender equality and mainstreaming in the activities and consequently the outputs of the project. In particular, it focuses on the gender concerns relating to equal access to opportunities, participation in decision-making, women's access to training and practical skills, and how the plans/strategies developed will ensure equal opportunities for women. Overall, the main approaches were undertaken so far, or to be undertaken, are 1) Conducting consultations with both genders to ensure the equal consideration of the perspectives of women and men, 2) Gender sensitivity in the project's implementation, and 3) Encouraging women to take staff and consultancy positions in the project. Proper consideration will be provided to pursuing a gender balance among staff/consultants/stakeholder beneficiaries, and in all procurement processes, in line with the NIE's commitment to Gender Equality and Equity. Remuneration will be based on the work requirements, irrespective of gender.

## H. The Consultation Process

The project has been designed based on the outcomes of consultations at the national and community level. Consultations with government institutions, community members, NGOs, researchers, etc. took place to inform the communities of the project development, develop a mechanism for stakeholder involvement in the process, and receive feedback on proposed activities (~~Table 20~~Table 22). Consultations with community representatives, a.o. women took place to identify their specific views on the project and to ensure equal distribution of benefits (Annex 1 Social and Gender Assessment). Selected findings of the Social and Gender Assessment indicate: (i) Women leaders in the communities and NGO/Government/Statutory agencies ensure female participation in the project, (ii) Belizean women are increasingly becoming better equipped to undertake the roles that used to be reserved for men, however, some women in the beneficiary communities prefer to adhere to the culturally/traditionally assigned gender-specific roles and decision-making by elders, (iii) During natural disasters, women are disproportionately affected, especially in female-headed households, (iv) Stakeholders were supportive of the project and felt that the proposed activities were beneficial to Belize's coastal communities.



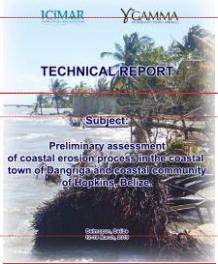
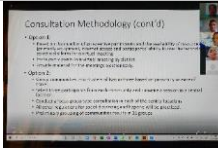
The consultative process was conducted to ensure the equitable participation of men, women, youths, vulnerable groups, indigenous communities and all cultural ethnicities within Belize. The dynamics of cultural rules and norms were taken into consideration in planning for and during the engagement process. Given the Covid-19 pandemic a variety of engagement methodologies were used to effectively involve communities and attain feedback for incorporation from all stakeholders on the proposed activities within the project. Members of communities included, but were not limited to, the following cultural ethnicities: Creole, Mestizo, Maya, Garinagu and East Indian. Traditional communities known for their customary fishing practices such as Sarteneja, Chunox, Punta Negra and Hopkins were also consulted.

Both Indigenous Groups in Belize were consulted during the session in the Belize, Stann Creek and Toledo Districts. Members of the Garifuna community were consulted as part of the consultations in the southern part of the country (Gales Point, Independence, Dangriga), as many of the communities are along the coast in that area. The Maya communities, which are most located inland in the Southern District of Toledo, were consulted during the state level consultations. The traditional rights of the Garinagu and the Mayas are integral to the successful implementation of the project, including Component 1.1. Key Partner Agencies have also conducted sector specific consultations with traditional and indigenous communities during the development of their project components. In addition to the individual engagement via community stakeholder consultations, the Belize National Indigenous Council (BENIC) was also consulted.

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The Implementing Entities and Key Partner Agencies are cognizant of the need to continuously engage and involve all communities during project implementation. To ensure this continued involvement, project components were developed to utilize the functional capacities of the communities to actively assist in the implementation of project components. The functioning of the Coastal Advisory Councils will also ensure the continuous flow of information to and from communities for decision making by the Implementing Entities. The latter will be accompanied by the periodic community consultations that are planned under the projects M&E and which have been incorporated into individual project components by Key Partner Agencies. Furthermore, training under Component 4 will be extended to all coastal communities to monitor and report real time data/updates for decision making to the relevant agencies.

Table 20: Initial consultation outcomes and conclusions  
 Table 22: Initial consultation outcomes and conclusions

Stakeholder/Community	Objective of Session	Outcome	Evidence
Stakeholder Consultation Dangriga and Hopkins Village March 13 <sup>th</sup> and 14 <sup>th</sup> 2019	Field visit to the coastal town of Dangriga and coastal community of Hopkins with the objective to identify the various natural and human factors affecting coastal erosion.	Identification of prospective sites for erosion control interventions and the identification of potential assessments required to devise effective erosion adaptation solution.	
Javier Sabido – NAVCO Virtual, 11 Sept. 20	Inform the national village council and request support to organize community consultations.	NAVCO is positive about the project and supports to organize community consultations in villages received.	

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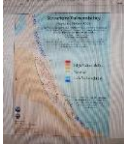



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<p>IHCANTIABRIA/IDB Virtual, 16 Sept. 20</p>	<p>Map lessons learned from other projects/ assess synergies</p>	<p>Relevant aspects of Belize's Disaster Risk Profile research integrated into feasibility analysis (Annex 2)</p>	
<p>Stakeholder Session (Corozal) Chunox, Sarteneja Copper Bank Chunox, 3 October 2020</p>	<p>Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.</p>	<p>Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment. Recommendations: GoB needs to monitor and ensure compliance. housing codes need to enforce the mangrove regulations; coastal zone management. Indicate the need for communications.</p>	
<p>Stakeholder Session (Corozal) Corozal Town/Altamira, Consejo, Corozal Town, 3 Oct. 2020</p>	<p>Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.</p>	<p>Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment. Recommendation: Consider alternative energy sources that are less expensive. Worried about groundwater contamination. Indicate the need for communications.</p>	
<p>Stakeholder Session (Toledo) Forest Home Punta Gorda, 10 Oct. 2020</p>	<p>Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.</p>	<p>Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment. Highlight: Want more consultations with council chair present.</p>	<p>Please refer to the stakeholder consultation report for the registration list.</p>
<p>Stakeholder Session (Belize District) St. George's Caye, Belize City, Ladyville, Belize City, 17 Oct. 2020</p>	<p>Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.</p>	<p>Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment. Recommendations: Need for protection and management of mangrove areas; development of a management plan for the cayes; development plans and land use laws, zoning regulations; improved governance structures at the central and local levels; monitoring and compliance; Legislation that includes building codes; a minimum standard for building construction in the city for people who don't have the resources; Awareness and education. Need flood/shoreline protection.</p>	

Stakeholder Session (Belize District) Gales Point, Mullins River Gales Point, 17 Oct. 2020	Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.	Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment. Worried about water due to droughts affecting supply. Want erosion controlled.	
Stakeholder Session (Belize District) San Pedro Town, Belize City Virtual, 22 Oct. 2020	Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.	Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment. Recommendations: Proper development planning, zoning; collaboration, and communication with local authorities. Worried about flooding and advocate EWS& mangroves. Positive about beach nourishment. Indicate the need for communications. Useful to have the GIS capabilities in the CZMAI.	Please refer to the stakeholder consultation report for the registration list.
Stakeholder Session (Stann Creek) Riversdale, Maya Beach Maya Beach, 23 Oct. 2020	Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.	Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment. Highlights: Suffering from Climate Change impacts& saltwater intrusion; no zoning regulation.	Please refer to the stakeholder consultation report for the registration list.
Stakeholder Session (Stann Creek) Placencia Placencia, 24 Oct. 2020	Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.	Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment. Highlights: Want to collaborate.	Please refer to the stakeholder consultation report for the registration list.
Stakeholder Session (Stann Creek) Dangriga Dangriga, 24 Oct. 2020	Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.	Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment. Highlight: Advocate for decentralization and collaboration. Suffer from saltwater intrusion. Happy that the town was chosen as a pilot. Advocate for control of man-made causes. Indicate the need for communication.	Please refer to the stakeholder consultation report for the registration list.
NGOs & Independence, Virtual, 28 Oct. 20	Inform about the project concept and receive feedback on relevant aspects, including their interventions.	Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment. NGOs collaborative support for implementation obtained.	

Timothy Hawthorne (UCF) Virtual, 10 Dec. 20	Learn about UCF's PGIS research at Hopkins	Relevant aspects of UCF PGIS research were considered, and UCF was identified as a potential partner.	
Executing Entities and Lead Agencies 20 Nov., 17 Nov., 5 Nov., 29 Oct., 27 Oct. 20	Understand each project component, related aspects, and synergies	Detailed discussions with entities about each project component, synergies, and related climate change and policy issues, beneficiaries, financial, gender, and social aspects (Annex 3 Consultation Report).	
Media Appearance (Love FM) 24 Nov 20	Sensitize national stakeholders on the objectives of the project	Discussion of the projects objective and intended outputs on national television to increase stakeholder knowledge of the project components.	
<u>Stakeholder Consultation (Hopkins Village)</u>  <u>15<sup>th</sup> February 2021</u>	<u>Inform about project activities and receive feedback on relevant aspects, vulnerability, social, gender.</u>	<u>Community expressed the need to address erosion as well as other environmental factors in the communities that have resulted in major flooding over the past 2 years during storm events. Highlights: Want to collaborate and be actively involved in the long-term monitoring program and to receive training that will better enable them to safeguard their community and way of life</u>	  <a href="#">Please refer to stakeholder consultation report for registration list</a>
<u>Stakeholder Consultation (Belize National Indigenous Council - BENIC)ENIC)</u>  <u>16<sup>th</sup> February 2021</u>	<u>Inform about project activities and receive feedback on relevant aspects, vulnerability, social, gender.</u>	<u>Belize National Indigenous Council (BENIC) expressed gratitude for being consulted as a group during the development of the project. They requested to be continuously engaged during project implementation and indicated that the project has no negative impact on the traditional rights of their member communities and are in support of the project.</u>	

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## I. Justification for Funding Requested, Focusing on the Full Cost of Adaptation Reasoning.

Ongoing measures to address national needs for adaptation and habitation have produced some results and increased the country's resilience. However, these initiatives need to be built on further to fully ensure climate resilient coastal communities, thereby protecting the lives of flora, fauna, and man. The effects of improper planning void of climate variability considerations, poor infrastructural development, and coastal erosion compounded by sea-level rise are already visible within heavily populated coastal areas of the

country. These have resulted in the loss of cultural assets in some communities, housing, community infrastructure, and beaches. As such, there is a need to devise concrete long-term solutions to address the safety of these coastal communities.

The proposed project components, outcomes, and outputs fully align with 1) national, community, and institutional priorities and gaps, with 2) identified community/vulnerable groups' needs and 3) with the Adaptation Fund outcomes. This alignment has resulted in the design of a comprehensive approach in which the different components strengthen each other and in which outputs and activities are expected to complement Belize's current climate change responses and corresponding institutional capacities.

The cost per beneficiary ranges from US\$0.30 per person (component 4.1) to US\$9.36 per person (component 3). The average cost for the project is US\$2.83 which is low considering its significant contribution to Belize's climate change adaptation efforts and the project's contribution to strengthening professional, academic, and local capacities. ~~Table 21~~ ~~Table 23~~ provides a justification for funding requested, focusing on the full cost of adaptation reasoning.

~~Table 21 Funding Justification~~  
~~Table 23: Funding Justification~~

Expected Result	Baseline Data	Additional with AF	Comments and alternative adaptation scenarios <u>Adaptation Reasoning</u>
<b>Component 1: Improving coastal land use for resilient habitation and sectoral activities</b>			
<b>Outcome 1.1</b> Improved National Housing Policy with clear a specification for coastal habitation and National Building Code with specifications for the coastal zone	Zero National Housing Policies with clear a specification for coastal habitation	One National Housing Policy with clear a specification for coastal habitation developed	<del>The alternative is to retain the status quo, however, that would entail that</del> <u>In retaining the status quo</u> the citizens will continue to suffer from climate hazards. Without a proper housing policy and building codes, as recent experiences with tropical storms, Eta and Iota have once again indicated, housing in Belize NOT climate resilient. A national housing policy, a crucial guidance tool, will address issues of land tenancy, land use planning, zoning, rentals, financial plans, subsidies, building codes, etc., and adhere to national sustainable development plans and initiatives. Building codes are urgently needed as they will establish the minimum requirements to be considered when building, to adequately safeguard the health, safety, and welfare of building occupants.  <u>Complementary activities under the Building Sector reform project are set to be completed by May 2021, providing the required baseline information for the completion of this activity.</u>
<b>Outcome 1.2</b> Improved Integrated Coastal Zone Management Plan and associated management guidelines for zonation to promote and enforce resilience measures	One Integrated Coastal Zone Management Plan without associated management guidelines for zonation	Drone mapping and ground-truthing conducted and Coastal Land Use Inventory updated	<del>There are no alternative scenarios.</del> The mandate to create legal instruments for the implementation of national development guidelines contained within the ICZMP due to Belize's central government system. Currently, the guidelines have no legal power and are being used merely as a suggestive recommendation for coastal development. The absence of a legal framework for their implementation has resulted in the unwarranted development in climate-vulnerable areas of the country. This proposed project will further aid the CZMAI to implement and enforce the provision of the coastal planning guidelines within three of the national planning regions, North, Central, and Southern.

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			<p><u>There are no complementary activities (co-financing) that would affect the successful implementation of this project activity.</u></p>
<p><b>Component 2: Coastal Vulnerability Monitoring</b></p>			
<p><b>Outcome 2.1</b> Strengthened institutional capacity for saline data collection</p>	<p>NHS (national level) has limited capacity to conduct saline intrusion research</p>	<p>Qualitative and quantitative research data on soil salinity were conducted to reduce the saline intrusion risk available.</p>	<p><u>The continued extraction of water from underground aquifers and rivers, in the absence of scientific data to regulate extraction may result in the limited availability of water resources for the country. As the country currently relies heavily of underground aquifers and rivers for the supply of potable water to communities and for sectoral activities. It is crucial that we understand the dynamics of water utilization in country and the characteristics of water sources, especially given the predicted changes to rainfall which would affect water availability. Alternative adaptation scenarios are the enhancement of rainwater harvesting. However, this is not feasible from a cost perspective and because there is insufficient rainfall to meet the needs of Belize's agriculture sector. Besides rainfall, it is unpredictable due to climate change patterns.</u></p> <p><u>There are no complementary activities that would affect the successful implementation of this project activity. Assessments and other water sector interventions will enable a comprehensive understanding on the availability of the country's water resources.</u></p>
<p><b>Outcome 2.2</b> Strengthened institutional capacity to reduce beach erosion risks</p>	<p>CZMAI (national level) has limited capacity to conduct beach erosion research</p>	<p>Qualitative and quantitative research data outlining coastal beach erosion available</p>	<p><u>There is limited financing in country to effectively monitor erosion sites via government agencies. Additionally, erosion along coastal communities are not monitored on a regular basis in order to determine the characteristics of the event or determine possible immediate solutions. The establishment of a national program, will enable the relevant entities such as the CZMAI, to determine periodically the state of the coastal zone in a effort to proactively devise solutions that would result from significant erosion in vulnerable areas.</u></p> <p><u>There are no complementary activities (co-financing) that would affect the successful implementation of this project activity. The alternative to this prevention measure would be to invest in adopting more protection strategies, such as engineering solutions. These are more capital-intensive. Setting up an Early Warning System is generally a low-cost option for alerting people, giving advance notice of impending flood, storm surge, and other hazards, allowing emergency plans to be put into action to save guard lives and property with existing and adequate forecasting and monitoring services.</u></p>

<p><b>Outcome 2.3</b> Strengthened institutional capacity to <u>develop a coastal early warning system and model storm surge</u> reduce coastal flooding and storm surge risks</p>	<p>NMS has limited capacity to <u>model storm surge</u> conduct coastal flooding and storm surge research</p>	<p><u>Modeling of storm surge</u> via <u>R</u>research data <u>obtained</u> on coastal flooding and storm surge risks reduction available</p>	<p>The alternative to beach erosion monitoring, a prevention measure, would be to invest in adopting more protection strategies, such as engineering solutions. These are more capital-intensive. This activity will enable the real-time attainment of weather data to be used within the coastal early warning system. In the absence of this data, there are gaps that inhibit the MET Service from providing optimal information to national and community disaster response agencies. In anticipation of climatic impacts such as increase in storm intensity and frequency, this information and the establishments of the system for early warning will enable proactive responses.</p> <p>There are no complementary activities (co-financing) that would affect the successful implementation of this project activity. The complementary activity identified, the ERCAP Project, will further expand the national network.</p>
<p><b>Component 3. Beach stabilization of High-Risk Coastal Areas</b></p>			
<p><b>Outcome 3.1</b> Increased adaptive capacity within Hopkins and Dangriga communities through infrastructure and /or soft structure assets</p>	<p>Hopkins and Dangriga are under threat due to climate change</p>	<p>Engineering solutions in Dangriga and Hopkins successfully established</p>	<p><u>Alternative adaptation scenarios</u> In the absence of this intervention communities and homeowners may be forced to <u>are migrate and -resettlement in other portions of the country. Some communities may be lost completed to the Caribbean Sea, resulting in loss of traditional ways of life, physical infrastructure and cultural assets. Such pilot interventions enable communities to reclaim land/beaches loss and safeguard physical infrastructure. As majority of the communities along the coast are fishing communities, the resettlement of persons in other parts of the country would alter many persons traditional way of life, or the construction of larger drainage channels, which are not feasible from a cost perspective and environmental and social risk point of view and will also not have the benefit of water supply. Due to the severe historical flood impacts, community-level flood reduction interventions won't reduce flood impacts enough.</u></p> <p><u>Co-financing activities are well underway under the FNC and the FBUR. Alternative solutions, in the event of further Covid19 restrictions, have been identified to avoid any potential delays. This will enable the timely implementation of the project intervention.</u></p>
<p><b>Component 4. Awareness raising, knowledge dissemination and capacity strengthening</b></p>			
<p><b>Outcome 4.1</b> Strengthened awareness and ownership of adaptation and climate risk reduction at the national and subnational levels</p>	<p>Limited awareness of predicted adverse impacts of climate change, and appropriate responses among the national population</p>	<p>NCCCSAP activities related to this project successfully implemented using written, audio, and visual materials</p>	<p>An alternative adaptation scenario is to focus more on regulating behaviors. This will, however, cause undesirable conflicts with citizens. Additionally, <u>T</u>he Government of Belize does not have adequate resources for policing destructive practices. Hence <u>C</u>ommunication and education, <u>on the other hand,</u> will encourage pro-environmental behaviors and enable adaptation practices that will safeguard communities in a changing climate.</p>

<p><b>Outcome 4.2</b> Strengthened institutional capacity of the Government of Belize and stakeholders to reduce climate risks</p>	<p>Limited awareness of predicted adverse impacts of climate change, and appropriate responses among the national population</p>	<p>NCCCSAP activities related to this project successfully implemented using written, audio, and visual materials</p>	<p><del>An alternative adaptation scenario is to focus more on regulating behaviors. This will, however, cause undesirable conflicts with citizens. Additionally, the Government of Belize does not have adequate resources for policing destructive practices. Communication and education, on the other hand, will encourage pro-environmental behaviors. There is the need to build the capacity of entities, government agencies, sectors, and communities in order to facilitate the effective adaptation to climate change. Capacity building enables all entities the opportunity to function independently of continued technical support to build the climate resiliency of sectors and communities over a longer period of time.</del></p> <p><u>The co-financed activity, the development of the NCCCSAP is already underway.</u></p>
<p><b>Outcome 4.3</b> Strengthened institutional capacity of CZMAI and partners to reduce climate risks</p>	<p>Limited national level capacities to use GIS technologies</p>	<p>Officials trained and equipped with useful knowledge to use GIS technologies</p>	<p><del>There is no alternative to GIS technologies training. This modern-day effective tool has many applications. Its needs to be professionally and efficiently utilized, ed can in safeguarding the communities via the monitoring and recording of climate change impacts. This tool will also enable the collection of data, which can be utilized by the CZMAI and other agencies in the decision making processes and the long term monitoring of climate change impacts.</del></p> <p><u>There are no complementary activities (co-financing) that would affect the successful implementation of this project activity.</u></p>

## J. Sustainability of the Project

The proposed project intends to maintain the sustainability of all components via the integration of components within the institutional functioning of implementing entities (NCCO and CZMAI) and key partners (PACT, MIDH, NHS, NMS). The components of the project are embedded as national adaptation priorities and the priorities of partner institutions. Long term implementation and monitoring will be managed by the key partners with the aid of participating community groups, which will be strengthened under the capacity building activities of this project.

The project aims to sustain adaptation benefits achieved and replicate best practices after the end of the project through a combination of anchoring activities into existing government programmes, strategies, and projects, including for policies and maintenance by sharing lessons and best practices. The projects have been described in Section F.

**Institutional/Policy sustainability:** The project strengthens national policies and mandates. The Housing Policy and Building codes (Component 1.1), Coastal Zone Management (Component 1.2), Saline intrusion (Component 2.1), Beach Erosion Monitoring (Component 2.2) are vital contributions of this project to Belize's preventive climate actions. The Housing Policy and Building codes benefit the nation, not just coastal communities. Moreover, under component 4 awareness and training will be conducted to strengthen relevant government capacities and best practices and lessons learned from all component outputs and outcomes will be shared at the national and sub-national level.

**Social sustainability:** By organizing and fully engaging community members and vulnerable groups in project activities, including assessments during project preparation and the development of plans/strategies and monitoring, the project aims to achieve long-lasting awareness and capacities of community members.

Moreover, community members will be trained to support pro-environmental behaviors. By bringing in positive behavior changes, the risk of flooding will be reduced. By adopting this strategy, the project will also promote ownership.

Economic sustainability: Investing in increasing resilience is a sustainable economic approach. It will reduce future costs related to erosion and flood impacts. The project will ensure that workers are used from the local communities and the investments under component 3 will result in enhanced capital liquidity in the Dangriga and Hopkins. Additionally, safe housing will benefit the tourism sector and soil salinity monitoring will benefit the agriculture sector as well.

Financial sustainability: The average cost for the project is US\$2.83 which is low considering its significant contribution to Belize's climate change adaptation efforts and the project's contribution to strengthening professional, academic, and local capacities. The project builds on cost-effectiveness strategies to enhance the project's impact: strategic partnerships with academic institutions, communities, and NGOs, enhancing youth professional capacities (student partnership).

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Technical sustainability: Belize's institutional framework is backed up by knowledgeable and dedicated professionals. Various policy documents emphasize the need for stronger capacities. As State institutions have limited funding, and technologies progress over time, there's an urgent need for capacities to be strengthened to promote adaptation efforts and the effective implementation of technical solutions. Successful pilots exist and through this project, these will be scaled up and strengthened, opportunities for complementarity utilized to increase the impacts in the different areas of this AF proposal. Table 24 provides an overview of project outputs and arrangements envisioned to maintain and build on the efforts.

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Table 22: Overview of arrangements for sustainability

Table 24: Overview of arrangements for sustainability

Expected Concrete Outcome	Arrangements to sustain / maintain activities / interventions
Outcome 1.1 Improved National Housing Policy with clear a specification for coastal habitation and National Building Code with specifications for the coastal zone	The developed tools for long-term development National Housing Policy and building codes and ICZM zonation guidelines are crucial to climate change adaptation efforts as they will consider climate change/disaster risks developed using internationally accepted tools and guidelines such as International Guidelines on Urban and Territorial Planning. They will be used beyond the lifespan of the project as well.
Outcome 1.2 Improved Integrated Coastal Zone Management Plan and associated management guidelines for zonation to promote and enforce resilience measures	The development of a social housing prototype enables the citizens, especially the poor and lower-middle-income citizens to better understand the dynamics of construction concerning all climate vulnerabilities and validate the newly developed building codes while identifying viable alternatives for their budgets.

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Outcome 2.1 Strengthened institutional capacity for saline data collection	The development of public-community-NGO partnerships will enhance monitoring efforts and act as a catalyzer to enhance dialogue and partnerships for future interventions. NGOs active in the areas of this component, and possible partners, include Toledo Institute for Environment and Conservation (TIDE), Southern Environmental Association (SEA), and Sarteneja Alliance for Conservation and Development (SACD). The University of Belize is also interested in collaborating in the adaptation efforts of the project.
Outcome 2.2 Strengthened institutional capacity to reduce beach erosion risks	
Outcome 2.3 Strengthened institutional capacity to reduce coastal flooding and storm surge risk	
Outcome 3.1 Increased adaptive capacity within Hopkins and Dangriga communities through infrastructure assets	The data resulting from the research/monitoring interventions under this project will enable the detection of climate hazards sooner and provide government and partners with more time to adopt responses.
	Guidance for the establishment and agreement of the risk reduction measures will be identified collaboratively between communities and government. Also discussed will be the sustainability of interventions through collaborative maintenance arrangements.
	This component will share the knowledge and insights gained during this intervention to enhance dialogue with other coastal communities. The availability of the report on the pilot beach stabilization process will facilitate dialogue to identify appropriate solutions for the other coastal communities.
Outcome 4.1 Strengthened awareness and ownership of adaptation and climate risk reduction at the national and subnational levels	Community awareness-raising is included regarding all the project components. By capitalizing upon the policy provisions, by building partnerships with and inclusion of community groups, local civil society organizations, and local government institutions and service providers, it is expected that the project will provide the necessary platform among these groups for having direct stakes and benefits (ownership) to reduce the risks of flooding and contamination levels. Pro-environmental behaviors will continue beyond the duration of this project.
Outcome 4.2 Strengthened institutional capacity of the Government of Belize and stakeholders to reduce climate risks	This component contributes to equipping stakeholders with the tools to realize pro-environmental behaviors. Training guides, capacities, and technologies envisioned will be widely used tools available to facilitate future training programs.
Outcome 4.3 Strengthened institutional capacity of CZMAI and partners to reduce climate risks	

## K. Overview of the Environmental and Social Impacts and Risks Identified

The project is in full alignment with the Environmental and Social Policy (ESP) and the Gender Policy of the Adaptation Fund (Annex 4 Demonstrating Compliance). The summary screening overview below addresses the safeguard areas of the ESP, identifying any potential environmental and social risks and impact that proposed project components may pose.

The design and implementation of all components of this project will ensure adherence to all environmental, social, and gender requirements of the Fund and will ensure the representation and consultation of all beneficiary groups including indigenous peoples, marginalized and vulnerable groups. This project will produce positive economic, social, and environmental impacts to the 27 coastal communities and the key economic sectors, tourism, in the coastal zone of the country, and in doing so – under component 1 extends its reach to the national level.

This project has been categorized as Category B concerning the potential environmental and social impacts that can be generated during the implementation of Component 3. Activities under this component for beach stabilization may result in some changes to the natural environment within the two selected sites of Dangriga and Hopkins. However, these impacts are minimal and can be easily mitigated.

*Table 23: Environmental and social assessment*  
*Table 25: Environmental and Social Assessment*

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
<i>Compliance with the Law</i>	X	Low/No Risk  The project document and the implementation of activities under this project will ensure compliance with all relevant national legislation and international laws (Feasibility Study Part II, Section Policy, and Legislation).
<i>Access and Equity</i>	X	Low/No Risk  This project will enhance the availability of basic human services such as housing, water, and quality of life through the implementation of project components. This project in no way compromises access of communities to basic health services, clean water and sanitation, energy, education, housing, safe and decent working conditions, and land rights.  A participatory approach has been integrated into the project's design (e.g. coastal advisory committees, community wardens, beach erosion monitoring network, knowledge transfer, data availability) and will be applied throughout the project. By sharing the lessons learned in Dangriga and Hopkins, component 3 will also benefit communities that could not be included in the pilot under this component.
<i>Marginalized and Vulnerable Groups</i>	X	Low/Moderate Risk  Marginalized and vulnerable groups will benefit from the project adaptation efforts by being protected against pending climate hazards. If infrastructure and monitoring are improved, man/woman/child/person with disability/ elderly in the community benefits.  This project will not impose any disproportionate adverse impacts on marginalized and vulnerable groups including children, women and girls, the elderly, indigenous people, tribal groups, displaced people, refugees, people living with disabilities, and people living with HIV/AIDS.  This project is expected to improve the ability of all groups including marginalized and vulnerable groups to adapt to the adverse effects of climate change by building the resilience of communities to address issues such as sea-level rise, coastal erosion, storm intensity, and frequency.
<i>Human Rights</i>	X	Low/No Risk  This project will respect and adhere to all relevant national legislation and international conventions on human rights. The project supports among others: the right to shelter: Component 1 addresses the right to safe housing; right to participation: local communities and other stakeholders will be fully engaged, right to use law: apart from the grievance redress mechanism the stakeholders have access to more than 10 other grievance redress mechanisms which Belize has, including but not limited to the judicial system, right to work: the project will employ under just and favorable conditions, not limited to equal pay of genders, rest and holiday, cultural rights: The project will adhere to good practices and engagement including the guidance provided by national Free Prior and Informed Consent protocols. It encompasses and enhances climate change actions (SDG 13), decent employment (SDG8), safe water (SDG 6), gender equality (SDG 5), and resilient settlements (SDG 11)

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<i>Gender Equity and Women's Empowerment</i>	X	<u>Low/No Risk-Medium</u>  All participatory and consultative processes will ensure the representation of women groups from all communities, gender experts, and NGOs. The project partners will deliberately seek Gender Equity and Female participation in consultation and project activities, e.g. through quota systems and /or the organization of separate working groups during the implementation. The stakeholders indicated that the project has no gender-specific activities (Consultation report Section II). Proper gender balance will be considered and where needed actively pursued, for example in project staffing. Female community members will be actively engaged. Gender-disaggregated data will be monitored.
<i>Core Labor Rights</i>	X	Low/No Risk  This project will adhere to the core labor laws and rights of all parties.
<i>Involuntary Resettlement</i>	<u>X</u>	<u>Low/No Risk</u>  <u>The components for this project do not include involuntary resettlement. It is the aim of Component 3 to restore coastal beach areas to avoid the displacement of local communities such as Dangriga and Hopkins. The design during phase 1 of component 3 (financed under FNC) proper assessment of the context-appropriateness regarding the recommended risk reduction measures.</u>
<i>Indigenous Peoples</i>	X	Low/Moderate Risk  All components within this project ensure that local communities and indigenous peoples benefit. Extensive stakeholder consultations have been conducted for all project components; particularly those relying on the participation of local communities for implementation and long-term sustainability. These consultations will improve the involvement of indigenous people in the project development phase respecting their needs and rights (e.g. FPIC).
<i>Involuntary Resettlement</i>	<u>X</u>	<u>Low/No Risk</u>  <u>The components for this project do not include involuntary resettlement. It is the aim of Component 3 to restore coastal beach areas to avoid the displacement of local communities such as Dangriga and Hopkins. The design during phase 1 of component 3 (financed under FNC) proper assessment of the context-appropriateness regarding the recommended risk reduction measures.</u>
<i>Protection of Natural Habitats</i>	X	<u>Low/No Risk/Moderate Risk</u>  The implementation of the coastal guidelines under Component One and the national assessments for coastal salinity and beach erosion monitoring program under Component Two and the beach stabilization under Component Three, serve dual purposes of protecting the lives and livelihoods of coastal communities and their members as well as improving the protection of natural coastal habitats by regulating development based on sound scientific principles. The coastal guidelines, for instance, provides for sustainable development which takes into consideration environmental protection. The latter limits development in areas with highly vulnerable ecosystems and those where development would have a high negative impact on the natural environment.  The extensive community consultations and their involvement under component 3 aim at identifying through the discussions the risks posed to natural habitats, and remedial measures for the protection thereof. If it is recommended that the Dangriga / Hopkins protection measures consist of mangroves or other nature-based solutions, the mangrove species will be tested for sustainability based on community participation because mangrove species that are not indigenous may affect the existing local ecosystem.
<i>Conservation of Biological Diversity</i>	X	Low/No Risk  No activity under this project will pose any significant reduction or loss of biological diversity or facilitate the introduction of known invasive species. There are no real risks to biological diversity under this project. The need for conducting EIA under the project components have been considered in section E.
<i>Climate Change</i>	X	Low/No Risk

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		This project will contribute to Belize's climate change adaptation and mitigation efforts. This project, in no way, is intended to increase greenhouse gas emissions or contribute to any drivers of climate change. Also, if the component 3 disaster risk reduction measure is the implementation of a nature-based solution, this will have a positive effect on capturing carbon emissions.
<i>Pollution Prevention and Resource Efficiency</i>	X	Low/No Risk  This project will ensure the maximization of energy efficiency, strive to avoid any potential pollution, and minimize the production of greenhouse gas. Under component 4.2 sargassum use/farming will be considered as a livelihoods strengthening strategy. This will contribute to waste utilization for compost/green energy purposes.
<i>Public Health</i>	X	Low/No Risk  This project contributes to the enhancement of public health via the provision of climate efficient building codes, limiting the development of inadequate zones in line with the coastal zone guidelines, strengthening a warning system, and monitoring saline intrusion in coastal communities, thus ensuring the provision of potable water to all coastal communities. Component 3 disaster risk reduction measures will protect Dangriga and Hopkins from climate hazards. This project will in no way compromise public health in project sites.
<i>Physical and Cultural Heritage</i>	X	Low/No Risk  This project embraces the protection of physical and cultural heritage in the coastal communities being targeted via the implementation of components 1, 2, and 3. It is the aim of the project to increase the adaptive capacity of the coastal communities to address issues such as coastal erosion that would result in the loss of land and thus physical and cultural heritage. By encouraging pro-environmental thinking and strategies, it will have a long-term positive impact to protect heritage assets.
<i>Lands and Soil Conservation</i>	X	Low/ <del>No Risk</del> <u>Moderate Risk</u>  This project will improve the productive capacity of productive lands in the coastal zone, by providing viable solutions for addressing the impacts of climate changes on farming activities via the analysis of data obtained from the saline assessment program under Component 2. The strengthening and implementation of the coastal zone guidelines, under Component 1, will for instance ensure that coastal development occurs only in selected areas to avoid any adverse impacts to land and soil conservation, which would occur as a result of vegetation removal. However, this component -through sector regulation- has a positive impact on even the inland communities.  <u>The activities under Component 3 will require the sourcing of materials of the restoration action. The project will ensure that no adverse impacts are posed to ecosystems were sand is sources. This will be done via a comprehensive assessment and the identification of alternative sources during project implementation.</u>

## PART III: IMPLEMENTATION ARRANGEMENTS

### A. Describe the Arrangements for Project Implementation.

The following mechanisms for project execution, coordination, and oversight have been agreed in close consultation with Protected Areas Conservation Trust (PACT), as the National Implementing Entity

(NIE); National Climate Change Office (NCCO) and Coastal Zone Management Authority and Institute (CZMAI) as Executing Entities (EEs); and the key partners: Ministry of Infrastructure Development and Housing (MIDH), National Hydrological Service (NHS) within the Ministry of Natural Resources and National Meteorological Service (NMS). The Ministry of Finance (GOB) is Belize's Designated Authority of the AF. The Ministry of Finance (GOB) is Belize's Designated Authority of the AF.

### **Project Governance**

Figure 13 depicts the organogram. PACT is the NIE with fiduciary management responsibilities. PACT also has an oversight role and will report to the Adaptation Fund. The EEs of the project are NCCO and CZMAI. Entities with project implementation responsibilities include NCCO, CZMAI, NMS, NHS, and MIDH. The NCCO is responsible for the execution of components 3 and 4.1, the CZMAI for components 1.2, 2.2, 4.2, and 4.3; the MIDH for component 1.1, the NHS for 2.1, and the NMS for 2.3.

### **Project Management Unit (PMU)**

A Project Management Unit (PMU) will be established with overall project management responsibilities – financial, monitoring, and reporting. The PMU will receive guidance from both EEs: the NCCO and the CZMAI. Physical placement Physical placement of the PMU will be at the NCCO office in Belmopan because various crucial institutions (e.g. PACT, Ministry of Finance, NCCO, etc) for this project are located in Belmopan. Physical placement of the PMU will be at the NCCO office in Belmopan because various crucial institutions (e.g. PACT, Ministry of Finance, NCCO, etc) for this project are located in Belmopan.

The PMU will consist of a Project Manager and Technical Officer. The PMU will provide daily project management support, oversight, management of fund flow, and executing partners' delivery. The Project Manager will be engaged to coordinate project implementation. The Project Manager will oversee and keep abreast of project progress and facilitate the implementation of the project, including overseeing and cooperating with the project teams in the various lead agencies. The Technical Officer will keep track of the progress made according to the indicators and steer project implementation under the various components. The Technical Officer will also keep track of the gender indicators and standards

The Project Management Unit will be responsible for managing the project activities and ensuring compliance with the commitments set out in the project document, Environmental and Social Policy, with 15 principles of Adaptation Fund, as well as providing day-to-day support to all partner institutions. The project manager will develop, in collaboration with the partner agencies, a Monitoring and Evaluation Plan during the project inception phase. The project manager will also monitor project implementation, if needed, through periodic visits to the intervention sites. The PMU will ensure that the project is implemented on time and monitor the inter-institutional interventions.

### **Project Steering Committee (PSC)**

A Project Steering Committee (PSC) drawn from a cross-section of stakeholders in the coastal resources management field with particular reference to the priority areas of the components will be established. The Implementing Entities will establish a PSC to provide oversight and technical guidance for the implementation of the project. The PSC will be chaired by the Chief Executive Officer of the Ministry of Sustainable Development, Climate Change & Disaster Risk Management (MSDCCDRM). Members of the PSC will be nominated by their respective ministries and/or organizations and appointed by the MSDCCDRM. Members are appointed for the entire duration of the project. The proposed composition of the -proposed composition of the PSC is as follows :

- CEO or a designated representative in the Ministry of Sustainable Development, Climate Change & Disaster Risk Management
- CEO or a designated representative in the Ministry of Natural Resources, Petroleum and Mining

- CEO or a designated representative in the Ministry of Infrastructure Development and Housing.
- Financial Secretary or a designated representative in the Ministry of Finance, Economic Development and Investment
- CEO or a designated representative of the Coastal Zone Management Authority & Institute
- Chief Climate Change officer or a designated representative of the National Climate Change Office
- CEO or a designated representative in the Ministry of Rural Transformation, Community Development, Local Government and Labour
- Executive Director or a designated representative of PACT as an ex-officio observer
- The Project Manager is the recording secretary and ex-officio observer.

The role of the PSC is among others (1) approving annual work plans of the components and reviewing key project periodical reports; (2) reviewing and approving the contractual agreements, including work plans, budgets, and payment schedules, with a particular emphasis on leveraging synergies and avoiding duplication; (3) reviewing any deviations and considering amendments to work plans and contractual agreements.

#### **The Technical Advisory Committee (TAC)**

The TAC will provide general technical guidance for project implementation, including with regards to screening and review of project technical deliverables under the various components. They will also convene and meetings to address serious Environmental and Social safeguard risks if any arises. The TAC is comprised of the following members: MIDH, NCCO, CZMAI, NHS, NMS, National Association of Village Councils (NAVCO), District Association of Village Councils (DAVCO), CACs, Belize National Indigenous Council (BENIC) and the National Women's Commission.

The TAC will provide general technical guidance for project implementation, including with regards to screening and review of project technical deliverables under the various components. They will also convene and meetings to address serious Environmental and Social safeguard risks if any arises. The TAC is comprised of the following members: MIDH, NCCO, CZMAI, NHS, NMS.

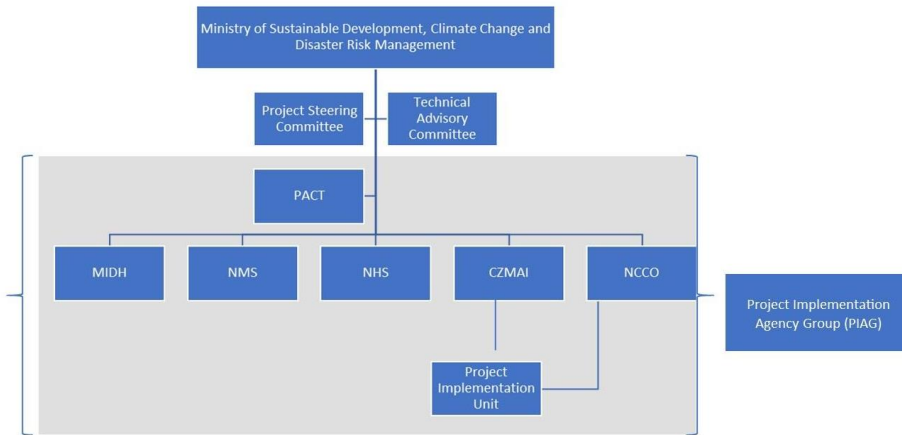
#### **Project Implementation Agency Group (PIAG)**

The PIAG will carry out the day-to-day management of the project including the coordination, supervision, monitoring, quality control, socio-environmental management and reporting. The PIAG will consist of the Project Manager, Technical Officer, staff from the Executing Entities (NCCO and CZMAI) and key partner entities (NHS, NMS, MIDH) and fiduciary staff from PACT. PACT will be responsible for ensuring sound fiduciary management of the Project's resources.

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*Figure 2148: Project Organooram*

*Figure 12 Project Organogram*

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## B. Describe the Measures for Financial and Project Risk Management.

Table 24: Project risk management

Table 26: Project Risk Management

Risk Type	Risk Category	Risk Level (Impact/Probability) 1: Low 4: High	Management/Mitigation Measure
Project Stakeholder Risk	National stakeholders do not support the project activities and do not participate in proposed interventions	Impact: 4 Probability: 2	Communities targeted for proposed interventions have been engaged during the development of the proposal to ensure the inclusion of their climate-adaptive needs including those of vulnerable and marginalized groups. Additionally, a dedicated communications professional will support raising awareness about the project interventions and the need for them throughout the lifespan of the project. This will strengthen community confidence regarding the adaptation measures.
Operational Risk	<b>Governance:</b> The national governance structures may not support the project.	Impact: 4 Probability: 1	Integration with policy and legislative priorities has been verified. The project integrates institutional collaboration and has supporting structures to promote the interventions: NIE, EE, PSC, TAC, PMU.
Institutional Risks	<b>Institutional:</b> Capacity constraints of local institutions may limit the effective implementation of interventions	Impact: 4 Probability: 1	The NIE, EE, and associated entities have competent staff. Additionally, the project will ensure to have competent staff. The project has a significant capacity building and training component IV, designed to promote effectiveness and sustainability at the national and local level for the implementation of interventions.
Design Risks	<b>Design:</b> The project design has provided insufficient integration of national, subnational, and technical requirements	Impact: 2 Probability: 1	The project design has ensured integration with policy, legislation, community views, technical considerations, financial considerations and has been determined sound. The project is in line with the NIE's commitment to Gender Equality and Equity, the Gender Action Plan, and the Environmental/Social Plan.
<u>Performance Risk</u>	<u><b>Operational:</b> Unavailability of experts in country resulting in</u>	<u>Impact: 3 Probability: 2</u>	<u>The timeframe for the project has been designed to take into consideration any unforeseen delays in the</u>

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	<u>implementation delays due to travel restrictions</u>		<u>attainment of international support. Additionally, most entities have established strong working relationship with international and regional entities that have committed their support for the implementation of the project activities. This support can be attained virtually in most cases. Local experts can also provide on the ground support under the guidance of international experts for the implementation of activities.</u>
Social Risks	<b>Social:</b> Lack of commitment/buy-in from local communities may result in delays.	Impact: 4 Probability: 1	Stakeholders have been widely involved in the early stages of the project design and will continue to be involved throughout the project cycle: implementation, monitoring, and evaluation. The involvement of key stakeholders at the community level and inclusion of vulnerable to climate change adaptation communities and groups such as youth, women, men local leaders, community beneficiaries, and fishers will continue to mitigate any risks related to stakeholders' involvement.
Social Risks	<b>Social:</b> Communities may fall back into negligent practices during or after the AF project.	Impact: 4 Probability: 2	The implementation of the communication strategy will have a long-term impact and inform stakeholders about the risks of unsustainable practices, e.g. related to mangroves, construction in high-risk areas, etc. The participatory approach has been integrated into the process design (e.g. coastal advisory committees, community wardens, beach erosion monitoring network, knowledge transfer, data availability) and will be applied throughout the project. The beneficiaries will be directly involved in the implementation of the adaptation options under component III.
Financial	Financial Control Risk	Impact: 4 Probability: 2	PACT will receive, disburse, and manage all funds under the Project. Funds will not be disbursed to any other entity for management, as only direct payments for the provision of services and products acquired. PACT will apply its standard financial management

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			procedures to ensure the proper management of funds in line with its Anti-Fraud Policies and Procedures. PACT has a solid track record of providing fiduciary and grants management services for third parties and its financial management structure is accredited by local, regional, and international organizations.
	The financial impact of the pandemic could lead to inflation depending on the government's fiscal measures, leading to price variations of good and services	Impact: 4 Probability: 2	The project budget has been prepared in USD. In the case of inflation, the USD- to BZD exchange rate will change and expenditures in the local currency will not be negatively affected.
	Late Disbursement of Funds could lead to implementation delays	Impact: 4 Probability: 2	Disbursements request will be made well in advance in accordance with the timelines as agreed upon by parties as set out in the project proposal. For disbursements from the AF, the project will follow the guidance of the funding agency.

**C. Describe the Measures for Environmental and Social Risk Management, In Line with the Environmental and Social Policy and Gender Policy of the Adaptation Fund.**

Part I, Section B describes how the project provides economic, social, and environmental benefits, including the most vulnerable groups within communities, including gender considerations. Part II and Sections E and K describes the results of the performed assessment related to national and AF standards and risks. Part II, Section H describes the consultation process that has been undertaken to ensure inter alia inclusion of potentially marginalized groups, including women and indigenous people. The results of these consultations and analyses have been integrated into the project design.

Based on the identification of financial, environmental, and social risk; appropriate measures have been incorporated to ensure that risks are avoided and that, where this is not the case, they are identified and mitigated on time (Part III, Section B).

Taking into consideration the principles of environmental and social policy of the Adaptation Fund, the project is classified as a "B" category project in terms of the environmental and social risks it poses. [Table 25-Table 27](#) sets out the Environmental and Social Risk screening including the identification of the potential risks and the preventative/mitigation measures that the project will take to reduce potentially adverse environmental and social risks to acceptable levels.

[Table 25-Environmental and Social Risk screening](#)  
[Table 27: Environmental and Social Risk Screening](#)

			Mitigation measures	Mitigation Action Plans
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Environmental and social principles	Environmental and Social impacts and risks / Component	Probability of Risks		
Compliance with the Law	The project does not carry any realistic risk of failing to comply with the law. All investments will be set up with the consent of the landowner or government agency responsible for the buildings and permits.	<u>Low/No Risk</u>	When and where applicable (e.g. NMS-weather monitoring stations, NCCO – coastal protection) the entities will check the status of the land-use and rights, conduct consultations with the right-holders and communities and collaboratively identify workable solutions. All required permits will be obtained.	-Implement mitigation actions on public land, and in the case of private land with the consent of right-holders.  -Consult the legal procedures to establish a community-owned business model  -In case of conflict utilize the national Land Rights Conflict Resolution Authority for resolution.
Access and Equity	Potential social inequality if preferential project benefits are shared with selected groups (Component 2.2 and 3)	<u>Low/No Risk-Low</u>	There is a potential risk of conflict when project engagement is limited to a limited number of people, and questions could rise (why them, not us).  There is also a potential risk of failure if traditional leaders in the Garifuna communities (Dangriga and Hopkins) are not engaged.	-Participatory approach has been integrated into the process design (e.g. coastal advisory committees, community wardens, beach erosion monitoring network, knowledge transfer, data availability) and will be applied throughout the project.  By sharing the lessons learned in Dangriga and Hopkins, component 3 will also benefit communities that could not be included under this proposal.
Marginalized and Vulnerable Groups	Potential social inequality if preferential project benefits are shared with selected groups (Component 2.2 and 3)	<u>Low/Moderate</u>	Marginalized and vulnerable groups will benefit from the project adaptation efforts by being protected against pending climate hazards. If infrastructure and monitoring are improved, man/woman/child/person with disability/ elderly in the community benefits.	Monitoring will be conducted through a mix of informal interviews, meetings with communities
Human Rights	Human rights breaches of international and national human rights  Laws (Component 1)	<u>Low/No Risk-Low</u>	The project supports the Human Right of shelter.	By establishing/ enforcing the building policy and codes and the Coastal Zone Management Plan and guidelines, people's lives and investments are being protected. The project supports among others: the right to shelter; the right to safe housing; the right to participation, the right to use law rights to work. It encompasses and enhances climate change actions (SDG 13), decent employment (SDG8), safe water (SDG 6), gender equality (SDG 5), and resilient settlements (SDG 11)
Gender Equity and	Women could be denied	Medium	The project partners will purposefully seek	The Project will monitor to ensure that the project follows best-practice guidelines for gender-balanced

Women's Empowerment	access to information and excluded from making critical decisions (all Components)		Gender Equity and Female participation in consultation and project activities, e.g. through quota systems and /or organization of separate working groups during the implementation.	participation. The message 'women are encouraged to apply' will be included in the Terms of References. Remuneration will be based on the work requirements, irrespective of gender.
Core Labor Rights	Labor rights may not be respected when contracting communities (Components 2.2, 3, and 4.1)	<u>Low/No Risk/Low</u>	The project will monitor international and national labor laws for any work that may be carried out concerning the project	All contracts will be reviewed to ensure these, and the project activities comply with both national laws and international standards, including ILO labor standards.
Involuntary resettlement	While there is no risk of resettlement arising from the project, there is a risk that there may be damage to homes or disruption of access, and as such management and mitigation actions are required. People can be temporarily inconvenienced by the establishment of the risk reduction measures under component 1.1 & 3.	<u>Low/No Risk/Low</u>	Communities will be fully and regularly briefed on the nature and progress of the establishment of the risk reduction measure before they begin, including the expected duration, the disruption expected, and the grievance mechanism.	The project technical officer will conduct periodic informal discussions with households to ensure that they have had unhindered access to their homes and no damage or other issues have occurred.
Indigenous Peoples		<u>Low/Moderate</u>	There is also a potential risk of failure if traditional leaders in the Garifuna communities (Dangriga and Hopkins) are not engaged.	Engagement strategies will be respectful of traditional/indigenous leaders and communities and traditional customs (Free Prior and Informed Consent).
Protection of Natural Habitats	While damage to natural habitats and threats to biological diversity are unlikely, there is a possibility that construction work undertaken or reforestation measures may adversely impact local biodiversity (Component 3)	<u>Low/Moderate/Low</u>	Relevant policies and guidelines will be explained to and understood by project personnel before implementation and monitored.	The project includes community consultation and involvement in identifying and protecting natural habitats. If it is recommended that the Dangriga / Hopkins protection measures consist of mangroves, the mangrove species will be tested for sustainability based on community participation because mangrove species that are not indigenous may affect the existing local ecosystem.
Conservation of Biological	No realistic risks to biological diversity.	<u>Low/No Risk/n/a</u>	No mitigation or management actions required beyond those highlighted elsewhere,	No specific monitoring measures were included as no risks were identified.

Diversity			especially under pollution prevention and resource efficiency	
Climate Change	No significant or unjustified increase in greenhouse gas emissions or other drivers of climate change.	<u>Low/No Risk</u> <u>Low</u>	This project is inherently an adaptation project and as such, no maladaptation is foreseen.	n/a
Pollution Prevention, Resource Efficiency and Public Health	Construction of infrastructure can generate wastes and may even have health consequences (Component 3 & 4.2)	<u>Low/No Risk</u> <u>Low</u>	The project will ensure that waste materials are properly being disposed of. All workers engaged under component 3 will be informed on proper procedures to dispose of waste materials generated during the construction, to ensure that there is no risk of improper disposal.	NCCO will conduct monitoring to assess whether the sector standards are adhered to. This will also be assessed during consultations with consultants/stakeholders.  The sargassum use/farming will be considered as a livelihood strengthening strategy. This will contribute to waste utilization for compost/green energy purposes.
Public Health	A lack of occupational health and safety standards and procedures could result in injuries to workers or community members (component 1 & 3)	<u>Low/No Risk</u> <u>Low</u>	Occupation health and safety training will be monitored for construction works, and necessary safety equipment, such as boots and hard hats will be provided by the contractor.	The monitoring report will capture the results of occupational health and safety for the project components.
Physical and Cultural Heritage	Activities may not permanently interfere with existing access and use of such physical and cultural resources	<u>Low/No Risk</u> <u>N/A</u>	No physical or cultural heritage impacts are foreseen	Although no physical or cultural heritage impacts are foreseen; however, this will have to be reviewed when the activities are being taken place on-site for surrounding influence. This review will include the tenure/ownership of the location for risk reduction measures (component 3).
Lands and Soil Conservation	Projects should promote soil conservation and avoids degradation or conversion of productive lands or land that provides valuable ecosystem services (component 3)	<u>Low/Moderate Risk</u> <u>Low</u>	Since the project will not be able to cover all the vulnerable areas of soil erosion there is a potential risk that the change of water dynamic and flow may affect other areas, which are not protected.	Consultations have and will continue to capture all critical issues and this risk will be monitored throughout the project. Provisions for this have been made in the methodology under phase 2. Careful consideration will be given to the expected impacts of coastal protection intervention to find the best areas for implementation.

An assessment of social and gender issues (Annex 1 Social and Gender assessment) was conducted for compliance with AF gender policies, the results of which have been integrated into project activities and will be monitored by M&E arrangement and plans. The gender action plan of the project (Annex 1 Social and Gender assessment) aims to ensure equal participation of men and women and to integrate the gender-related needs of the local communities into the technical design and the way the project is implemented. The Gender Action Plan describes the proposed measures to be included in the project design and

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implementation to promote gender equality and mainstreaming in the activities and consequently the outputs of the project. Annex 4 demonstrates compliance of the project with the Environmental and Social Safeguards (ESS) of the Adaptation Fund. The ESMP located in Annex 4 identifies the mitigation measures that have been incorporated into the project to ensure that the project enhances environmental and social benefits, and prevents, reduces, or mitigates adverse environmental and social risks and impacts. The ESMP will form the bases of the project compliance with national and international standards for environmental and social safeguards. During project implementation all risks will be monitored periodically. An assessment of social and gender issues (Annex 1 Social and Gender assessment) was conducted for compliance with AF gender policies, the results of which have been integrated into project activities and will be monitored by M&E arrangement and plans. The gender action plan of the project (Annex 1 Social and Gender assessment) aims to ensure equal participation of men and women and to integrate the gender-related needs of the local communities into the technical design and the way the project is implemented. The Gender Action Plan describes the proposed measures to be included in the project design and implementation to promote gender equality and mainstreaming in the activities and consequently the outputs of the project. Annex 4 demonstrates compliance of the project with the Environmental and Social Safeguards (ESS) of the Adaptation Fund. This section sets out the mitigation measures that have been incorporated into the project to ensure that the project enhances environmental and social benefits, and prevents, reduces, or mitigates adverse environmental and social risks and impacts.

#### **Grievance Mechanism**

The grievance mechanism will be available to all the project's target communities and will be open to beneficiaries and non-beneficiaries. It will allow them an accessible, transparent, fair, and effective means to communicate with the project management (and Project Steering Committee) if there are any concerns regarding the project design and implementation. Access information for the grievance mechanism will be available through the websites of the NIE, EE's and Key Partner Agencies, it will also be included on the social media pages of the entities. All employees, executing entities and consultants/contractors, and community members will be made aware of the grievance mechanism to lodge any complaint, criticism, concern, or query regarding the project's implementation. The mechanism will consider the needs of different groups in the target communities. It combines various options to communicate with the Project Management Unit. Additionally, any stakeholder involved with the project can use any training event or any other event organized by the project, either in public or in private to ~~to~~ raise a grievance verbally. Project staff, including those from the executing entities, will also be trained to recognize grievances from community members and how to deal with grievance reports. The local facilitators in each community will also be trained to recognize dissatisfaction and how to report grievances. All stakeholders, including beneficiaries, will be made aware of the grievance mechanism, their options for reporting, what constitutes a grievance, and their right to anonymity at the start of the project, and/or whenever the project first contacts them. Stakeholders will be reminded of the grievance mechanism periodically throughout the project. Figure 22 ~~Figure 14~~ provides an overview of the grievance redress flow chart. The process will be managed by the Project Management Unit.

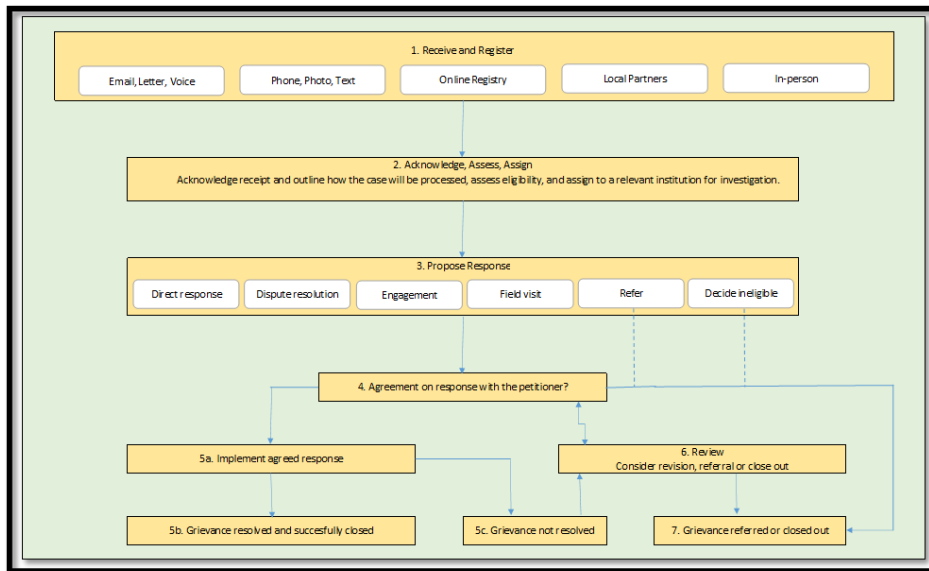


Figure 2249: Flowchart of the Grievance Redress Implementation Framework

Figure 14 Flowchart of the Grievance Redress Implementation Framework

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**D. Describe the Monitoring and Evaluation Arrangements and Provide a Budgeted M&E Plan, In Compliance with the ESP and the Gender Policy of the Adaptation Fund.**

This M&E plan follows the AF Evaluation Framework, ESP, and complies with its Gender Policy. M&E will be based on targets and indicators established in the Project Results Framework as set out in Part III, Section E. Additionally, the status of identified environmental and social risks and the Mitigation Action Plan, will be monitored throughout the project (6-months field mission reports, annual project progress and performance reports, mid-term, and terminal evaluation reports). The same applies to financial and project management risks and mitigation measures. Table 28 sets out the M&E Plan for this project.

This M&E plan follows the AF Evaluation Framework, ESP, and complies with its Gender Policy. M&E will be based on targets and indicators established in the Project Results Framework as set out in Part III, Section E. Additionally, the status of identified environmental and social risks and the Mitigation Action Plan, will be monitored throughout the project (6-months field mission reports, annual project progress and performance reports, mid-term, and terminal evaluation reports). The same applies to financial and project management risks and mitigation measures. Table 26 sets out the M&E Plan for this project.

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Table 26 Outline Monitoring and Evaluation Plan  
Table 28: Outline Monitoring and Evaluation Plan

Type of M&E Activities	Responsible Parties	Time Frame for reporting	Reporting Format	Budget (US\$)	Source
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Inception workshop	Project Manager	Within the first quarter in year 1	Inception workshop report	5,000	5000 from PCM project support budget
Measurements of means of verification (baseline assessment and M&E plans for the components)	Project Manager; Project team; external consultant	First-quarter of year 1	M&E Plans / Result frameworks	8,000	8000 from PCM project support budget
Project progress and performance reviews	Project Manager	Quarterly, Annually	The quarterly project progress and annual performance reports	-	Covered by PE budget
Community consultations/ workshops/trainings	Project Manager; Project team	Max. 2 weeks after each event	Event reports		No additional cost
Steering Committee meetings	Steering Committee	Every 6 months	Steering Committee biannual reporting		Covered by PCM budget
Direct Project Monitoring and Quality Assurance including progress and financial reporting, project revisions, technical assistance, and risk management	Project Manager; With input from Project team; NAVCO, community-level monitoring	Quarterly and annually	The quarter, annual project progress, and performance reports	-	Covered by PE budget
Field missions	Project Manager	Every three months	Field mission reports	25,000	PE budget
The Mid-term Evaluation	Project Manager + external consultant	After 26 months of the project period	Midterm evaluation report	7,500	PE budget
The Terminal Evaluation	Project Manager + external consultant	Six months before the end of the project period	Terminal evaluation report	8,700	PE budget
Audit	External Consultant	Final project year	Audit report	25,000	PCM Evaluation support
Conduct M&E and verification (including environmental and social management plans and gender indicators)	M&E Officer	Year 1,2,3,4	M&E verification reports	13,000	Budget outcome 4.2 and 4.3
Hire monitoring and evaluation officer	Project Manager	Monthly	Monitoring and evaluation updates and reports	83,700	Budget outcome 1.1
			<b>Total Budget</b>	<b>175,900</b>	

The project manager will coordinate the development of the M&E Plans during the project's inception phase through working sessions. The M&E plans will be distributed and presented to relevant stakeholders during the first community workshop. The emphasis of the M&E Plan will be on participatory outcome/result monitoring, project risks, collaboration and project sustainability, and informing stakeholders of the

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importance to collect gender-disaggregated data. Periodic monitoring, including gender indicators, will be conducted through a field mission to the intervention sites every six months.

The project manager will coordinate the development of the M&E Plans during the project's inception phase through working sessions. The M&E plans will be distributed and presented to relevant stakeholders during the first community workshop. The emphasis of the M&E Plan will be on participatory outcome/result monitoring, project risks, collaboration and project sustainability, and informing stakeholders of the importance to collect gender disaggregated data. Periodic monitoring will be conducted through a field mission to the intervention sites every six months.

#### Gender Action Plan for Monitoring and Evaluation

The following gender action plan of the project aims to ensure equal participation of men and women and to integrate the gender-related needs of the local communities into the technical design and the way the project is implemented. The Gender Action Plan (Table 40) describes the proposed measures to be included in the project design and implementation to promote gender equality and mainstreaming in the activities and consequently the outputs of the project. In particular, it focuses on the gender concerns relating to equal access to opportunities, participation in decision-making, women's access to training and practical skills, and how the plans/strategies developed will ensure equal opportunities for women. Overall, the main approaches were undertaken so far, or to be undertaken, are 1) Conducting consultations with both genders to ensure consider equally the perspectives of women and men, 2) Gender sensitivity in the project's implementation and 3) Encouraging women to take staff and consultancy positions in the project. Proper consideration will be provided to pursuing a gender balance among staff/consultants/stakeholder beneficiaries, and in all procurement processes, in line with the NIE's commitment to Gender Equality and Equity under its operational frameworks. Additionally, remuneration will be based on the work requirements, irrespective of gender.

Table 29: Gender Action Plan

Project Components	Outcomes	Gender issue	Action	Indicator	Beneficiaries	Responsible Party
<i>Component 1 Improving coastal land use for resilient habitation and sectoral activities</i>	1.1 Development of the National Housing Policy and Building Codes for resilient habitation based on vulnerabilities	Female-headed households are particularly vulnerable to climate hazards and also in the lower-income segment.	The policymakers consider equally the needs of men and women, and particularly considers women who work in the home. Discussions with communities are gender-equal and disaggregated.	No. or women engaged in the development of the policy and codes  Monitoring of Indicator:  A detailed description of how the needs of men and women (particularly women who work in the home) will be incorporated. An equal number of men and women participate. Attendance registers are	National level: 419,199 persons: 209,603 males and 209,596 females  (Staff: 8 consultants: 4 male/4 female. Construction workers are generally male)	MIDH, M&E Officer, Project Manager, PSC (oversight)

				<u>taken (anonymized) that identify numbers of men and women.</u>		
		<u>Female-headed household are particularly vulnerable and need information about</u>	<u>The policymakers consider equally the needs of men and women, and particularly considers women who work in the home. Women will be encouraged to apply for positions as wardens and committee members. Discussions with communities are gender-equal and disaggregated.</u>	<u>No. of women engaged and involved in the process</u>  <u>Monitoring of Indicator:</u>  <u>A detailed description of how the needs of men and women (particularly women who work in the home) will be incorporated. Progress made about female inclusion as wardens and committee members are documented An equal number of men and women participate. Attendance registers are taken (anonymized) that identify numbers of men and women</u>	<u>National level: 419,199 persons: 209,603 males and 209,596 females</u>  <u>(Staff: 12 persons: 6 male/6 female, however also influenced by available local capacities)</u>	<u>CZMAI, M&amp;E Officer, Project Manager, PSC (oversight)</u>
	<u>1.2 Strengthening the implementation of the Integrated Coastal Zone Management Plan and associated management guidelines for zonation</u>	<u>Importance of adhering to coastal zonation.</u>				
<u>Component 2 Coastal Vulnerability Monitoring</u>	<u>2.1 Strengthening data availability for the development of a national coastal saline intrusion program</u>	<u>Gender-neutral work based on qualification. Females will be encouraged to apply, with equal consideration to both genders.</u>	<u>Training sessions target an equal number of men and women. Men and women are targeted to be trained in equal numbers. However, this is dependent on the intrinsic composition of the institutions. Female participation will likely outnumber males.</u>	<u>No. of women involved and trained under program</u>  <u>Monitoring of Indicator: Training sessions completed with records documenting equal participation from men and women. Documentation about these sessions</u>	<u>27 coastal communities - 117,823 persons: 57,787men; 60,035women</u>  <u>(Target 50 trainees: 25 male/25 female)</u>	<u>NHS, M&amp;E Officer, Project Manager, PSC (oversight)</u>

				prepared by M&E Officer and reviewed by the Project Manager and PSC.		
	<a href="#">2.2 Develop and implement a National Beach Erosion Monitoring Program</a>	<a href="#">Gender-neutral work based on qualification. Females will be encouraged to apply, with equal consideration to both genders.</a>	<a href="#">Training sessions target an equal number of men and women. Men and women are targeted to be trained in equal numbers. However, this is dependent on the intrinsic composition of the institutions. Female participation will likely outnumber males. Women will be encouraged to join the community committees.</a>	<a href="#">No. of women involved in the program</a>  <a href="#">Monitoring of Indicator: Training sessions completed with records documenting equal participation from men and women. Documentation about these sessions prepared by M&amp;E Officer and reviewed by the Project Manager and PSC.</a>	<a href="#">27 coastal communities - 117,823 persons; 57,787men; 60,035women</a>  <a href="#">(Target 50 trainees: 25 male/25 female)</a>	<a href="#">CZMAI, M&amp;E Officer, Project Manager, PSC (oversight)</a>
	<a href="#">2.3 Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge</a>	<a href="#">Gender-neutral work based on qualification. Females will be encouraged to apply, with equal consideration to both genders.</a>	<a href="#">Training sessions target an equal number of men and women. Men and women are targeted to be trained in equal numbers. However, this is dependent on the intrinsic composition of the institutions. Female participation will likely outnumber males.</a>	<a href="#">No. of women trained</a>  <a href="#">Monitoring of Indicator: Training sessions completed with records documenting equal participation from men and women. Documentation about these sessions prepared by M&amp;E Officer and reviewed by the Project Manager and PSC.</a>	<a href="#">27 coastal communities - 117,823 persons; 57,787men; 60,035women.</a> <a href="#">(Target 10 trainees: 5 male/5 female)</a>	<a href="#">NMS, M&amp;E Officer, Project Manager, PSC (oversight)</a>
<a href="#">Component 3 Beach stabilization</a>	<a href="#">3.1 Increased adaptive capacity within</a>	<a href="#">Female-headed households</a>	<a href="#">The engineer's methodology will consider</a>	<a href="#">No. of women involved in the pilot project</a>	<a href="#">9,591persons (4,615 men, 4,976 women)</a>	<a href="#">Engineer, NCCO, M&amp;E Officer,</a>

<u>of High-Risk Coastal Areas</u>	<u>Hopkins and Dangriga communities through infrastructure assets</u>	<u>are particularly vulnerable to climate hazards.</u>	<u>equally the needs of men and women, and particularly considers women who work in the home, and how to avoid inconvenience. Discussions with communities are gender-equal.</u>	<u>Monitoring of Indicator: The engineer's progress report describes in detail how the needs of women (particularly women who work in the home) have been met, and if any conflicts have occurred.</u>	<u>in Dangriga, and 1,610 persons (777 men, 833 women) in Hopkins (Staff target 5 consultants: 2 male/3 female. Construction workers generally male)</u>	<u>Project Manager, PSC (oversight)</u>
		<u>Female stakeholders are particularly explicit about the need for information.</u>	<u>Knowledge sharing sessions target an equal number of men and women. Interventions will consider equally the needs of men and women, particularly women who are not in a leadership position.</u>	<u>No. of persons engaged</u>  <u>Monitoring of Indicator: Knowledge sharing sessions completed with records documenting equal participation by men and women. Documentation of sessions prepared by M&amp;E Officer and reviewed by the Project Manager and PSC.</u>	<u>25 coastal communities – 106,622 persons: 52,395 men; 54,226 women</u>  <u>(100 session participants: 50 male/50 female from 25 coastal communities)</u>	<u>NCCO, M&amp;E Officer, Project Manager, PSC (oversight)</u>
<u>Component 4 Awareness raising, knowledge dissemination and capacity strengthening</u>	<u>4.1 Development of a National Climate Change Communication Strategy and Action Plan</u>	<u>Female stakeholders are particularly explicit about the need for information.</u>	<u>Awareness sessions target an equal number of men and women. Interventions will consider equally the needs of men and women, particularly women who are not in a leadership position.</u>	<u>No. of communities and persons sensitized</u>  <u>Monitoring of Indicator: Awareness sessions were completed with records documenting equal participation from men and women. Documentation of sessions prepared by M&amp;</u>	<u>National level: 419,199 persons: 209,603 males and 209,596 females</u>  <u>(100 session participants: 50 male/50 female from 25 coastal communities)</u>	<u>NCCO, M&amp;E Officer, Project Manager, PSC (oversight)</u>

				<u>E Officer and reviewed by the Project Manager and PSC.</u>		
<u>4.2 Development of training modules for best coastal adaptation practices</u>	<u>Gender-neutral work based on qualification. Females staff equally considered for training.</u>	<u>Training sessions target an equal number of men and women. Interventions will consider equally the needs of men and women, particularly women who are not in a leadership position.</u>	<u>No. of persons trained.</u>  <u>Monitoring of indicator: Training sessions completed with records documenting equal participation from men and women.</u> <u>Documentation of sessions prepared by M&amp;E Officer and reviewed by the Project Manager and PSC.</u>	<u>27 coastal communities - 117,823 persons: 57,787men; 60,035women (target 50 trainees: 25 male/25 female)</u>	<u>CZMAI, M&amp;E Officer, Project Manager, PSC (oversight)</u>	
<u>4.3 Strengthening of GIS capabilities of CZMAI and partners</u>	<u>Gender-neutral work based on qualification. Females staff equally considered for training.</u>			<u>27 coastal communities - 117,823 persons: 57,787men; 60,035women (target 15 trainees: 7male/8 female)</u>		

**E. Include A Results Framework for the Project Proposal, Including Milestones, Targets, and Indicators, Including One or More Core Outcome Indicators of the Adaptation Fund Results Framework, and In Compliance With The Gender Policy of the Adaptation Fund.**

*Table 27 Results framework for the project proposal*  
*Table 30: Results Framework for the Project Proposal*

Expected Result	Indicators	Baseline Data	Targets	Risks & assumptions	Data collection method	Frequency	Responsibility
<b>Component 1: Improving coastal land use for resilient habitation and sectoral activities</b>							
<b>Outcome 1.1</b> Development of the National Housing Policy and Building Codes for resilient habitation based on vulnerabilities	Number of persons/communities knowledgeable of National Housing Policies with clear a specification for coastal habitation	Zero National Housing Policies with clear a specification for coastal habitation	One National Housing Policy with clear a specification for coastal habitation developed  <u>30% of men and women consulted during the development of the policy and building codes</u>  <u>65% of communities consulted during the development of Building Codes</u>	R- Housing policy not accepted by beneficiary community members A - Beneficiary community members are aware of the need for the Housing policy	Visits to communities, formal and informal discussions, high-resolution photos/videos (to be added to the database)	Baseline, annual, mid-term, and end-term	MIDH, PMU
<b>Output 1.1.1</b> Development of the National Housing Policy with clear a specification for coastal habitation	Number of persons/communities knowledgeable of National Housing Policy with clear a specification for coastal habitation	Zero National Housing Policies with clear a specification for coastal habitation	Legislative review completed and Discussion paper developed	R- Housing policy not accepted by beneficiary community members A - Beneficiary community members are aware of the need for the Housing policy	The legislative review report, Discussion paper	Baseline, annual, mid-term, and end-term	MIDH, PMU

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<b>Output 1.1.2</b> <i>Development of National Building Codes</i>	Number of persons/communities knowledgeable of National Building Code with a specification for climate change	Zero National Building Codes with a specification for the climate change	A discussion paper and National Building codes developed	R- Housing policy not accepted by beneficiary community members A - Beneficiary community members are aware of the need for the Housing policy	Discussion paper, national building codes	Baseline, annual, mid-term, and end-term	MIDH, PMU
<b>Output 1.1.3</b> <i>Development of a social housing pilot</i>	Number of persons/communities knowledgeable of pilot social house with building code specifications (climate resistant)	Zero pilot social houses	One pilot social house established and process and lessons learning captured for knowledge dissemination	R- Housing policy not accepted by beneficiary community members A - Beneficiary community members are aware of the need for the Housing policy	Pilot social house & related report	Baseline, annual, mid-term, and end-term	MIDH, PMU
<b>Outcome 1.2</b> <i>Strengthening the implementation of the Integrated Coastal Zone Management Plan and associated management guidelines for zonation</i>	Number of persons/communities knowledgeable of Integrated Coastal Zone Management Plan and associated management guidelines for zonation	One Integrated Coastal Zone Management Plan without associated management guidelines for zonation	Drone mapping and ground-truthing conducted and Coastal Land Use Inventory updated  <u>50% of persons engaged being women</u>  <u>70% of coastal communities consulted</u>	R- ICZMP and associated zonation guidelines not accepted by beneficiary community members A - Beneficiary community members are aware of the need for the ICZMP and associated guidelines	One Integrated Coastal Zone Management Plan without associated management guidelines for zonation	Baseline, annual, mid-term, and end-term	CZMAI, PMU

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<p><b>Output 1.2.1</b> <i>Strengthening the implementation of the Integrated Coastal Zone Management Plan and associated management guidelines for zonation</i></p>	<p>Number of persons/communities knowledgeable of Integrated Coastal Zone Management Plan and associated management guidelines for zonation</p>	<p>One Integrated Coastal Zone Management Plan without associated management guidelines for zonation</p>	<p>Integrated Coastal Zone Management Plan and associated management guidelines for zonation updated/developed</p>	<p>R- ICZMP and associated zonation guidelines not accepted by beneficiary community members A - Beneficiary community members are aware of the need for the ICZMP and associated guidelines</p>	<p>One Integrated Coastal Zone Management Plan without associated management guidelines for zonation</p>	<p>Baseline, annual, mid-term, and end-term</p>	<p>CZMAI, PMU</p>
<p><b>Output 1.2.2</b> <i>Collaborative approach for strengthening the implementation of the Integrated Coastal Zone Management Plan</i></p>	<p>No. of meetings with Community Wardens, and Coastal Advisory to monitor compliance with the Coastal Zone Management guidelines</p>	<p>No meetings with Community Wardens, and Coastal Advisory to monitor compliance with the Coastal Zone Management guidelines</p>	<p>Regular site inspections and meetings with 8 Community Wardens and 4 Coastal Advisory Committees were conducted and recorded.</p>	<p>R- ICZMP and associated zonation guidelines not accepted by beneficiary community members A - Beneficiary community members are aware of the need for the ICZMP and associated guidelines</p>	<p>Bi-weekly meetings or phone conversations with Community Wardens, and Coastal Advisory Committees to monitor compliance with the Coastal Zone Management guidelines</p>	<p>Monthly monitoring, Baseline, annual, mid-term, and end-term</p>	<p>CZMAI, PMU</p>
<p><b>Activities under Output 1.1.1</b></p> <ul style="list-style-type: none"> <li>• Conduct Review of Existing Legislation and regulations related to Housing in Belize (Town Planning Act, Town Council Act, Land Utilization Act, Land Subdivision Act, Energy Act, Coastal Zone Management, etc.) and report preparation with concrete recommendations on how to use the legislation through consolidation or amendments</li> <li>• Consult with stakeholders (3x)</li> <li>• Prepare a discussion paper</li> <li>• Prepare draft Housing Policy taking into consideration economic, social, gender and climate factors</li> <li>• Raise awareness on the National Housing Policy</li> </ul> <p><b>Activities under Output 1.1.2</b></p> <ul style="list-style-type: none"> <li>• Prepare a discussion paper</li> <li>• Consult with stakeholders (2x)</li> <li>• Development of a Draft Building Code</li> <li>• Conduct stakeholder sensitization</li> </ul> <p><b>Activities under Output 1.1.3</b></p> <ul style="list-style-type: none"> <li>• Development of social housing pilot which takes into consideration climate factors (temperature, wind, humidity, etc.)</li> <li>• Obtain construction permit</li> </ul>					<p><b>Milestones</b></p> <p>Activities under Output 1.1.1 begin by Month 1 complete by Month 51</p> <p>Activities under Output 1.1.2 begin by Month 1 complete by Month 51</p> <p>Activities under Output 1.1.3 begin by Month 34 complete by Month 50</p> <p>Activities under Output 1.2.1 begin by Month 2 complete by Month 51</p> <p>Activities under Output 1.2.2 begin by Month 4 complete by Month 49</p>		



<ul style="list-style-type: none"> <li>• Construction of the pilohouse</li> <li>• Construction process and lessons learned captured for knowledge-sharing purposes</li> </ul> <p><b>Activities under Output 1.2.1</b></p> <ul style="list-style-type: none"> <li>• Procure necessary software and equipment for data collection and processing</li> <li>• Utilize software and equipment for data collection and analysis</li> <li>• Continue drone mapping and ground-truthing exercise to update the Coastal Land Use Inventory to update the register for three planning regions in the northern, central, and southern Belize.</li> <li>• Collect information to update the ICZM Plan</li> <li>• Share updated recommendations with national stakeholders</li> <li>• Conduct site inspections, meetings with Community Wardens, and Coastal Advisory Committees to monitor compliance with the Coastal Zone Management guidelines</li> </ul> <p><b>Activities under Output 1.2.2</b></p> <ul style="list-style-type: none"> <li>• Conduct site inspections, meetings with Community Wardens, and Coastal Advisory Committees to monitor compliance with the Coastal Zone Management guidelines</li> </ul>							
<b>Component 2: Coastal Vulnerability Monitoring</b>							
<p><b>Outcome 2.1</b> Strengthening data availability for the development of a national coastal saline intrusion program</p>	<p>No. and type of targeted institutions with increased capacity at the national and sub-national level to minimize saline intrusion risks</p>	<p>NHS (national level) has limited capacity to conduct saline intrusion research</p>	<p>Qualitative and quantitative research data on soil salinity were conducted to reduce the saline intrusion risk available.</p> <p><a href="#">50% of participants trained being women</a></p> <p><a href="#">80% of the National Hydrological Services Staff Trained</a></p>	<p>R- Lack of mitigation measures to enable soil salinity research to have an impact A - Beneficiary stakeholders are aware or will be made aware of the salinity intrusion risks under component 4.1</p>	<p>Research data report available on salinity intrusion</p>	<p>Monthly monitoring, Baseline, annual, mid-term, and end-term</p>	<p>NHS, PMU</p>
<p><b>Output 2.1.1</b> Enhance evidence-based knowledge to determine best use practices for freshwater supply for the coastal areas / Reducing probability of further saline intrusion</p>	<p>No. of meetings and training exercises with national, sub-national, community levels for technology transfer to stakeholders</p>	<p>Zero meetings and training exercises with national, sub-national, community levels for technology transfer to stakeholders</p>	<p>Regular meetings/training exercises with national, sub-national, community levels for technology transfer to stakeholders conducted and recorded</p>	<p>R- Lack of mitigation measures to enable soil salinity research to have an impact A - Beneficiary stakeholders are aware or will be made aware of the salinity intrusion risks under component 4.1</p>	<p>Monthly report on Bi-weekly meetings or phone conversations with beneficiary stakeholders to support research</p>	<p>Monthly monitoring, Baseline, annual, mid-term, and end-term</p>	<p>NHS, PMU</p>

<b>Outcome 2.2</b> Develop and implement a National Beach Erosion Monitoring Program	No. and type of targeted institutions with increased capacity at the national and sub-national level to reduce beach erosion risks	CZMAI (national level) has limited capacity to conduct beach erosion research	Qualitative and quantitative research data outlining coastal beach erosion available  <u>50% women participation in the program</u>	R- Lack of an early erosion detection program results in insufficient mitigation/preparedness A - Beneficiary stakeholders are aware or will be made aware of coastal erosion risks under component 4.1	Research data report available on coastal beach erosion	Baseline, annual, mid-term, and end-term	CZMAI, PMU
<b>Output 2.2.1</b> Coastal Research and Monitoring	No. and type of targeted institutions with increased capacity at the national and subnational level for coastal research and monitoring	CZMAI (national level) has limited capacity to conduct beach erosion research	Qualitative and quantitative research data outlining coastal beach erosion available	R- Lack of an early erosion detection program results in insufficient mitigation/preparedness A - Beneficiary stakeholders are aware or will be made aware of coastal erosion risks under component 4.1	Research data report available on coastal beach erosion	Baseline, annual, mid-term, and end-term	CZMAI, PMU
<b>Output 2.2.2</b> Strong local presence through community partnerships	No. of meetings with community network	Zero meetings and training exercises with national, sub-national, community levels for knowledge/technology transfer to stakeholders	Regular meetings/training exercises with national, sub-national, community levels for technology/knowledge transfer to stakeholders conducted and recorded	R- Lack of an early erosion detection program results in insufficient mitigation/preparedness A - Beneficiary stakeholders are aware or will be made aware of coastal erosion risks under component 4.0	Monthly report on Bi-weekly meetings or phone conversations with beneficiary stakeholders to support research	Monthly monitoring, Baseline, annual, mid-term, and end-term	CZMAI, PMU
<b>Output 2.2.3</b> Develop and implement training schedule and training programs	No. of training for staff and stakeholders	Zero meetings and training exercises with national, sub-national, community levels for knowledge/technology transfer to stakeholders	Regular meetings/training exercises with national, sub-national, community levels for technology/knowledge transfer to stakeholders conducted and recorded	R- Lack of an early erosion detection program results in insufficient mitigation/preparedness A - Beneficiary stakeholders are aware or will be made aware of coastal erosion risks under component 4.1	Training report including material, participants list, and high-resolution photos/videos (to be added to the database)	Baseline, annual, mid-term, and end-term	CZMAI, PMU

<b>Outcome 2.3</b> Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge	No. and type of targeted institutions with increased capacity to minimize exposure to coastal flooding and storm surge risks	NMS has limited capacity to conduct coastal flooding and storm surge research	Research data on coastal flooding and storm surge risks reduction available	R- Financing uncertainty to implement phases 2-4 A - Beneficiary stakeholders are aware or will be made aware of coastal flooding and storm surge risks under component 4.1	Progress report outlining EWS products designed and developed by staff	Baseline, annual, mid-term and end-term	NMS, PMU
<b>Output 2.3.1</b> The implementation of Phase 1 – EWS development & Storm Surge modeling	No. and type of targeted institutions with increased capacity to minimize exposure to coastal flooding and storm surge risks	NMS has limited capacity to conduct coastal flooding and storm surge research	Research data on coastal flooding and storm surge risks reduction available	R- Financing uncertainty to implement phases 2-4 A - Beneficiary stakeholders are aware or will be made aware of coastal flooding and storm surge risks under component 4.1	Progress report outlining EWS products designed and developed by staff	Baseline, annual, mid-term and end-term	NMS, PMU
<b>Output 2.3.2</b> The establishment of Weather Stations/Sensors along the coast	No. and type of targeted institutions with increased capacity to minimize exposure to coastal flooding and storm surge risks	NMS has limited capacity to conduct coastal flooding and storm surge research	Chapter in progress reports regarding weather data collection	R- Financing uncertainty to implement phases 2-4 A - Beneficiary stakeholders are aware or will be made aware of coastal flooding and storm surge risks under component 4.1	Chapter in progress reports on weather stations utilization for data collection	Baseline, annual, mid-term, and end-term	NMS, PMU
<b>Activities under Output 2.1.1</b> <ul style="list-style-type: none"> <li>• Build the institutional capacity of NHS via the procurement of equipment and other tools for research on groundwater, water quality, and soil salinity</li> <li>• Conduct saline intrusion risk mapping and ground water risk mapping considering current and future conditions under various extreme weather and climate change scenarios</li> <li>• Develop a field program to assess the chemical quality of groundwater in high-risk areas</li> <li>• Develop training tools related to capacity building of / technology transfer are being developed</li> <li>• Conduct workshop/field visit for training purposes</li> </ul>					<b>Milestones</b> <ul style="list-style-type: none"> <li>Activities under Output 2.1.1 begin by Month 1 complete by Month 54</li> <li>Activities under Output 2.2.1 begin by Month 1 complete by Month 54</li> <li>Activities under Output 2.2.2 begin by Month 1 complete by Month 54</li> <li>Activities under Output 2.2.3 begin by Month 1 complete by Month 54</li> </ul>		

**Activities under Output 2.2.1**

- Conduct research on Techniques available to assess erosion to determine best options analyzed
  - Analyze aerial films
- Hardware and software for database procured
- Establish database

**Activities under Output 2.2.2**

- Select and recruit members for monitoring program

**Activities under Output 2.2.3**

- Develop a training program
- Train community network and CZMAI Staff

**Activities under Output 2.3.1**

- - Improve the current server and/or workstation to link with existing Early Warning procedures
- Train NMS staff in Delft-FEWS, coastal processes, and modeling

**Activities under Output 2.3.2**

- Purchase and installation of weather stations/sensors
- Purchase 1 field vehicle
- Utilize assets to strengthen weather data collection

Activities under Output 2.3.1 begin by Month 1 complete by Month 54

Activities under Output 2.3.2 begin by Month 1 complete by Month 54

<b>Component 3. Beach stabilization of High-Risk Coastal Areas</b>							
<b>Outcome 3.1</b> Increased adaptive capacity within Hopkins and Dangriga communities through infrastructure and/or soft structure assets	Beach recovered and stabilized to withstand climate change and variability-induced stress	Hopkins and Dangriga are under threat due to climate change	Engineering solutions in Dangriga and Hopkins successfully established  <u>40% of community consulted during the pilot (gender disaggregated data)</u>	R- Insufficient public awareness of whether the risk reduction measure has a temporary nature leads to investments/habitation in high-risk areas A - Beneficiary stakeholders are insufficiently aware of climate change hazards	Monthly progress, Baseline, annual, mid-term and, end-term evaluation, including photos/videos and meeting records	Baseline, annual, mid-term and, end-term	NCCO/PMU
<b>Output 3.1.1</b> Implementation of beach recovery and stabilization through a pilot project in the high-risk coastal communities Dangriga and Hopkins	Beach recovered and stabilized to withstand climate change and variability-induced stress	Hopkins and Dangriga are under threat due to climate change	Engineering solutions in Dangriga and Hopkins successfully established	R- Insufficient public awareness of whether the risk reduction measure has a temporary nature leads to investments/habitation in high-risk areas A - Beneficiary stakeholders are insufficiently aware of climate change hazards	Monthly progress, Baseline, annual, mid-term and, end-term evaluation, including photos/videos and meeting records	Baseline, annual, mid-term and, end-term	NCCO/PMU
<b>Output 3.1.2</b> <b>Monitoring and evaluation of activities' effectiveness and documentation of lessons learnt</b>	Monitoring and evaluation of activities and lessons learnt documented and disseminated to	The remaining 25 coastal communities are also under threat (with varying severeness levels) due to climate change	Lessons learned and a scale-up plan developed and disseminated	R- Insufficient public awareness of whether the risk reduction measure has a temporary nature leads to investments/habitation in high-risk areas A - Beneficiary stakeholders	User-friendly report capturing process and lessons learned and scale-up recommendations	Baseline, annual, mid-term and, end-term	NCCO/PMU

	scale up in the future			are insufficiently aware of climate change hazards			
<b>Activities under Output 3.1.1</b> Conduct preliminary assessments for the development of engineering solutions • Development and Implementation of engineering solution(s) • Consult with stakeholders  • Monitoring of the effectiveness  <b>Activities under Output 3.1.2</b> • Assess the effectiveness of engineering solution (s) via monitoring • Develop a report on lessons learned and a plan to scale up developed • Consult with stakeholders •					<b>Milestones</b> Activities under Output 3.1.1 begin by Month 1 complete by Month 54 Activities under Output 3.1.2 begin by Month 37 complete by Month 54		
<b>Component 4. Awareness raising, knowledge dissemination and capacity strengthening</b>							
<b>Outcome 4.1</b> Development of a National Climate Change Communication Strategy and Action Plan	Percentage of the national population aware of predicted adverse impacts of climate change, and appropriate responses	Limited awareness of predicted adverse impacts of climate change, and appropriate responses among the national population	NCCCSAP activities related to this project successfully implemented using written, audio, and visual materials  <u>50% of the population aware of climate change impacts and adaptation measures</u>	R- Insufficient public awareness to promote pro-environmental behaviors A - Beneficiary stakeholders are insufficiently aware of climate change hazards	Activities reports, materials, photo database	Baseline, annual, mid-term and end-term	NCCO/PMU, CZMAI, MIDH, NHS, NMS
<b>Output 4.1.1</b> Implementation of the NCCSAP	Percentage of the national population aware of predicted adverse impacts of climate change,	Limited awareness of predicted adverse impacts of climate change, and appropriate responses among the national population	NCCCSAP activities related to this project successfully implemented using written, audio, and visual materials	R- Insufficient public awareness to promote pro-environmental behaviors A - Beneficiary stakeholders are insufficiently aware of climate change hazards	Activities reports, materials, photo database	Baseline, annual, mid-term and end-term	NCCO/PMU, CZMAI, MIDH, NHS, NMS

	and appropriate responses						
<b>Outcome 4.2</b> Development of training modules for best coastal adaptation practices	No. of persons trained to predict, detect, respond to, and mitigate impacts of, climate-related events from targeted institutions increased  No. of training workshops	Limited awareness of predicted adverse impacts of climate change, and appropriate responses among the national population	NCCCSAP activities related to this project successfully implemented using written, audio, and visual materials  <a href="#">50% of communities trained (data disaggregated by sex)</a>  <a href="#">50% of sectors (data disaggregated by sex)</a>	R- Insufficient staff and stakeholder capacities to adopt pro-environmental behaviors and implement climate research A - Beneficiary stakeholders are insufficiently equipped with the necessary tools to mitigate and adapt to climate change hazards	Training reports, registration lists, high-resolution photos/videos (to be added to the database), training materials, materials	Baseline, annual, mid-term and, end-term	CZMAI, NCCO, PMU
<b>Output 4.2.1</b> Development of training modules for best coastal adaptation practices	No. of persons trained to predict, detect, respond to, and mitigate impacts of, climate-related events from targeted institutions  No. of training workshops	Limited national level capacities to predict, detect, respond to, and mitigate impacts of, climate-related events from targeted institutions	Officials and community members trained and equipped with useful knowledge to promote pro-environmental behaviors	R- Insufficient staff and stakeholder capacities to adopt pro-environmental behaviors and implement climate research A - Beneficiary stakeholders are insufficiently equipped with the necessary tools to mitigate and adapt to climate change hazards	Training reports, registration lists, high-resolution photos/videos (to be added to the database), training materials, materials	Baseline, annual, mid-term and, end-term	CZMAI, NCCO, PMU
<b>Output 4.2.2</b> Implementation of training modules for best coastal adaptation practices	No. of persons trained to predict, detect, respond to, and mitigate impacts of, climate-related events from targeted institutions  No. of training workshops	Limited national level capacities to predict, detect, respond to, and mitigate impacts of, climate-related events from targeted institutions	Officials and community members trained and equipped with useful knowledge to promote pro-environmental behaviors	R- Insufficient staff and stakeholder capacities to adopt pro-environmental behaviors and implement climate research A - Beneficiary stakeholders are insufficiently equipped with the necessary tools to mitigate and adapt to climate change hazards	Training reports, registration lists, high-resolution photos/videos (to be added to the database), training materials, materials	Baseline, annual, mid-term and, end-term	CZMAI, NCCO, PMU

<b>Outcome 4.3</b> Strengthening of GIS capabilities of CZMAI and partners	No. of persons trained to use GIS increased  No. of training workshops	Limited national level capacities to use GIS technologies	Officials trained and equipped with useful knowledge to use GIS technologies  <a href="#">50% of CZMAI staff trained in GIS (data disaggregated by sex)</a>	R- Insufficient staff and stakeholder capacities to use GIS technologies is a barrier to climate change research A - Beneficiary staff and stakeholders are insufficiently equipped to use GIS technologies in climate research	Training reports, registration lists, high-resolution photos/videos (to be added to the database), training materials, materials	Baseline, annual, mid-term and, end-term	CZMAI, PMU, NHS
<b>Output 4.3.1</b> Development of GIS training modules	No. of persons trained to use GIS  No. of training workshops	Limited national level capacities to use GIS technologies	Officials trained and equipped with useful knowledge to use GIS technologies	R- Insufficient staff and stakeholder capacities to use GIS technologies is a barrier to climate change research A - Beneficiary staff and stakeholders are insufficiently equipped to use GIS technologies in climate research	Training reports, registration lists, high-resolution photos/videos (to be added to the database), training materials, materials	Baseline, annual, mid-term and, end-term	CZMAI, PMU, NHS
<b>Output 4.3.2</b> Implementation of GIS training modules	No. of persons trained to use GIS  No. of training workshops	Limited national level capacities to use GIS technologies	Officials trained and equipped with useful knowledge to use GIS technologies	R- Insufficient staff and stakeholder capacities to use GIS technologies is a barrier to climate change research A - Beneficiary staff and stakeholders are insufficiently equipped to use GIS technologies in climate research	Training reports, registration lists, high-resolution photos/videos (to be added to the database), training materials, materials	Baseline, annual, mid-term and, end-term	CZMAI, PMU, NHS
<b>Activities under Output 4.1.1</b> <ul style="list-style-type: none"> <li>Development of written, audio, and visual productions materials for publication</li> </ul> <ul style="list-style-type: none"> <li>Carry out communications activities as envisioned in the NCCSAP</li> <li>Conduct working sessions with AF proposal entities</li> <li>Conduct monitoring, verification, and information sharing of communications activities</li> </ul> <b>Activities under Output 4.2.1</b> <ul style="list-style-type: none"> <li>Conduct a training needs assessment and prepare a training plan (including modules)</li> </ul> <b>Activities under Output 4.2.2</b> <ul style="list-style-type: none"> <li>Carry out training interventions</li> <li>Conduct M&amp;E and verification</li> <li>Share lessons learned</li> </ul>					<b>Milestones</b> <ul style="list-style-type: none"> <li>Activities under Output 4.1.1 begin by Month 1 complete by Month 54</li> <li>Activities under Output 4.2.1 begin by Month 1 complete by Month 54</li> <li>Activities under Output 4.2.2 begin by Month 1 complete by Month 54</li> <li>Activities under Output 4.3.1 begin by Month 1 complete by Month 54</li> </ul>		



<p><b>Activities under Output 4.3.1</b></p> <ul style="list-style-type: none"> <li>• Conduct a GIS training needs assessment and prepare a training/investment plan</li> <li>• Purchase equipment and software</li> <li>• Prepare training materials</li> </ul> <p><b>Activities under Output 4.3.2</b></p> <ul style="list-style-type: none"> <li>• Carry out training interventions</li> <li>• Conduct M&amp;E and verification</li> <li>• Share lessons learned</li> </ul>	<p>Activities under Output 4.3.2 begin by Month 1 complete by Month 54</p>
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Output	Year 1				Year 2				Year 3				Year 4				Year 5
Output 1.1.1 Development of the National Housing Policy with clear a specification for coastal habitation	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Output 1.1.2 Development of Building Codes	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Output 1.1.3 Development of a social housing pilot													x	x	x	x	x
Output 1.2.1 Strengthening the implementation of the Integrated Coastal Zone Management Plan and associated management guidelines for zonation	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Output 1.2.2 Collaborative approach for strengthening the implementation of the Integrated Coastal Zone Management Plan		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Output 2.1.1 Enhance evidence-based knowledge to determine best use practices for freshwater supply for the coastal areas / Reducing probability of further saline intrusion	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x



## F. Demonstrate How the Project/Programme Aligns with the Results Framework of the Adaptation Fund

Table 29: Project alignment with the Results Framework of the Adaptation Fund

Table 31: Project alignment with the Results Framework of the Adaptation Fund

Project Outcomes	Project Indicators	Fund Outcome	Fund Outcome Indicator	Grant Amount (US\$)
<b>Component 1. Improving coastal land use for resilient habitation and sectoral activities</b>				
1.1 Development of the National Housing Policy and Building Codes for resilient habitation based on vulnerabilities	No. of National Housing Policies with clear a specification for coastal habitation No. of National Building Code with the specification for the coastal zone	Outcome 7: Improved policies and regulations that promote and enforce resilience measures	No. of policies introduced or adjusted to address climate change risks (by sector)  <u>No. of beneficiaries including estimations for direct and indirect beneficiaries</u>  <u>No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by sector)</u>	480,000.00
1.2 Strengthening the implementation of the Integrated Coastal Zone Management Plan associated management guidelines for zonation	No. of Integrated Coastal Zone Management Plan associated management guidelines for zonation	Outcome 7: Improved policies and regulations that promote and enforce resilience measures	No. of policies introduced or adjusted to address climate change risks (by sector)  <u>No. of beneficiaries including estimations for direct and indirect beneficiaries</u>  <u>Percentage of target population applying appropriate adaptation responses</u>	187,000.00
<b>Component 2. Coastal Vulnerability Monitoring</b>				
2.1 Strengthening data availability for the development of a national coastal saline intrusion program	No. and type of targeted institutions with increased capacity at the national and sub-national level to minimize saline intrusion risks	Outcome 2: a strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	No. and type of targeted institutions with increased capacity to minimize exposure to climate variability risks  <u>No. and type of development sector services modified to respond to new conditions resulting from climate variability and change (by sector and scale)</u>	709,000.00

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2.2 <i>Develop and implement a National Beach Erosion Monitoring Program</i>	No. and type of targeted institutions with increased capacity at the national and sub-national level to reduce beach erosion risks	Outcome 2: A strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	No. and type of targeted institutions with increased capacity to minimize exposure to climate variability risks  <u>No. of technical committees/associations formed to ensure transfer of knowledge</u>	<b>220,000.00</b>
2.3 <i>Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge</i>	No. and type of targeted institutions with increased capacity to minimize exposure to coastal flooding and storm surge risks	Outcome 2: A strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	No. and type of targeted institutions with increased capacity to minimize exposure to climate variability risks  <u>No. of early warning systems (by scale) and no. of beneficiaries covered</u>	<b>265,000.00</b>
<b>Component 3. Beach Stabilization of High-Risk Coastal Areas</b>				
3. <i>Beach Stabilization of High-Risk Coastal Areas</i>	<i>Beach recovery and stabilization</i> improved to withstand climate change and variability-induced stress	Outcome 4: Increased adaptive capacity within relevant development sector services and infrastructure assets	<u>Physical infrastructure improved to withstand climate change and variability-induced stress</u> <u>4.2- Beach recovery and stabilization to withstand climate change and variability-induced stress</u>	<b>1,100,000.00</b>
<b>Component 4. Awareness Raising, Knowledge Dissemination and National Capacity Strengthening</b>				
4.1 <i>Development of a National Climate Change Communication Strategy and Action Plan</i>	Percentage of the national population aware of predicted adverse impacts of climate change, and appropriate responses	Outcome 3: A strengthened awareness and ownership of adaptation and climate risk reduction	<u>3-4</u> Percentage of the targeted population aware of predicted adverse impacts of climate change, and appropriate responses	<b>125,000.00</b>
4.2 <i>Development of training modules for best coastal adaptation practices</i>	The capacity of staff/stakeholders to predict, detect, respond to, and mitigate impacts of, climate-related events from targeted institutions increased	Outcome 2: A strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	<u>2-4.1</u> -No. of staff trained to respond to, and mitigate impacts of, climate-related events (by gender)  <u>No. of targeted institutions with increased capacity to minimize exposure to climate variability risks (by type, sector and scale)</u>	<b>150,406.00</b>
	The capacity of staff/partners to predict,	Outcome 2: A strengthened	<u>2-4.1</u> -No. of staff trained to respond	<b>100,000.00</b>

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Table 30 Budget Expected Concrete Outputs

Table 33: Budget Expected Concrete Outputs

Outcome	Output	Activities	Year 1	Year 2	Year 3	Year 4	Year 5	Total Budget (US\$)	
<b>Component 1: Improving coastal land use for resilient habitation and sectoral activities</b>									
<b>1.1 Development of the National Housing Policy and Building Codes for resilient coastal habitation based on vulnerabilities</b>	1.1.1 Implementation of the National Housing Policy	Prepare draft Housing Policy taking into consideration economic, social, gender and climate factors	33,750	33,750				67,500	
		Consultation	6,000	6,000	3,700	3,700		19,400	
		Technical Support	13,783	13,783	13,783			41,349	
		Raise awareness on the National Housing Policy				15,000		15,000	
	<b>Output 1.1.1 Total</b>			<b>53,533</b>	<b>53,533</b>	<b>17,483</b>	<b>18,700</b>		<b>143,249</b>
	1.1.2 Development of Building Codes	Development of a Draft Building Code	10,000	75,000					85,000
		Consultation	5,000	10,950	5,950	2,500	2,500		26,900
		Conduct stakeholder sensitization		10,000	27,500	25,000	25,000		87,500
	<b>Output 1.1.2 Total</b>			<b>15,000</b>	<b>95,950</b>	<b>33,450</b>	<b>27,500</b>	<b>27,500</b>	<b>199,400</b>
	1.1.3 Development of a social housing pilot	Development of social housing pilot which takes into consideration climate factors (temperature, wind, humidity, etc.)			20,000				20,000
		Technical Support			14,117	14,117	14,117		42,351
		Construction of the pilothouse				75,000			75,000
	<b>Output 1.1.3 Total</b>					<b>34,117</b>	<b>89,117</b>	<b>14,117</b>	<b>137,351</b>
<b>Output 1.1 Total</b>			<b>68,533</b>	<b>149,483</b>	<b>85,050</b>	<b>135,317</b>	<b>41,617</b>	<b>480,000</b>	
<b>1.2 Strengthening the implementation of the Integrated Coastal Zone</b>	1.2.1 Strengthening the implementation of the Integrated Coastal Zone	Procure necessary software and equipment for data collection and processing	7,523	7,523	7,523	7,523	7,506	37,600	

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<b>Management Plan and associated management guidelines for zonation</b>	Management Plan and associated management guidelines for zonation	Utilize software and equipment for data collection and analysis	20,000	20,000	20,000	20,000	9,400	89,400
		Continue drone mapping and ground-truthing exercise to update the Coastal Land Use Inventory to update the register for three planning regions in northern, central, and southern Belize.	7,500	7,500	7,500	5,000	3,250	30,750
		Collect information to update the ICZM Plan	1,500	1,500	1,500	1,500	750	6,750
		Share updated recommendations with national stakeholders						
	<b>Output 1.2.1 Total</b>		<b>36,523</b>	<b>36,523</b>	<b>36,523</b>	<b>34,023</b>	<b>20,906</b>	<b>164,500</b>
	1.2.2 Collaborative approach for strengthening the implementation of the Integrated Coastal Zone Management Plan	Conduct site inspections, meetings with Community Wardens, and Coastal Advisory Committees to monitor compliance with the Coastal Zone Management guidelines	5,000	5,000	5,000	5,000	2,500	22,500
	<b>Output 1.2.2 Total</b>		<b>5,000</b>	<b>5,000</b>	<b>5,000</b>	<b>5,000</b>	<b>2,500</b>	<b>22,500</b>
<b>Output 1.2 Total</b>		<b>41,523</b>	<b>41,523</b>	<b>41,523</b>	<b>39,023</b>	<b>23,406</b>	<b>187,000</b>	
<b>Output 1 Total</b>		<b>92,486</b>	<b>177,348</b>	<b>141,398</b>	<b>188,898</b>	<b>66,869</b>	<b>667,000</b>	
<b>Component 2: Coastal Vulnerability Monitoring</b>								
<b>2.1. Strengthening data availability for the development of a national coastal saline intrusion program</b>	2.1.1 Enhance evidence-based knowledge to determine best use practices for freshwater supply for the coastal areas / Reducing probability of further saline intrusion	Procure of equipment and other tools for research on groundwater, water quality, and soil salinity	142,375	142,375				284,750
		Plan and execute a field program to assess and verify soil salinity conditions	4,250	4,250	4,250	4,250	4,250	21,250
		Update GIS products to reflect newly acquired information	140,000	140,000				280,000
		Conduct workshop/field visit for training purposes	25,000	35,500	25,000	25,000	12,500	123,000
	<b>Output 2.1.1 Total</b>		<b>311,625</b>	<b>322,125</b>	<b>29,250</b>	<b>29,250</b>	<b>16,750</b>	<b>709,000</b>

			<b>Output 2.1 Total</b>	<b>311,625</b>	<b>322,125</b>	<b>29,250</b>	<b>29,250</b>	<b>16,750</b>	<b>709,000</b>
<b>2.2. Develop and implement a National Beach Erosion Monitoring Program</b>	2.2.1 Develop Coastal Research and Monitoring	Establish framework coastal beach erosion monitoring program including the identification of best techniques available to assess erosion and conduct training	37,500	37,500					75,000
		Hardware and software for program	25,000						25,000
	<b>Output 2.2.1 Total</b>		<b>25,000</b>						<b>100,000</b>
	2.2.2 Establish								
		Select and recruit members for programme	7,500	10,000	10,000	10,000	7,500		45,000
		Coastal Monitoring Technician	20,000	20,000	20,000	15,000			75,000
	<b>Output 2.2.2 Total</b>		<b>47,500</b>	<b>45,000</b>	<b>10,000</b>	<b>10,000</b>	<b>7,500</b>		<b>120,000</b>
	2.2.3 Develop and implement training schedule and training programs	Train members of monitoring programme	5,000	7,500	7,500	5,000	5,000		30,000
		<b>Output 2.2.3 Total</b>		<b>15,000</b>	<b>17,500</b>	<b>17,500</b>	<b>15,000</b>	<b>10,000</b>	
	<b>Output 2.2 Total</b>		<b>87,500</b>	<b>62,500</b>	<b>27,500</b>	<b>25,000</b>	<b>17,500</b>		<b>220,000</b>
<b>2.3 Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge</b>	2.3.1 The implementation of Phase 1 – EWS development & Storm Surge modeling	Improvement of the NMS's Surface Database to implement early warning system and model storm surge	120,000						120,000
		Purchase physical Server or Workstation	10,000						10,000
		SURFACE/PLUVIO Integration for the importation of Numerical Weather Prediction (NWP) and other data from (NOAA GFS, Local products Belize Meteorological Service, etc.)	10,000						10,000
	<b>Output 2.3.1 Total</b>		<b>140,000</b>						<b>140,000</b>



	2.3.2 The establishment of Weather Stations/Sensors along the coast	Purchase 1 field vehicle for monitoring weather stations	40,000					40,000
		Purchase and installation of weather stations/sensors to strengthen weather data collection	85,000					85,000
	<b>Output 2.3.2 Total</b>	<b>125,000</b>					<b>125,000</b>	
	<b>Output 2.3 Total</b>	<b>265,000</b>					<b>265,000</b>	
<b>Output 2 Total</b>		<b>664,125</b>	<b>384,625</b>	<b>56,750</b>	<b>54,250</b>	<b>34,250</b>	<b>1,194,000</b>	
<b>Component 3. Beach stabilization of High-Risk Coastal Areas</b>								
3.1 Increased adaptive capacity within Hopkins and Dangriga communities through infrastructure and/or soft structure assets	3.1.1 Implementation of beach recovery and stabilization through a pilot project in the high-risk coastal communities Dangriga and Hopkins	Development and Implementation of engineering solution(s)	250,000	375,000	10,000	10,000	10,000	655,000
		Consult with stakeholders	25,000	25,000	25,000	25,000	25,000	125,000
		Monitoring and evaluation of effectiveness	50,000	50,000	50,000	50,000	50,000	250,000
	<b>Output 3.1.1 Total</b>	<b>325,000</b>	<b>450,000</b>	<b>85,000</b>	<b>85,000</b>	<b>85,000</b>	<b>1,030,000</b>	
	3.1.2 Monitoring and evaluation of activities' effectiveness and documentation of lessons learnt	Develop a report on lessons learned and a plan to scale up developed				50,000		50,000
		Consult with stakeholders				10,000	10,000	20,000
<b>Output 3.1.2 Total</b>				<b>60,000</b>	<b>10,000</b>	<b>70,000</b>		
<b>Output 3.1 Total</b>	<b>325,000</b>	<b>450,000</b>	<b>85,000</b>	<b>145,000</b>	<b>95,000</b>	<b>1,100,000</b>		
<b>Output 3 Total</b>		<b>325,000</b>	<b>450,000</b>	<b>85,000</b>	<b>145,000</b>	<b>95,000</b>	<b>1,100,000</b>	
<b>Component 4. Awareness raising, knowledge dissemination and capacity strengthening</b>								
4.1 Development of a National Climate Change Communication Strategy and Action Plan	4.1.1 Implementation of the NCCSAP							
		Communication consultant	5,000	5,000	5,000	5,000	2,500	22,500
		Production of written, audio and visual materials for publication	7,500	7,500	7,500	7,500	5,000	35,000
		Carry out communications activities as envisioned in the NCCSAP	10,000	10,000	10,000	10,000	5,000	45,000

		Conduct working sessions with AF proposal entities	2,500	2,500	2,500	2,500	1,250	11,250
		Conduct monitoring, verification and information sharing of communications activities	2,500	2,500	2,500	2,500	1,250	11,250
		<b>Output 4.1.1 Total</b>	<b>27,500</b>	<b>27,500</b>	<b>27,500</b>	<b>27,500</b>	<b>15,000</b>	<b>125,000</b>
		<b>Output 4.1 Total</b>	<b>27,500</b>	<b>27,500</b>	<b>27,500</b>	<b>27,500</b>	<b>15,000</b>	<b>125,000</b>
<b>4.2 Development of training modules for best coastal adaptation practices</b>	4.2.1 Development of training modules for best coastal adaptation practices	Development of modules via a consultant	5,000	5,000	5,000	5,000	5,000	25,000
		Conduct a training needs assessment and prepare training plan	7,500	7,500	7,500	5,406	5,000	32,906
		Prepare training materials	10,000	10,000	10,000	10,000	5,000	45,000
		<b>Output 4.2.1 Total</b>	<b>22,500</b>	<b>22,500</b>	<b>22,500</b>	<b>20,406</b>	<b>15,000</b>	<b>102,906</b>
	4.2.2 Implementation of training modules for best coastal adaptation practices	Carry out training interventions	5,000	5,000				10,000
		Conduct M&E and verification	5,000	5,000				10,000
		Share lessons learned			10,000	10,000	7,500	27,500
		<b>Output 4.2.2 Total</b>	<b>10,000</b>	<b>10,000</b>	<b>10,000</b>	<b>10,000</b>	<b>7,500</b>	<b>47,500</b>
		<b>Output 4.2 Total</b>	<b>32,500</b>	<b>32,500</b>	<b>32,500</b>	<b>30,406</b>	<b>22,500</b>	<b>150,406</b>
	<b>4.3 Strengthening of GIS capabilities of CZMAI and partners</b>	4.3.1 Development of GIS training modules	Conduct a GIS training needs assessment and prepare a training/investment plan via a consultant	5,000	7,500	7,500	5,000	
Purchase equipment and software			15,000	15,000	12,500	12,500	6,500	61,500
		<b>Output 4.3.1 Total</b>	<b>20,000</b>	<b>22,500</b>	<b>20,000</b>	<b>17,500</b>	<b>6,500</b>	<b>86,500</b>
4.3.2 Implementation of GIS training modules		Carry out training interventions			1,500	1,500		3,000
		Conduct M&E and verification			1,500	1,500		3,000
		Share lessons learned				5,000	2,500	7,500
		<b>Output 4.3.2 Total</b>			<b>3,000</b>	<b>8,000</b>	<b>2,500</b>	<b>13,500</b>

	<b>Output 4.3 Total</b>	<b>20,000</b>	<b>22,500</b>	<b>23,000</b>	<b>25,500</b>	<b>9,000</b>	<b>100,000</b>
	<b>Output 4 Total</b>	<b>80,000</b>	<b>82,500</b>	<b>83,000</b>	<b>83,406</b>	<b>46,500</b>	<b>375,406</b>
<b>5. Total Components</b>		<b>1,161,611</b>	<b>1,094,473</b>	<b>366,148</b>	<b>471,554</b>	<b>242,619</b>	<b>3,336,406</b>
<b>6. Project/Programme Execution cost</b>		84,500	70,500	78,000	70,030	47,200	350,230
<b>7. Total Project/Programme Cost</b>		1,246,111	1,164,973	444,148	541,584	289,819	3,686,636
<b>8. Project/Programme Cycle Management Fee</b>		66,750	69,250	69,250	69,250	38,864	313,364
<b>Amount of Financing Requested</b>							<b>4,000,000</b>

*Table 31 Project Execution cost*

Table 34: Project Execution Cost

Description	Year 1	Year 2	Year 3	Year 4	Year 5	Total (US\$)
<b>Project Manager</b>	24,000	24,000	24,000	24,000	12,000	108,000
<b>Office staff and technical support</b>	33,000	33,000	33,000	33,000	16,500	148,500
<b>Office facilities</b>	15,000	8,500	8,500	8,030	5,000	45,030
<b>Travel</b>	5,000	5,000	5,000	5,000	5,000	25,000
<b>Baseline</b>	7,500					7,500
<b>Mid-Term Evaluation</b>			7,500			7,500
<b>End-Term Evaluation</b>					8,700	8,700
<b>Total for component 6</b>	<b>84,500</b>	<b>70,500</b>	<b>78,000</b>	<b>70,030</b>	<b>47,200</b>	<b>350,230</b>

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*Table 32 Project Cycle Management fee Budget*

Table 35: Project Cycle Management Fee Budget

Description	Year 1	Year 2	Year 3	Year 4	Year 5	Total (US\$)
<b>Evaluation Support Cost</b>	15,500	15,500	15,500	15,500	10,000	72,000
<b>Project Support Costs, rent, utilities, etc.</b>	18,750	18,750	18,750	18,750	9,000	84,000
<b>Management Supervision</b>	15,000	17,500	17,500	17,500	12,364	79,864
<b>PACT staff salary/supervision of reports etc.</b>	17,500	17,500	17,500	17,500	7,500	77,500
<b>Total for component 8</b>	<b>66,750</b>	<b>69,250</b>	<b>69,250</b>	<b>69,250</b>	<b>38,864</b>	<b>313,364</b>

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## H. Include A Disbursement Schedule with Time-Bound Milestones

*Table 33 disbursement schedule with time bound milestones*

Table 36: Disbursement Schedule with Time-bound Milestones

	Year 1	Year 2	Year 3	Year 4	Year 5
	1st Disbursement - upon agreement signature	2nd disbursement - One year after project start	3rd disbursement - Two years after project start	4th disbursement - Three years after project start	5th disbursement - Four years after project start

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	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Reporting</b>		Upon the First Annual Report Upon financial report indicating disbursement of at least 70% of funds	Upon the Second Annual Report Upon financial report indicating disbursement of at least 70% of funds	Upon the Third Annual Report Upon financial report indicating disbursement of at least 70% of funds	Upon the Fourth Annual Report Upon financial report indicating disbursement of at least 70% of funds
<b>Output</b>	<b>Milestone (By the end of the year)</b>				
1.1. Development of national policy for resilient coastal habitation based on vulnerabilities	i. Review of Existing Legislation and regulations related to Housing in Belize (Town Planning Act, Town Council Act, Land Utilization Act, Land Subdivision Act, Energy Act, Coastal Zone Management, etc.) and report preparation with concrete recommendations on how to use the legislation through consolidation or amendments completed ii. Stakeholders consultations commenced and will continue throughout the implementation. iii. Discussion paper on building codes prepared	i. Discussion paper on Housing Policy developed ii. Building codes developed	i. Housing Policy prepared iii. Designer pilot social house hired	i. Design of pilot social house completed ii. Communication products developed	ii Construction of pilot social house completed ii Communication products distributed
1.2. Strengthening the implementation of the Integrated Coastal Zone Management Plan and associated management guidelines for zonation	i. Drone mapping and ground-truthing are have commenced will continue throughout implementation	i. Updated information is being made available for updating the Coastal Land Use Inventory ii. Regular site inspections and meetings with Community Wardens and Coastal Advisory Committees are being conducted and recorded.	i. The Coastal Land Use Inventory is updated ii Integrated Coastal Zone Management Plan and associated management guidelines for zonation are being updated/developed iii. Community Wardens and Coastal Advisory Committees are properly supporting the monitoring activities.	Integrated Coastal Zone Management Plan and associated management guidelines for zonation have been developed and distributed	Roll-over activities and evaluation completed

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	Year 1	Year 2	Year 3	Year 4	Year 5
2.1. Development of a national coastal saline intrusion program	i. Equipment and other tools for research on groundwater, water quality, and soil salinity have been procured.	i. Research on groundwater, water quality, and soil salinity has commenced.	i. A research report on groundwater, water quality, and soil salinity is available. ii. Training tools related to capacity building of / technology transfer are being developed	i. Training tools related to capacity building of / technology transfer are available	Roll-over activities and evaluation completed
2.2. Strengthening data availability for the development of a national coastal saline intrusion program	i. Coastal monitoring technicians recruited	ii. consultancy commenced assessing techniques available to assess erosion and determine best options iii. equipment and software purchased to enable analyzing aerial films and establish a database for the data collection and storage iv. action plan formulated and series of meetings techniques to establish community network for on the ground monitoring commenced	ii. consultancy to assess techniques available to assess erosion and determine best options completed iv. action plan formulated and series of meetings techniques to establish community network for on the ground monitoring completed v. assessment commenced to develop a sustainability/funding mechanism commenced	v. assessment commenced developing a sustainability/funding mechanism completed	Roll-over activities and evaluation completed
2.3. Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge	i. Necessary equipment for data collection and monitoring purchased ii. The implementation of Phase 1 – EWS development & Storm Surge modeling commenced iii. Weather stations established along the coast	i. Updating of National Meteorological Service web-based data management system has continued	i. Updating of National Meteorological Service web-based data management system has continued	i. Updating of National Meteorological Service web-based data management system has continued	Evaluation
3.1 Pilot nourishment/ rehabilitation of selected coastal communities Dangriga and Hopkins	i. Implementation of beach stabilization through a pilot project in the high-risk coastal communities Dangriga and Hopkins to recover areas lost to erosion commenced	i. Implementation of beach stabilization through a pilot project in the high-risk coastal communities Dangriga and Hopkins to recover areas lost to erosion completed	i. M&E of the effectiveness of beach stabilization through a pilot project in the high-risk coastal communities Dangriga and Hopkins to recover areas lost to erosion conducted	i. M&E of the effectiveness of beach stabilization through a pilot project in the high-risk coastal communities Dangriga and Hopkins to recover areas lost to erosion conducted	Evaluation

	Year 1	Year 2	Year 3	Year 4	Year 5	
3.2 Documenting lessons learned and developing a plan to scale up to other coastal communities		i. Data on lessons learned being collected	i. Documentation of lessons learned to scale up in the future completed	i. Lessons learned to scale up in the future shared with 25 other coastal communities	Roll-over activities and evaluation completed	
4.1. Implementation of a National Climate Change Communication Strategy and Action Plan	i. Communications professional hired ii. Communication strategy and action plan is implemented	ii. Communication strategy and action plan is implemented	ii. Communication strategy and action plan is implemented	ii. Communication strategy and action plan implementation completed	Evaluation	
4.2 Development of training modules for best coastal adaptation practices for Belize	i. Training needs assessment, prioritization conducted, and plan developed	ii. Training material being developed, and training is conducted	ii. Training material being developed, and training is conducted	ii. Training material development and training completed	Evaluation	
4.3 Strengthening of GIS capabilities within the CZMAI and partners	i. Training plan developed, and software/hardware purchased	ii. Training material being developed, and training is conducted	ii. Training material being developed, and training is conducted	ii. Training material development and training completed	Evaluation	
<b>Schedule date</b>	<b>October 2021 (or Upon Signing)</b>	<b>Jun-22</b>	<b>Jun-23</b>	<b>Jun-24</b>	<b>Jun-25</b>	<b>Totals</b>
Project Funds	1,161,611	1,094,473	366,149 <sup>98</sup>	471,554	242,619	<u>3,336,406</u>
Project Execution	84,500	70,500	78,000	70,030	47,200	<u>350,230</u>
Programme cycle Management	66,750	69,250	69,250	69,250	38,864	<u>313,364</u>
<b>Total (US\$)</b>	<b>1,312,861</b>	<b>1,234,223</b>	<b>513,399<sup>98</sup></b>	<b>610,834</b>	<b>328,683</b>	<b><u>4,000,000</u></b>

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

**A. Record of endorsement on behalf of the government<sup>1</sup>** Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:

 Mr. Joseph Waight Financial Secretary Ministry of Finance		Date: 14 JANUARY 2021
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**B. Implementing Entity certification** Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (Belize's Growth and Sustainable Development Strategy, National Climate Change Policy Strategy and Action Plan and Belize's Nationally Determined Contributions to the UNFCCC) and subject to the approval by the Adaptation Fund Board, commit to implementing the project in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project.

<sup>1</sup> Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.





Mrs. Nayari Diaz-Perez  
Executive Director of the Protected Areas Conservation Trust  
Implementing Entity Coordinator

Date: 14 January 2021	Tel. and email: (501) 822-3637 ed@pactbelize.org
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Project Contact Person: Ms. Denaie Swasey Tel. And Email: (501) 822-3637 / cc.techofficer@pactbelize.org
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**GOVERNMENT OF BELIZE**  
*Ministry of Finance*  
*Belmopan, Belize*

C/GEN/120/01/21 (7) Vol. 1

14<sup>th</sup> January 2021

The Adaptation Fund Board  
c/o Adaptation Fund Board Secretariat  
Email: [Secretariat@Adaptation-Fund.org](mailto:Secretariat@Adaptation-Fund.org)  
Fax: 202 522 3240/5


Dear Sir/Madam:

**Subject: Endorsement for Enhancing the Resilience of Belize's Coastal  
Communities to Climate Change Impacts**

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

Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the project will be implemented by Protected Areas Conservation Trust (PACT) and executed by the National Climate Change Office (NCCO) and Coastal Zone Management Authority and Institute (CZMAI).

Sincerely,

  
**(JOSEPH WAIGHT)**  
Financial Secretary



- c. Chief Executive Officer, Ministry of Sustainable Development, Climate Change and Disaster Risk Management  
Executive Director, Protected Areas Conservation Trust (PACT)

Tel: 501-822-2158, 2344, 828-4123

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[www.mof.gov.bz](http://www.mof.gov.bz)

## ANNEX I GENDER/SOCIAL ASSESSMENT

### PART I: INTRODUCTION

#### Gender and Climate Change

Climate change has a more pronounced effect on poor and marginalized populations globally. This is because it is often that these populations are the most reliant on natural resources for their livelihoods and/or have the least capacity to respond to natural hazards, such as droughts, landslides, floods, and hurricanes. This vulnerability extends particularly to women who are generally responsible for securing water, food, cooking fuel, and other amenities that are required in the home. Women also experience a disproportionate denial of access to decision-making processes and resources that are required for income generation or survival. In more traditional communities, such as Mayan communities in the south, the men are expected to control resources and make decisions. In general, women are not expected to be landowners and entrepreneurs. This is further exacerbated by the fact that they are expected to be the caregivers in their communities.

Gender-based variations in time use, access to assets and credit, and treatment by markets and formal institutions (including the legal and regulatory framework) constrain women's opportunities and account for the discrepancy between women's and men's differentiated exposure and vulnerability to climate change risks. The United Nations Framework Convention on Climate Change (UNFCCC, 2017) suggests that:

*Women commonly face higher risks and greater burdens from the impacts of climate change in situations of poverty, and the majority of the world's poor are women. Women's unequal participation in decision-making processes and labor markets compound inequalities and often prevent women from fully contributing to climate-related planning, policymaking, and implementation.*

Women nevertheless play a critical role in the response to climate change due to their local knowledge of and leadership in e.g. sustainable resource management and/or leading sustainable practices at the household and community level. Parties to the UNFCCC have recognized the importance of involving women and men equally in the development and implementation of national climate policies that are gender-responsive by establishing a dedicated agenda item under the Convention addressing issues of gender and climate change (UNFCCC, 2017). At the national level, Belize's National Climate Change Policy, Strategy and Action Plan (NCCPSAP) identifies as one of its guiding principles of gender equity and non-discrimination in access to opportunities. The NCCPSAP encourages all livelihood development initiatives to consider the gender-differentiated needs and roles of the society, encourage equity and non-discrimination, and provide equal access opportunities to all (NCCPSAP, 2015).

#### Country gender profile

Belize's midyear population estimate for 2020 is 209,603 males, 209,596 females, and 419,199 for the total population. The population estimates for the major administrative areas and urban/rural figures are indicated in Table 34. The 2013 Labor Force Survey recorded the labor force at 148,736, or 46.1% of the total population. Four out of every five men of working age were included in the labor force, compared to only one in two women of working age, revealing a distinctive gender-segregation in the formal labor

market. Moreover, the unemployment rate for females far exceeded that of males, at 20.4% and 6.7% respectively.

*Table 34: Midyear estimates: Major Administrative Areas (SIB, 2020)*

*Table 37: Midyear estimates: Major Administrative Areas (SIB, 2020)*

Area	Males	Females	Estimated Mid-Year Population 2020
Country Total	209,603	209,596	419,199
Urban	91,405	95,844	187,249
Rural	118,198	113,752	231,950
Corozal	25,163	25,327	50,490
Orange Walk	26,683	26,690	53,373
Belize	63,102	64,581	127,683
Cayo	51,028	51,086	102,115
Stann Creek	23,844	22,170	46,015
Toledo	19,783	19,742	39,525

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Ministry of Education statistics show that even in rural communities, women are enjoying increased access to resources, particularly education. [Table 38 and Table 39](#) ~~Table 36 and Table 36~~ below are graphs that show the enrollment in high school and the transition from primary school to high school.

*Table 35: Enrolment in high school* ~~Table 38: Enrolment in high school~~

District and Sex	2017-18					2018-19				
	Form 1	Form 2	Form 3	Form 4	TOTAL	Form 1	Form 2	Form 3	Form 4	TOTAL
<b>Belize</b>	2,066	1,802	1,642	1,425	<b>6,935</b>	2,054	1,817	1,719	1,402	<b>6,992</b>
Male	1,013	866	744	615	<b>3,238</b>	1,005	859	806	614	<b>3,284</b>
Female	1,053	936	898	810	<b>3,697</b>	1,049	958	913	788	<b>3,708</b>
<b>Corozal</b>	743	632	573	469	<b>2,417</b>	710	616	590	501	<b>2,417</b>
Male	364	327	268	192	<b>1,151</b>	350	289	280	233	<b>1,152</b>
Female	379	305	305	277	<b>1,266</b>	360	327	310	268	<b>1,265</b>
<b>Stann Creek</b>	859	754	656	565	<b>2,834</b>	855	769	673	602	<b>2,899</b>
Male	442	369	289	232	<b>1,332</b>	420	379	326	279	<b>1,404</b>
Female	417	385	367	333	<b>1,502</b>	435	390	347	323	<b>1,495</b>
<b>Toledo</b>	639	568	477	407	<b>2,091</b>	708	553	517	429	<b>2,207</b>
Male	337	290	241	217	<b>1,085</b>	394	280	263	218	<b>1,155</b>
Female	302	278	236	190	<b>1,006</b>	314	273	254	211	<b>1,052</b>
<b>TOTAL</b>	4,307	3,756	3,348	2,866	<b>14,277</b>	4,327	3,755	3,499	2,934	<b>14,515</b>
Male	2,156	1,852	1,542	1,256	<b>6,806</b>	2,169	1,807	1,675	1,344	<b>6,995</b>
Female	2,151	1,904	1,806	1,610	<b>7,471</b>	2,158	1,948	1,824	1,590	<b>7,520</b>

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*Table 36: Transition from Primary School to High School*  
*Table 39: Transition from Primary School to High School*

District and Sex	2017-18			2018-19		
	2016-17 Graduates	New Entrants	Rate	2016-17 Graduates	New Entrants	Rate
<b>Belize</b>	1,928	1,900	98.55%	1,912	1,871	97.86%
Male	948	909	95.89%	911	879	96.49%
Female	980	991	101.12%	1,001	992	99.10%
<b>Corozal</b>	874	716	81.92%	951	666	70.03%
Male	441	346	78.46%	480	327	68.13%
Female	433	370	85.45%	471	339	71.97%
<b>Stann Creek</b>	807	794	98.39%	774	800	103.36%
Male	403	395	98.01%	382	389	101.83%
Female	404	399	98.76%	392	411	104.85%
<b>Toledo</b>	787	600	76.24%	848	693	81.72%
Male	389	312	80.21%	446	383	85.87%
Female	398	288	72.36%	402	310	77.11%
<b>Total</b>	4,396	4,010	91.22%	4,485	4,030	89.86%
Male	2,181	1,962	89.96%	2,219	1,978	89.14%
Female	2,215	2,048	92.46%	2,266	2,052	90.56%

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While most households are headed by males, approximately 1 in 4 households are headed by females (Figure 23). This means that they play an important role as decision-makers in the communities. Women participate in micro and small enterprises as entrepreneurs (cooking, handicraft, shops, hairdressers, etc.), but there is still some undervaluing of women's labor in monetary terms. There is a division of labor along gender lines within the home. Women are expected to care for the family while men are expected to earn the money that is spent in the home. However, the labor statistics show that the percentage of women and men who are employed as unskilled laborers is approximately the same. Gender divisions in agriculture, firewood, and water collection.

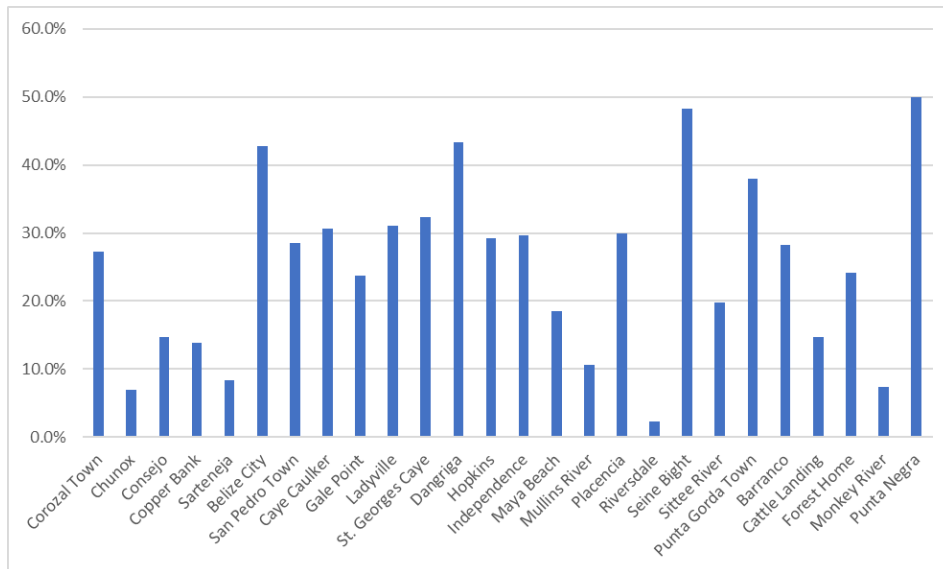


Figure 23-20: Percentage of Households in the coastal communities headed by women

Figure 15 Percentage of Households in the coastal communities headed by women

According to the CDB 2016 Gender profile, Belize has a significantly gender-segregated and male-dominated labor force, demonstrated, for example by male participation in the primary industries outnumbering female participation by nearly 19 to 1. The male to female employment ratio diminished from primary to secondary, to tertiary industries at 3.9 to 1 in secondary industries, and 1.2 to 1 in tertiary industries. Males earn more than females, with female (annual) average income estimated at US\$4,475 and male (annual) estimated average income at US\$10,317 (2016), at a ratio of 0.46:1. Tourism is significant to the Belizean economy, and the industry employs one in seven persons. Male to female participation in tourism was estimated at 55% to 45% (2016). Despite the effective integration of women in the tourism sector, compared to the primary and secondary sectors, male and female labor is highly gender segregated.

The National Women's Commission estimated in 2016 that approximately 60% of female labor was concentrated in services, shop sales, clerical duties, and elementary occupations, further revealing the significance of the tourism sector to their labor and underscoring the nature of female employment opportunities. Females are highly concentrated in domestic services-related jobs such as cleaning, housekeeping, and other poorly paid service jobs, including hair-braiding and souvenir selling. Male employment is most prevalent in areas including resort ownership and management; building and grounds maintenance; taxi driving and tour guiding (CDB, 2016) – although accounts suggest that female participation is becoming more widespread in the latter case.

**This study**

Analysis of the available statistics indicates some interesting gender-related trends in Belize. The 2010 census is the most recent source of disaggregated population data for the communities that are the beneficiaries of the project. A review of the information shows that the total population in the coastal districts of Corozal, Belize, Stann Creek, and Toledo was 201,461 in 2010, with 100,568 males and 100,893 females. In rural Belize, there is an est. population of 231,950 of which 118,198 males and 113,752 females. This entails an increase of approximately 30% for the total population, 28% for urban areas, and 31% for rural areas compared to the 2010 census figures. The disaggregated information for 2010 shows a total

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population of 117,613 living in the coastal communities that are the areas of focus for this project. There were some 33,035 households of which an average of 25.2% was headed by women. This represents a range of 2.3% in Riversdale to 50% in Punta Negra. The graph in Figure 1 below provides information on the percentage of households headed by women in coastal communities in 2010. (SIB, 2019). Using the 30% average population increase between 2010 and 2020 calculated above and applying it to the coastal communities, the 2020 estimated mid-year population would be approximately 152,897. Extrapolating further, using the average of 3.6 persons per household calculated from the information above, it is estimated that in 2020 there are some 42,471 households in the coastal communities, of which 25.2% or some 10,617 are headed by women. These estimates need to be validated by the 2020 population census when this data becomes available.

#### **Purpose**

The purpose of the Gender/Social Assessment is to:

- Assess the social and gender-based aspects of the project in all coastal communities inclusive of indigenous people, marginalized and vulnerable groups
- Analyze positive and adverse impacts the project components may pose to persons in coastal communities and devise mechanisms for mitigating adverse impacts
- Ensure that the project components, activities, and outcomes are not biased to negatively impact or put one gender or social group at a disadvantage.

#### **Methodology**

The methodology selected relied on the Capacities and Vulnerabilities Analysis tool that is used primarily for disaster preparedness and humanitarian relief. The tool specifically looks at a community's existing strengths (or capacities) and weaknesses (or vulnerabilities) to determine the impact that a crisis has (or may have) on them, as well as the way they respond to the crisis. The rationale for this approach is that a crisis becomes a disaster when it outstrips a community's capacity to cope. The analysis helps to avoid this by identifying the weaknesses that need to be addressed and building on the strengths in the community concerning natural disasters, in this case, response to climate change. Capacities include existing strengths of individuals and social groups, while vulnerabilities include the long-term factors which weaken the community's ability to cope with the sudden onset of disaster, or with drawn-out emergencies.

The Capacities and Vulnerabilities Analysis was done during the stakeholder consultation process. To this end, extra effort was made to ensure the participation of women and youth in the consultation process. All groups present were asked to collectively identify how vulnerabilities and capacities differ (or coincide) by gender and economic class. The intention was to complete the Capacities and Vulnerabilities Analysis Matrix, then disaggregate CVA by gender and economic class. This was only partially realized because the information provided was not enough to do a meaningful disaggregation. Conducting a full statistically representative CVA was not feasible due to challenges related to time, timing, resources, competition with stakeholders' other priorities (Annex 3 Stakeholder Consultation Report), and the fact that communities strongly prefer in-person consultations.

## **PART II RESULTS**

The consultation process of stakeholders in the AF Project's 27 target coastal communities (Corozal Town, Belize City, Dangriga, Punta Gorda Town, Altamira, St. Georges Caye, Hopkins, Barranco, Consejo, Ladyville, Sittee River, Cattle Landing, Chunox, San Pedro Town, Independence, Forest Home, Copper Bank, Caye Caulker, Seine Bight, Punta Negra, Sarteneja, Gales Point, Placencia, Monkey River, Mullins

River, Riversdale, Maya Beach) Corozal, Belize, Stann Creek, and Toledo Districts provided the following data relevant to the Gender and Social Assessment<sup>9</sup>:

Women are in charge or are the primary contacts for all the lead and key stakeholder agencies involved in the project. Women are also in charge of 8 of the 10 NGO stakeholders that do work in the coastal zone and which are potential collaborators with the project (SEA, TIDE, BAS, Fragments of Hope, Wildlife Conservation Society, The Nature Conservancy, WWF, Oceana). This guarantees that there will be female participation in the project at the decision-making level and places them in a position to ensure that there is gender equity built into the planning and implementation.

Of the 18 villages that we were able to consult during this assignment (Stakeholder Consultation Report), five have female chairpersons and all have at least two women on the council. At the municipal level, none of the municipalities have a woman mayor or deputy mayor, but all have at least one woman elected to the council. The two towns in the north (Corozal and San Pedro) both have one female councilor each, Belize City has three, and the two towns in the south (Dangriga and Punta Gorda) have two each. In the communities, the level of participation by women appears to be in direct relationship to the position that was held. Thus, there are women in local level leadership positions, although not always in equal representation. The women who were chairpersons, leaders of community-based organizations, business owners, or heads of households appeared to be more vocal. This is an indication that women are taking a more active leadership role in their communities and appear to be more assertive. It also provides a platform on which to develop gender-sensitive collaboration with the communities during and after the implementation of the project.

The women from the Southern and Central portion of the country, including Belize City, were more engaged in the discussions and more vocal about the issues that were identified. On average, the women who were heads of organizations, held senior positions in organizations, were community leaders or were actively involved in the communities tended to be younger (40 years and below) and have some education level (at least high school but mostly junior college and above). Ministry of Education statistics indicate that while equal numbers of males and females enter the school system at primary school, by the time they graduate from high school there is an average of 25% attrition in males and 10% in females. This indicates that increasingly women are becoming better equipped to undertake academically biased roles. This finding is an indication that, of necessity, women will be required to undertake tasks that were traditionally reserved for men. It was pointed out that there was no such thing as gender-specific roles within any of the project components. In that regard, the project provides a host of opportunities for anyone with the requisite training and skill.

Women in the villages tended to adhere more closely to the culturally/traditionally assigned gender-specific roles. In some instances, it was pointed out that they felt some of the activities and decisions were for the men and that they were comfortable with making some of the decisions.

While 60% of the Belizean population is 26 years of age and younger, most of the community representatives were 30 years of age and older. This suggests that the traditional community structure where decisions are made by the elders is still in place in most rural communities. These are cultural practices that should be respected until or unless a community member is negatively impacted.

Women in some of the communities want equal standing with men when it comes to land ownership, leadership roles, and decision-making. They feel that they are not taken seriously even though the laws do not differentiate between males and females. Studies have shown that women tend to be more judicious owners and managers of the property. This is important in a project where buy-in and active participation is a key requirement, particularly with coastal monitoring. It was felt that while the impacts of climate change affected everyone equally, during natural disasters women, particularly those who were heads of

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<sup>9</sup> The full collected dataset, as well as a summary thereof, is included in Annex 3 Stakeholder consultation report



households were affected disproportionately. They are tasked with the bulk of the preparation, evacuation coordination, care during the disaster, and the post-disaster recovery work that needs to be done. Additionally, because of their role as caregivers, anything that impacted the home or the immediate environment normally placed undue stress on them. The planned activities for the project could be done by anyone who was properly trained to carry out the work, particularly the coastal monitoring and flood watch because they were mostly at home in the community.

While no legislation currently exists that specifically addresses gender disparity in Belize, by default much has been done to address the issues of gender in society. As more girls make their way further along the academic ladder it will become increasingly more difficult to deny them the opportunities that were culturally and traditionally reserved for males. There is still much to be done but it needs to be targeted. One example is the issue of natural disasters and the role that women play in preparation and response. The Gender Policy states that the Government of Belize is committed to “Foster social and community development to enhance gender equity within families.”

### **Conclusions**

Women leaders in the communities, Government, and NGOs ensure female participation in the project. Belizean women are increasingly becoming better equipped to undertake the roles that used to be reserved for men. Consequently, their role as decision makers in the communities is stronger, although some prefer to adhere to the culturally/traditionally assigned gender-specific roles and decision-making by elders. Enhanced education levels among female participants are beneficial for the project as there will be a cadre of people at the community level who will be able to function as a change agent within their communities (e.g. support data collection, communication activities, decision-making, etc.), as will their increased interest on climate change and disaster preparedness. There is room for improvement in the area of valuing women’s labor in monetary terms (e.g. cooking, handicraft, shops, hairdressers, etc).

During natural disasters, women are disproportionately affected, especially in female-headed households (1 in 4). They lead preparation, evacuation coordination, care during the disaster, and the post-disaster recovery actions. Additionally, because of their role as caregivers, they are responsible for themselves and others. Emerging issues that women are increasingly showing interest in wanting to be considered on equal standing with men are land rights, access to investment financing, information about climate change, and disaster preparedness. There are concerns about safety and security, particularly around times of disasters. Women, particularly heads of households indicate that they do not feel safe, and worry about the timing of actions, adequacy, and availability of emergency shelters and the fact that emergency response appears to be tailored to male heads of households primarily. As such, the NCCCSAP needs to pay special attention to information sharing with women.

The result of the analysis suggests that in most communities, women prefer not to assume what are considered to be non-traditional roles. Culturally, gender roles have been clearly defined over time and most communities prefer to keep it that way. However, in communities where there were younger women who attended school up to the tertiary level, they expected that there would be a greater role for women to play in the project. Women who attend school and graduate are beginning to outnumber men at approximately 3:1. This puts them in a better position to make effective use of the project and the products thereof.

The results of the community consultations indicate that participants were supportive of the project and felt that the proposed activities were beneficial to coastal communities. It was felt that all the activities could be considered gender-neutral and would not adversely impact one gender, ethnic group, or demographic over the other. The project was seen as providing opportunities for communities to become more involved with the adaptation to climate change and sea-level rise. The project activities will be done by anyone who is properly trained to carry out the work, particularly the coastal monitoring and flood watch because they were mostly at home in the community.

The request for continued consultation and participation is an implementation detail that will be addressed with the understanding that there are clear gender-based roles within these communities that are slowly changing with the increased access to education by young women and girls.

### PART III: Gender Action Plan

The following gender action plan of the project aims to ensure equal participation of men and women and to integrate the gender-related needs of the local communities into the technical design and the way the project is implemented. The Gender Action Plan (Table 40) describes the proposed measures to be included in the project design and implementation to promote gender equality and mainstreaming in the activities and consequently the outputs of the project. In particular, it focuses on the gender concerns relating to equal access to opportunities, participation in decision-making, women’s access to training and practical skills, and how the plans/strategies developed will ensure equal opportunities for women. Overall, the main approaches were undertaken so far, or to be undertaken, are 1) Conducting consultations with both genders to ensure consider equally the perspectives of women and men, 2) Gender sensitivity in the project’s implementation and 3) Encouraging women to take staff and consultancy positions in the project. Proper consideration will be provided to pursuing a gender balance among staff/consultants/stakeholder beneficiaries, and in all procurement processes, in line with the NIE’s commitment to Gender Equality and Equity. Additionally, remuneration will be based on the work requirements, irrespective of gender.

Table 37: Gender Action Plan  
 Table 40: Gender Action Plan

Project Components	Outcomes	Gender issue	Action	Indicator	Beneficiaries	Responsible Party
Component 1 Improving coastal land use for resilient habitation and sectoral activities	1.1 Development of the National Housing Policy and Building Codes for resilient habitation based on vulnerabilities	Female-headed households are particularly vulnerable to climate hazards and also in the lower-income segment.	The policymakers consider equally the needs of men and women, and particularly considers women who work in the home. Discussions with communities are gender-equal and disaggregated.	No. of women engaged in the development of the policy and codes  Monitoring of Indicator:  A detailed description of how the needs of men and women (particularly women who work in the home) will be incorporated. An equal number of men and women participate. Attendance registers are taken (anonymized) that identify	National level: 419,199 persons: 209,603 males and 209,596 females  (Staff: 8 consultants: 4 male/4 female. Construction workers are generally male)	MIDH, M&E Officer, Project Manager. PSC (oversight)

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				numbers of men and women.		
		Female-headed household are particularly vulnerable and need information about	The policymakers consider equally the needs of men and women, and particularly considers women who work in the home. Women will be encouraged to apply for positions as wardens and committee members. Discussions with communities are gender-equal and disaggregated.	No. of women engaged and involved in the process  Monitoring of Indicator:  A detailed description of how the needs of men and women (particularly women who work in the home) will be incorporated. Progress made about female inclusion as wardens and committee members are documented An equal number of men and women participate. Attendance registers are taken (anonymized) that identify numbers of men and women	National level: 419,199 persons: 209,603 males and 209,596 females  (Staff: 12 persons: 6 male/6 female, however also influenced by available local capacities)	CZMAI, M&E Officer, Project Manager. PSC (oversight)
	1.2 Strengthening the implementation of the Integrated Coastal Zone Management Plan and associated management guidelines for zonation	Importance of adhering to coastal zonation.				
<i>Component 2 Coastal Vulnerability Monitoring</i>	2.1 Strengthening data availability for the development of a national coastal saline intrusion program	Gender-neutral work based on qualification. Females will be encouraged to apply, with equal consideration to both genders.	Training sessions target an equal number of men and women. Men and women are targeted to be trained in equal numbers. However, this is dependent on the intrinsic composition of the institutions. Female participation will likely outnumber males.	No. of women involved and trained under program  Monitoring of Indicator: Training sessions completed with records documenting equal participation from men and women. Documentation about these sessions prepared by M&E Officer and reviewed by the	27 coastal communities - 117,823 persons: 57,787men; 60,035women  (Target 50 trainees: 25 male/25 female)	NHS, M&E Officer, Project Manager. PSC (oversight)

				Project Manager and PSC.		
	2.2 Develop and implement a National Beach Erosion Monitoring Program	Gender-neutral work based on qualification. Females will be encouraged to apply, with equal consideration to both genders.	Training sessions target an equal number of men and women. Men and women are targeted to be trained in equal numbers. However, this is dependent on the intrinsic composition of the institutions. Female participation will likely outnumber males. Women will be encouraged to join the community committees.	No. of women involved in the program  Monitoring of Indicator: Training sessions completed with records documenting equal participation from men and women. Documentation about these sessions prepared by M&E Officer and reviewed by the Project Manager and PSC.	27 coastal communities - 117,823 persons: 57,787men; 60,035women  (Target 50 trainees: 25 male/25 female)	CZMAI, M&E Officer, Project Manager. PSC (oversight)
	2.3 Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge	Gender-neutral work based on qualification. Females will be encouraged to apply, with equal consideration to both genders.	Training sessions target an equal number of men and women. Men and women are targeted to be trained in equal numbers. However, this is dependent on the intrinsic composition of the institutions. Female participation will likely outnumber males.	No. of women trained  Monitoring of Indicator: Training sessions completed with records documenting equal participation from men and women. Documentation about these sessions prepared by M&E Officer and reviewed by the Project Manager and PSC.	27 coastal communities - 117,823 persons: 57,787men; 60,035women. (Target 10 trainees: 5 male/5 female)	NMS, M&E Officer, Project Manager. PSC (oversight)
Component 3 Beach stabilization	3.1 Increased adaptive capacity within	Female-headed households	The engineer's methodology will consider	No. of women involved in the pilot project	9,591persons (4,615 men, 4,976 women)	Engineer, NCCO, M&E Officer,

<i>of High-Risk Coastal Areas</i>	Hopkins and Dangriga communities through infrastructure assets	are particularly vulnerable to climate hazards.	equally the needs of men and women, and particularly considers women who work in the home, and how to avoid inconvenience. Discussions with communities are gender-equal.	Monitoring of Indicator: The engineer's progress report describes in detail how the needs of women (particularly women who work in the home) have been met, and if any conflicts have occurred.	in Dangriga, and 1,610 persons (777 men, 833 women) in Hopkins (Staff target 5 consultants: 2 male/3 female. Construction workers generally male)	Project Manager. PSC (oversight)
		Female stakeholders are particularly explicit about the need for information.	Knowledge sharing sessions target an equal number of men and women. Interventions will consider equally the needs of men and women, particularly women who are not in a leadership position.	No. of persons engaged  Monitoring of Indicator: Knowledge sharing sessions completed with records documenting equal participation by men and women. Documentation of sessions prepared by M&E Officer and reviewed by the Project Manager and PSC.	25 coastal communities – 106,622 persons: 52,395 men; 54,226 women  (100 session participants: 50 male/50 female from 25 coastal communities)	NCCO, M&E Officer, Project Manager. PSC (oversight)
<i>Component 4 Awareness raising, knowledge dissemination and capacity strengthening</i>	4.1 Development of a National Climate Change Communication Strategy and Action Plan	Female stakeholders are particularly explicit about the need for information.	Awareness sessions target an equal number of men and women. Interventions will consider equally the needs of men and women, particularly women who are not in a leadership position.	No. of communities and persons sensitized  Monitoring of Indicator: Awareness sessions were completed with records documenting equal participation from men and women. Documentation of sessions prepared by M&	National level: 419,199 persons: 209,603 males and 209,596 females  (100 session participants: 50 male/50 female from 25 coastal communities)	NCCO, M&E Officer, Project Manager. PSC (oversight)

				E Officer and reviewed by the Project Manager and PSC.		
4.2 Development of training modules for best coastal adaptation practices	Gender-neutral work based on qualification. Females staff equally considered for training.	Training sessions target an equal number of men and women. Interventions will consider equally the needs of men and women, particularly women who are not in a leadership position.	No. of persons trained.  Monitoring of indicator: Training sessions completed with records documenting equal participation from men and women. Documentation of sessions prepared by M&E Officer and reviewed by the Project Manager and PSC.	27 coastal communities - 117,823 persons: 57,787men; 60,035women (target 50 trainees: 25 male/25 female)	CZMAI, M&E Officer, Project Manager. PSC (oversight)	
4.3 Strengthening of GIS capabilities of CZMAI and partners	Gender-neutral work based on qualification. Females staff equally considered for training.			27 coastal communities - 117,823 persons: 57,787men; 60,035women (target 15 trainees: 7male/8 female)		

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Through this project, it will be ensured to include female and youth involvement, including indigenous women and youth groups in climate change discussions, trainings, and capacity building initiatives. Women are represented in all NGO and community groups that have been met with to develop this project proposal and so communications with these women and youth will be continued if the project is implemented. While implementing activities women’s knowledge, needs and roles will be reflected, while also incorporating indigenous expertise and traditional practices. Women comprise of large portion of the workforce in the tourism and agricultural sector; thus, they need to be provided with the same access to resources and training opportunities. When reaching out to community groups and indigenous groups special effort will be made to ensure equal representation of males and females, while ensuring that those who are chosen have the interest in supporting the project and in the learning opportunities that will be provided. Groups such as NAVCO, BENIC, the National Women’s Commission and others will also be consulted throughout the entire process. The project will build on the capabilities, unique knowledge, and perspectives of women, to not only build their climate resilience but also make them active agents of the project.

## ANNEX II FEASIBILITY STUDY

### PART I: ANALYSIS OF THE SITUATION

#### Analysis of the current situation of the coastal zone vulnerability and exposure, opportunities and gaps

##### Belize's Coastal Risk Profile

Belize's recent Coastal Risk Profile study concluded that both mangroves and coral reefs provide effective protection to people and properties. The study identified the entire country of Belize being at high to extreme risk to climate change vulnerability (Figure 24Figure 16), with red being assigned for the areas that are at extreme risk and orange for the risk-not-extreme (CAF 2014).

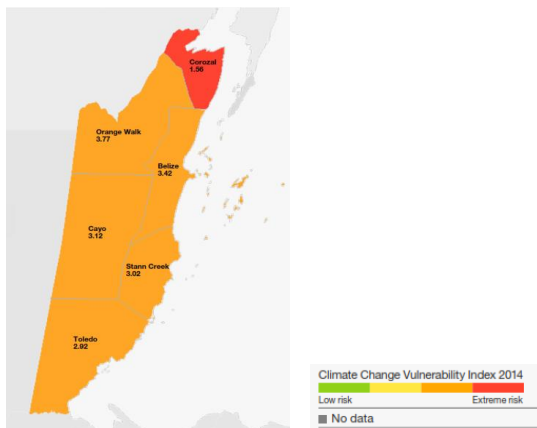


Figure 2424: Risk Profile Map (CAF 2014)

Figure 16 Risk profile map (CAF 2014)

Through the study, it was determined that impact was greater across the northern area of the country, whereas the southern part of the country is less exposed to coastal flooding associated with tropical cyclones. In terms of population and infrastructure, Belize City, Ambergris Caye, and Corozal Town are the most exposed and vulnerable areas, showing higher estimates of serious injuries/loss of life and damage to households and associated replacement costs. There is a significant shoreline retreat estimated in all sandy coastal areas of the country, but this beach erosion derived from tropical cyclones can be naturally covered after a period because the beaches are resilient. Shoreline retreat and beach surface loss are estimated to be the highest in Ambergris Caye and, second, in the beaches of Central and Southern Belize. Although the effect on coastal structures of coastal erosion derived from tropical cyclones is limited and it has been estimated to be relevant only in Placencia and Ambergris Caye (IHCantambria and IDB, 2020).

As for the environmental component, relevant and protected ecosystems play an important role in the northern and central regions not only due to their protection services but also due to the cultural,

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provisioning, and regulatory services they provide. Mangroves, in particular, avoid coastal erosion derived from tropical cyclones very effectively, i.e. where there are mangroves, the coastline doesn't move at all, and erosion is minimal; limited to perhaps the loss of the 1-2 rows of mangroves (more or less 2ft.).

**Recommended risk reduction measures**

Based on their intensive review, - which included scenario building related to coastal flooding and erosion due to tropical cyclones, - with as a basis the current situation and Horizon 2050, - using 69 historical tropical cyclones (45 category 1 or higher) and expanding the dataset with 652 synthetic tropical cyclones (290 category 1 or higher), IHCantambria and IDB (2020) identified a set of suitable risk reduction measures addressing diverse strategies and approaches. At least seven of these identified Risk Reduction Measures will be utilized in this AF Project as demonstrated in (Table 38), thus pursuing the pre-event risk management strategies: Prevention, Protection, Preparedness strategies<sup>10</sup> (Table 41 Table 38).

*Table 38: Strategies, approaches, and RRM in the catalog (adapted from IHCantambria and IDB; 2020, Blue Carbon Working Group; 2020)*

*Table 41: Strategies, approaches, and RRM in the catalog (adapted from IHCantambria and IDB; 2020, Blue Carbon Working Group; 2020)*

Strategy	Approach	Risk Reduction Measure	AF Project
<i>Prevention: Protect through actions taken in advance of the hazard, reducing the exposure to the hazard or the vulnerability of the exposed investments or people.</i>	Receivers adaptation	Building codes and regulations	Housing Policy and Building codes; Component 1.1
		Flood-proofing	n/a
	Exposure reduction	Land use regulations and urban planning	Coastal Zone Management; Component 1.2
	Modeling and assessments to enhance prevention	Hazard, exposure, vulnerability, and risk assessments under coastal flooding and erosion	Saline intrusion; Component 2.1
	Maintenance and conservation of the coastal system	Maintenance of coastal structures, beach width, coastal ecosystems, and habitats	Beach Erosion Monitoring; Component 2.2
<i>Protection: Shield from the direct impacts of the hazard through mitigation measures.</i>	Nature-based	Beach restoration	Component 3
		Wetland restoration	
		Coral reef conservation	
		Riparian buffers restoration	
		Forest conservation	
	Hard Engineering	Seawalls	
		Breakwaters and groins	
		Land claim	
	Soft Engineering	Managed retreat	
		Sand re-nourishment	

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<sup>10</sup> Further explanation of each risk reduction measure in IHCantambria & IDB (2020) Deliverable 6. Final Proposal of Risk Reduction Measures in Priority Hotspots.



<i>Preparedness: Knowledge and skills development to anticipate and respond to the impacts of a climate hazard.</i>	Forecasting and warning	Early warning systems	Early Warning; Component 2.3
	Emergency response	Emergency and contingency plans	n/a
	Enhance Public awareness	Education programs	Component 4.2 & 4.3
Raising awareness campaigns		Component 4.1	

## Preliminary analysis of key issues and risk reduction measures

### Component 1

#### Housing Policy and Building codes; Component 1.1

Goal: To safeguard citizens from dangers related to construction methods that are inadequate to withstand the impacts of weather hazards. Building codes are a set of recommended good practices or legislation; when enforced by the Central Building Authority provide minimum standards for safety, health, and general welfare including structural integrity and other requirements, especially in disaster-prone areas.

With the recent passing of the tropical storms, Eta and Iota over the Central American region and Belize not escaping the effects of these, the Ministry of Infrastructure Development and Housing (MIDH) recognizes that it is not only coastal communities being affected by climate change but also flood-prone inland communities. This highlights the need for National Building Codes for the coastal communities and inland communities. Standards will vary, depending on the reality of the different affected communities.

*Table 39: SWOT ANALYSIS BUILDING CODES (adapted from IHCantabria and IDB, 2020)*

*Table 42: SWOT ANALYSIS BUILDING CODES (adapted from IHCantabria and IDB, 2020)*

STRENGTHS	WEAKNESSES	Mitigation measures
<ul style="list-style-type: none"> <li>Building codes help the sustainability of structural integrity and safeguard construction quality and reduce building vulnerability.</li> <li>Building codes outline standard requirements for commercial, industrial, and residential structures design and construction according to an acceptable safety level.</li> <li>The current regulations were updated following major devastation caused by Hurricane Hattie (1961).</li> </ul>	<ul style="list-style-type: none"> <li>Limited stakeholder buy-in to the implementation of these standards as they raise initial costs of construction.</li> <li>Implementation is slowed down due to bureaucracy.</li> <li>The central and local building authorities are responsible for the generation of building codes and regulations, but there are other guidelines (e.g. ICZMP) that are not regulated via legislation.</li> </ul>	<ul style="list-style-type: none"> <li>Establish a social housing pilot Communication to improve buy-in</li> <li>M&amp;E and adjustments of bureaucratic procedures</li> <li>Continue – through other interventions – strengthen the regulatory framework</li> </ul>
OPPORTUNITIES	THREATS	Mitigation measures
<ul style="list-style-type: none"> <li>Examples of good practices are expected to support the acceptance of building codes and laws. Therefore, the AF project also includes the establishment of a pilot home/building.</li> </ul>	<ul style="list-style-type: none"> <li>Building codes can include non-scientific regulation/limitations.</li> <li>There are accounts of low-income families in Belize that construct houses that do not comply with the regulations.</li> <li>Building codes may not comply with cultural heritage designs</li> </ul>	<ul style="list-style-type: none"> <li>Properly designed sound building codes</li> <li>Enforcement of building codes and targeted subsidies for low-income families</li> <li>When developing the building codes, an assessment should be conducted on how the traditional housing structures (cultural heritage) of the Indigenous and</li> </ul>

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		Garifuna peoples will be integrated.
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### Coastal Zone Management guidelines; Component 1.2

Goal: To limit certain uses in hazardous areas, in accordance with coastal risks (e.g. industrial, residential), whereas other uses (e.g. recreational, natural ecosystems) are limited or forbidden. A buffer zone is established between a hazard area and coastal development using specific regulation/legislation. This buffer protects properties against coastal flooding and erosion by regulating that buildings are not located in an area susceptible to climate impacts.

*Table 40: SWOT analyses Land use regulation (adapted from IHCantabria and IDB, 2020)*

*Table 43: SWOT analyses Land use regulation (adapted from IHCantabria and IDB, 2020)*

STRENGTHS	WEAKNESSES	Mitigation measures
<ul style="list-style-type: none"> <li>An effective method to minimize property damage due to coastal flooding and erosion.</li> <li>A low-cost alternative for shoreline erosion or flood protection.</li> </ul>	<ul style="list-style-type: none"> <li>ICZM Plan is not regulated via legislation.</li> <li>The establishment of land use guidelines requires good quality data, which is not always available.</li> <li>Existing structures are usually permitted to stay within the buffer area</li> <li>Coastal erosion or sea-level rise can reduce the buffer zone between structures and the sea.</li> <li>Land use regulations are widely used globally and also used nationally (e.g. Punta Negra, Dangriga), but are currently moderately enforced in Belize.</li> </ul>	<ul style="list-style-type: none"> <li>Continue to strengthen the regulatory framework</li> <li>Strengthen data availability through research/monitoring</li> <li>If existing structures are significantly damaged or destroyed, they are to be reconstructed in line with the new regulation</li> <li>Buffer zones must be reviewed from time to time</li> <li>Improved enforcement of Land use regulations</li> </ul>
OPPORTUNITIES	THREATS	Mitigation measures
<ul style="list-style-type: none"> <li>They help to maintain shoreline access by regulating development in the immediate seafront area.</li> <li>They help to sustain the natural appearance of the coastline and protect natural shoreline dynamics.</li> <li>They result in an open space for the enjoyment of the natural shoreline.</li> </ul>	<ul style="list-style-type: none"> <li>If good quality data related to hazards is lacking, the established buffer either provides too little protection or are too restrictive to shoreline development.</li> <li>Setbacks do not protect structures in the buffer area.</li> </ul>	<ul style="list-style-type: none"> <li>Strengthen research/data collection</li> <li>Intensive communication about the risks of building in the buffer area</li> </ul>

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## Component 2

### Saline intrusion; Component 2.1

Goal: To define coastal risks. It is an assessment that helps to enhance the understanding and awareness of coastal saline intrusion and to reduce its impact on nature, production, and people. These assessments enable the identification of at-risk-areas and help prioritize risk reduction efforts. As such, this component strengthens various relevant sectors/activities, such as Water Resource Management (including agricultural water management), agricultural planting decisions and, zoning (including planning tourism and residential facilities). It will contribute to water security in the coastal communities.

**Table 44:**

*Table 44: SWOT analyses Saline intrusion (adapted from IHCantabria and IDB, 2020)*

*SWOT analyses Saline intrusion (adapted from IHCantabria and IDB, 2020)*

STRENGTHS	WEAKNESSES	Mitigation Measures
<ul style="list-style-type: none"> <li>It quantifies the existing saline intrusion risk and identifies the areas at risk.</li> <li>It is a basic tool for Integrated Coastal Zone Management, and it strengthens other planning and prevention measures (establishing production zones, tourist facilities, water resource management, agricultural planting decisions) and preparedness measures (early warning systems, emergency and contingency plans).</li> <li>Moderately accepted in Belize.</li> </ul>	<ul style="list-style-type: none"> <li>It does not reduce the risk by itself. Without proper mitigation measures, the information is useless.</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of a comprehensive program that targets the prevention, protection, preparedness, and recovery. The proposal contributes to three of these areas.</li> </ul>
OPPORTUNITIES	THREATS	Mitigation Measures
<ul style="list-style-type: none"> <li>It helps in the zoning and selection of mitigation measures.</li> <li>It enhances the development of coastal areas with lower risk.</li> <li>It informs water allocation and improves decision making for water resources management.</li> <li>Informs agricultural water management.</li> </ul>	<ul style="list-style-type: none"> <li>It might contribute to impoverish coastal areas with higher risk, due to hesitation among investors.</li> </ul>	<ul style="list-style-type: none"> <li>Identification/Promotion of alternative opportunities, e.g. seaweed harvesting</li> </ul>

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### Beach Erosion Monitoring; Component 2.2

Goal: Beach erosion monitoring is considered a first step in the maintenance of the coastal system (structures, land features, and ecosystems): ensuring optimal levels of serviceability and safety and minimizing costs and environmental impact. Beach coastal structures do not provide permanent protection. Maintaining a wide beach buffers wave energy and slows retreat rates.

**Table 45:**

*Table 45: SWOT analyses Beach Erosion Monitoring (adapted from IHCantabria and IDB, 2020)*

STRENGTHS	WEAKNESSES	Mitigation Measures
<ul style="list-style-type: none"> <li>Monitoring and timely prevention reduces climate impacts on the environment and can be cost-effective.</li> <li>Well-maintained coastal structures and wide beaches, as well as healthy mangroves effectively</li> </ul>	<ul style="list-style-type: none"> <li>Without an early erosion detection program, maintenance of beach width is likely limited to the availability of large volumes of sand.</li> </ul>	<ul style="list-style-type: none"> <li>Early detection of erosion through monitoring</li> </ul>

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<ul style="list-style-type: none"> <li>prevent coastal erosion and flooding.</li> <li>There exists a legal requirement for a 66-foot buffer to be maintained next to all water bodies.</li> </ul>		
<b>OPPORTUNITIES</b>	<b>THREATS</b>	<b>Mitigation Measures</b>
<ul style="list-style-type: none"> <li>The improvement of beach areas at a lower cost.</li> <li>Early erosion detection and the maintenance of ecosystems retain the ecological value of the beaches.</li> <li>Beach restoration programs can be linked to environmental education initiatives.</li> <li>Wide beaches protect against coastal flooding and erosion and are a valuable coastal habitat for many highly specialized plants and animals.</li> </ul>	<ul style="list-style-type: none"> <li>Erosion rates have increased in Belize. Additionally, land titles were granted before the 66-foot buffer was legally binding.</li> </ul>	<ul style="list-style-type: none"> <li>Intensive communication about the risks of building in the buffer area</li> </ul>

### Early Warning System and Storm Surge Modelling; Component 2.3<sup>11</sup>

Goal: The goal of developing an early warning system and storm surge modeling is to detect or forecast hurricanes or other threatening flood events early so that the public can be alerted in advance and can undertake appropriate responses to minimize the impact of the event. It has two distinct stages: (1) flood or hurricane warning and (2) response. Through forecasting and monitoring of meteorological conditions, detection of threatening events to take place before it hits a community.

*Table 43: SWOT Analyses Early Warning System (adapted from IHCantabria and IDB, 2020)*

*Table 46: SWOT Analyses Early Warning System (adapted from IHCantabria and IDB, 2020)*

<b>STRENGTHS</b>	<b>WEAKNESSES</b>	<b>Mitigation measures</b>
<ul style="list-style-type: none"> <li>It is relatively low-cost, and it has proven its benefit globally.</li> <li>Widely accepted in Belize.</li> <li>This preparedness measure reduces the damages related to coastal flooding and storm surges.</li> <li>It minimizes losses particularly human lives.</li> </ul>	<ul style="list-style-type: none"> <li>The warning alone does not reduce the hazard impacts.</li> <li>Its effectiveness depends on the public's responses, on the coordination between local communities and state agencies, and intergovernmental coordination.</li> <li>Skilled and experienced staff is necessary for its development and implementation.</li> </ul>	<ul style="list-style-type: none"> <li>National emergency planning measures (evacuation routes and shelters) need to be evaluated and where necessary strengthened.</li> <li>Awareness and education campaigns are also needed.</li> <li>Strengthening staff capacities</li> </ul>
<b>OPPORTUNITIES</b>	<b>THREATS</b>	<b>Mitigation measures</b>
<ul style="list-style-type: none"> <li>It improves the timing and efficiency of some flood control measures (e.g. storm surge barriers, temporary flood defenses, sandbags).</li> <li>It promotes timely evacuation.</li> </ul>	<ul style="list-style-type: none"> <li>It relies on the available means of communication which is not equally efficient everywhere.</li> <li>It might encourage the development of areas-at-risk where the system is implemented.</li> </ul>	<ul style="list-style-type: none"> <li>Investing/improving in reliable communication</li> <li>Intensive communication about the risks of investing in areas-at-risk</li> </ul>

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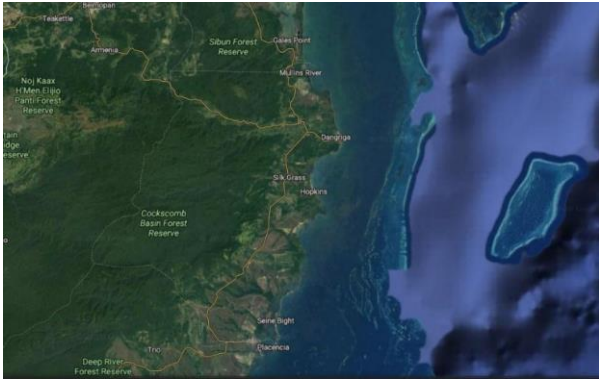
<sup>11</sup> An EWS is a preparedness measure that reduces the damages related to coastal flooding and storm surges. The development of a full EWS requires 4 phases. The AF proposal relates to implementation of Phase 1 – EWS development & Storm Surge modelling. This is a first step towards implementing Belize's vision of establishing a full EWS. Flooding (coastal, riverine, pluvial, etc. or any combination) is a function of Hydrological Services and the mandate of NHS. Storm surge EWS is a function of Meteorological Services and the mandate of NMS. NMS and NHS will collaborate to have a joint system where the data from the storm surge monitoring system and coastal flood warning system are incorporated.

<ul style="list-style-type: none"> <li>The system can be useful for other purposes (e.g. to inform coastal works, fishing, and navigation).</li> </ul>		
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**Component 3**

Dangriga and Hopkins (Figure 17), the two beneficiary communities of component 3, are situated in the Stann Creek district. Research has indicated that Dangriga has an extremely high exposure risk (0.54) (CAF 2014). Additionally, Participatory GIS research in Hopkins (2016-ongoing) proves that Hopkins indeed suffers from climate change impacts. Within Hopkins, there is a disconnect between the far north end and far south end – the traditional village and the tourist area. The lowest cost lands, which the Garifuna families get from their village council, floods easily. Besides climate change, flooding also has man-made causes. The village infrastructure is not keeping up with the new pavement coming into the village. The paved road has resulted in more runoff and a higher impact (UCF, 2020). The choice for the inclusion of these specific communities was also based on experts’ advice (from CCCCC, [NCCO and CZMA](#)), [their high vulnerability, reliance on natural resources, sensitive ecosystems and no financing option funding that is already being provided](#) through the Fourth National Communication [to carry out the required assessments and determine what are the best options to restore the beach in both communities, and that the IDB is preparing a mangrove intervention in Northern Belize.](#)

The following sections include a brief examination of the key issues regarding coastal flooding and erosion and a non-extensive exploration of risk reduction measures for Component 3. The final design, however, will be the result of comprehensive research using an analysis of sea dynamics, land characteristics, and lab analysis which are ongoing under Belize’s Fourth National Report to the UNFCCC. Although coastal erosion has been observed in both Dangriga and Hopkins, many uncertainties remain regarding the processes that cause this erosion. Therefore, it is a priority that a comprehensive coastal modeling and assessment is completed to understand the causes of erosion, sediment sources, and sinks and estimate shoreline position changes. More on this ongoing assessment to identify proposed solutions and develop their technical and design parameters are included in section II Research and Technologies.



*Figure 25-2: Geographical depiction of the Component 3 Location*

*Figure 17: Geographical depiction of the Component 3 Location*

**Site description and key issues**

Dangriga and Hopkins, the two beneficiary communities of component 3 of this AF Project Proposal, are situated in coastal units 14 and 15 – the South Northern region where the environmental component plays an important role (Figure 25/ Figure 17). Coastal erosion is very evident in Dangriga and Hopkins coastal

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areas. Beach scarp, dead trees, exposed roots, waves reaching building foundations, and inefficient coastal protection structures, validate the widespread character of coastal erosion in this area. According to local accounts, the shoreline has retreated around 20-25 feet in the last 5 years. The anthropogenic causes are river mining and the incorrect location of buildings in the coastal area and the construction of inefficient shore protection structures. Surveys to be conducted by GAMMA S.A. will determine what the natural causes of erosion are.

*Table 44: Key issues in Dangriga, Hopkins, and Placencia (sources: Gamma, 2019; IHCantabria and IDB, 2020; own analyses)*  
*Table 47: Key issues in Dangriga, Hopkins, and Placencia (sources: Gamma, 2019; IHCantabria and IDB, 2020; own analyses)*

Dangriga	Hopkins
The mouths of North Stann Creek and Havana Creek are clogged for long periods, cutting off river flow and retaining river sediment yield, until heavy rains open-up the river mouths, especially at Havana Creek. Between North Stann Creek mouth and Havana Creek mouth, the urban area is densely populated with several properties located on the seafront, whereas south of Havana Creek the seafront is mainly covered with parks and recreation areas.	In recent years, the beach in front of Hopkins has become occupied by new tourist facilities. It is a high risk to buildings and demonstrates the unsustainable character of that tourist development model.
Hurricane Greta (1978) made landfall in Dangriga town and there was minimal flooding on the mainland despite a high storm surge. Storm tides in Dangriga were 1.8 to 2.1 m above normal, which did not cause much flooding. Beach erosion related to tropical cyclones has been estimated in around 6 m of shoreline retreat for the 500-year return period and over 8 m including the effect of climate change.	Coastal flooding event in this area is minimal.
Further is research required. However, preliminary possibilities for risk reduction measures include beach restoration, hard engineering (seawall), and soft engineering (sand re-nourishment for beach restoration) to limit or avoid erosion and the definition of coastal setbacks (land use regulations and urban planning), where erosion cannot be avoided.	Further research is required. Preliminary possibilities for risk reduction measures include beach restoration, hard engineering (seawall), and soft engineering (sand re-nourishment for beach restoration) to limit or avoid erosion and the definition of coastal setbacks (land use regulations and urban planning), where erosion cannot be avoided.

Table 48 Table 45 provides a summary of the findings.

*Table 45: Probable Risk Reduction Measures under Component 2 (Sources: Gamma, 2019; IHCantabria/IDB, 2020; Blue Carbon Working Group, 2020; own analysis)*  
*Table 48: Probable Risk Reduction Measures under Component 3 (Sources: Gamma, 2019; IHCantabria/IDB, 2020; Blue Carbon Working Group, 2020; own analysis)*

		D an gr ig	H op ki
Key issues	Coastal erosion	✓	✓
	Coastal flooding	x	x
	Impacts of climate change	✓	✓
	Building codes and regulations	x	x

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<b>R e c o m m e n d e d R</b>	Flood-proofing	x	x
	Land use regulations and urban planning	✓	✓
	Hazard, exposure, vulnerability, and risk assessments under coastal flooding and erosion	✓	✓
	Maintenance of coastal structures, beach width, coastal ecosystems and habitats	✓	✓
	Beach restoration	✓	✓
	Wetland restoration	x	x
	Coral reef conservation	x	x
	Riparian buffer restoration	x	x
	Forest conservation	x	x
	Seawalls	✓	✓
	Breakwaters and groins	x	x
	Land claim	x	x
	Managed retreat	x	x
	Sand re-nourishment	✓	✓
	Early warning systems	x	x
	Emergency and contingency plans	x	x
	Education programs	✓	✓
	Raising awareness campaigns	✓	✓
	Clean-up and restoration activities	x	x
	Disaster assistance	x	x
Insurance policies	x	x	

**Possible proposed measure: Sand re-nourishment**

Goal: To restore the sedimentary balance in the coastal zone when a deficit of sediment exists. It is a soft engineering technique based on the addition of sand to the coastal system. Sand can be retrieved from inland sources or offshore dredging. It does not reduce erosion but provides extra sediment upon which continuing forces will act, eventually returning the beach to its original state if the beach is not in equilibrium after the nourishment.

Table 46: SWOT analysis sand re-nourishment (adapted from IHCantabria and IDB, 2020)

Table 49: SWOT analysis sand re-nourishment (adapted from IHCantabria and IDB, 2020)

STRENGTHS	WEAKNESSES	Mitigation measures
<ul style="list-style-type: none"> <li>Protects the area at the back of the renourishment against coastal flooding and erosion</li> <li>Technology and methods clear and relatively easy to implement</li> <li>Soft solution compatible with many other supplementary risk reduction measures</li> <li>Moderately accepted in Belize</li> </ul>	<ul style="list-style-type: none"> <li>The renourished area usually continues to be vulnerable to coastal flooding and erosion</li> <li>Low public awareness that this solution has a temporary nature</li> </ul>	<ul style="list-style-type: none"> <li>Renourishment is required regularly or the implementation of other engineering measures</li> <li>Awareness-raising needs are strengthened</li> </ul>
OPPORTUNITIES	THREATS	Mitigation measures
<ul style="list-style-type: none"> <li>Possible benefits in adjacent areas</li> <li>Disposal option for maintenance dredging of harbors and channels</li> <li>Promotion of beach tourism through beach widening</li> </ul>	<ul style="list-style-type: none"> <li>Damage of seafloor with potentially high ecological value in the dredging area.</li> </ul>	<ul style="list-style-type: none"> <li>Proper Environmental Impact Assessment before dredging</li> </ul>

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## Component 4

### Communication and Awareness; Component 4.1

Goal: To promote among the public, leaders, and decision-makers understanding of the importance of hazard management to reduce the risks of future climate impacts. Communication action plans include a wide variety of activities focused on various audiences and implemented by different means such as media (social media, radio, tv, newspapers), public bulletins, permanent displays (memorials, museums, high watermarks), commemorative activities, conferences, etc. A National Climate Change Communication Strategy and Action Plan (NCCSAP) is being formulated to effectively increase and improve the level of awareness, interest, positive attitudes, behaviors, and practices towards climate change adaptation and mitigation among the public, vulnerable communities, and stakeholders in Belize. This action plan is formulated based on a comprehensive research of:

- communities' understanding and attitude towards the impact of climate change and behavioral actions related to adaptation and mitigation.
- Identification of the gaps in communication, coordination, and dissemination of climate change adaptation and mitigation information among various stakeholders.

Table 47: SWOT analyses Communication and Awareness (adapted from IHCantabria and IDB, 2020)

Table 50: SWOT analyses Communication and Awareness (adapted from IHCantabria and IDB, 2020)

STRENGTHS	WEAKNESSES	Mitigation measures
<ul style="list-style-type: none"> <li>A high level of awareness is crucial to enhance cooperation between the government and the public.</li> <li>Can result in long-term benefits</li> <li>Widely accepted in Belize.</li> </ul>	<ul style="list-style-type: none"> <li>Communication actions in indigenous communities according to a rights-based approach can come at a high cost.</li> <li>Credibility is crucial for efficient awareness-raising activities and depends on communication channels (e.g. influential community leader, media) and the credibility of the information.</li> <li>Highly variable costs for an effective awareness-raising</li> </ul>	<ul style="list-style-type: none"> <li>Proper cost planning to respect FPIC rights</li> <li>Utilizing credible information channels</li> </ul>

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	campaign, depending on the target group.	
<b>OPPORTUNITIES</b>	<b>THREATS</b>	<b>Mitigation measures</b>
<ul style="list-style-type: none"> <li>Awareness among the public and leaders is key to the success of many other risk reduction measures.</li> <li>Communication and awareness can act as a catalyzer for discussion and innovations in the design and implementation of other risk reduction measures.</li> </ul>	<ul style="list-style-type: none"> <li>An awareness-raising campaign can be misused for propaganda.</li> </ul>	<ul style="list-style-type: none"> <li>Proper planning of relevant strategies and actions</li> </ul>

**Education and Training; Component 4.2 & 4.3**

Goal: Transfer of knowledge and skills related to coastal risk to the public through teaching/training. Educational programs can be implemented for different target groups:

- Universities may incorporate coastal risk related topics in their teaching curricula and research.
- Capacity building programs in institutions to increase staff capacity to perform core functions related to hurricane risk reduction.
- Educational campaigns to promote behavioral changes.

*Table 49: SWOT analyses Education and Training (adapted from IHCantabria and IDB, 2020)*  
*Table 51: SWOT analyses Education and Training (adapted from IHCantabria and IDB, 2020)*

<b>STRENGTHS</b>	<b>WEAKNESSES</b>	<b>Mitigation Measures</b>
<ul style="list-style-type: none"> <li>High level of effectiveness due to the availability of manuals and programs, which have been successfully implemented in Belize.</li> <li>Relatively low cost when incorporated in a formal education curriculum.</li> <li>The implementation of each risk reduction measure requires a high level of technical knowledge that needs to be learned and updated as new technologies are continuously developed.</li> <li>Many different capacity building methods can be combined and improve their effectiveness.</li> <li>Commonly used and accepted in Belize.</li> </ul>	<ul style="list-style-type: none"> <li>Implementation depends on commitment from the government institutions, educational institutions, and community leaders as well as on the personal motivation of learners.</li> <li>Relatively high cost when implemented using external experts.</li> </ul>	<ul style="list-style-type: none"> <li>Motivate the relevant stakeholders and secure commitment</li> <li>Quality-cost based public procurement</li> </ul>
<b>OPPORTUNITIES</b>	<b>THREATS</b>	<b>Mitigation Measures</b>
<ul style="list-style-type: none"> <li>It results in professionals with adequate skills.</li> <li>It improves the effectiveness of several Risk Reduction Measures at a relatively low cost.</li> <li>A critical mass of well-trained professionals (e.g. technologists, scientists, managers)</li> <li>It ensures the intrinsic capability of the system to generate new skilled professionals.</li> </ul>	<ul style="list-style-type: none"> <li>If it is not done by trained educators there is a risk of disseminating wrong content.</li> <li>Badly trained professionals might cause new problems instead of solving them.</li> </ul>	<ul style="list-style-type: none"> <li>Careful selection of experts</li> </ul>

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## Conclusions

Having considered the data, the following has been concluded:

- Housing Policy and Building codes (Component 1.1), Coastal Zone Management (Component 1.2), Saline intrusion (Component 2.1), Beach Erosion Monitoring (Component 2.2) are vital contributions of this project to Belize's preventive climate actions. The Housing Policy and Building codes benefit the nation, not just coastal communities.
- The impacts of climate change are evident in Dangriga and Hopkins, but erosion is also due to anthropogenic causes. Considering the anthropogenic causes, the housing policy and building codes, coastal zone management guidelines, and beach erosion monitoring project components will have a positive (preventive) impact on these communities. To diminish the anthropogenic causes of beach erosion, it is recommended to consider awareness/training regarding river mining for inclusion in the Education and Awareness interventions (component 4).
- Preliminary analysis of potential protection measures for Dangriga and Hopkins, which shall be further considered and prioritized through comprehensive research by GAMMA S.A., include nature-based: beach nourishment, hard engineering: sea walls, and/or soft engineering solutions: managed retreat (*Table 8*).
- The impacts of climate change in Dangriga and Hopkins are partially due to anthropogenic causes. Component IV should consider including awareness actions regarding river mining and training interventions strengthened with information-sharing on alternative livelihood opportunities like sargassum farming.
- Enhancing interest in the utilization of Sargassum will support national challenges relating to waste management of this product and has the potential to contribute to eco-friendly crop production and energy sustainability.
- Investments in Belize's Early Warning System (Component 2.3) and Training, Education, and Awareness (Component 4.1 – 4.3) are important contributions to climate change preparedness.
- Recovery aspects to climate change adaptation (e.g. restoration, disaster assistance, insurance) - not being covered under the Adaptation Fund project – should be further explored and proposals developed. A comprehensive study is required to assess the efficacy of the existing systems, and if needed strengthen them.

## PART II FEASIBILITY

### POLICY AND LEGISLATION

The feasibility study indicates that Belize has a sufficient legal and policy base for the implementation of this project. Several key strategies and plans have been developed in recent years. The general targets of the national climate strategy are to enhance climate-compatible sustainable development ([Figure 26](#)[Figure 48](#)): the country's capacities in implementing adaptation measures and reducing greenhouse gas emissions to secure human safety and property as well as for sustainable development. It also aims to strengthen people and natural systems' adaptability to climate change while developing a low-carbon economy to protect and improve quality of life, guarantee national security and sustainable development in the context of global climate change, and proactively work with the international community in protecting the earth's climate system.

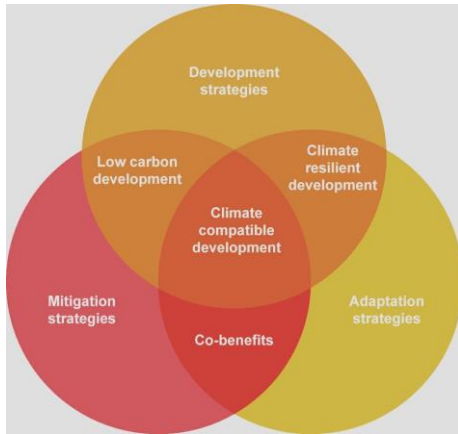


Figure 26: Climate compatible development Venn diagram (Source: CDKN, 2020)

Figure 18: Climate compatible development Venn diagram (Source: CDKN, 2020)

The most relevant national development plans for this project include the Horizon 2030 Vision (2010-2030), Growth and Sustainable Development Strategy, The National Climate Change Policy, Strategy and Action Plan (NCCPSAP) 2015-2020, and The Integrated Coastal Zone Management Plan (2016). Also relevant is the Nationally Determined Contribution (NDC) presented in 2015 before UNFCCC which set out the plan what Belize wants to achieve (Table 52-Table 49).

Table 49: Policy analysis

Table 52: Policy Analysis

Project Outcomes	Policy / Plan	Description
<b>Component 1. Improving coastal land use for resilient habitation and sectoral activities</b>		
1.1 Development of the National Housing Policy and Building Codes for resilient habitation based on vulnerabilities	NDC	Review and strengthen planning legislation and building codes, especially as it relates to coastal development
	NCCPSAP	Integrating Climate Change adaptation and mitigation into key national developmental plans, strategies, and budgets.
1.2 Strengthening the implementation of the Integrated Coastal Zone Management Plan associated management guidelines for zonation	NDC	Adaptation strategies in management and development planning in all coastal and marine sectors / Revise and streamline the current legislation and policies that relate to the management and regulation of development in the coastal zone to eliminate overlaps and close existing gaps /
	ICZMP	Support the allocation, sustainable use, and planned development of Belize's coastal resources through increased knowledge and building of alliances, for the benefit of all Belizeans and the global community / Recommends several areas in the Informed Management Zoning Scheme for Conservation (conservation, informed management, development), some of which include privately held lands.
<b>Component 2. Coastal Vulnerability Monitoring</b>		
2.1 Strengthening data availability for the development of	GSDS	Completing a Water Master Plan, a National Groundwater and Surface Water Assessment, and a Water Vulnerability Profile, including salt intrusion risk assessment

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a national coastal saline intrusion program		
2.2 Develop and implement a National Beach Erosion Monitoring Program	NDC	Manage and regulate further development of the coastline, especially in vulnerable areas
2.3 Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge	NCCPSAP	Strengthen Climate Change resilience to prevent, reduce, or adapt to the negative impacts of Climate Change on key sectors, economic activity, society, and the environment through policies and strategic processes.
<b>Component 3. Beach Stabilization of High-Risk Coastal Areas</b>		
3. Beach Stabilization of High-Risk Coastal Areas	NDC	Implement an adaptation strategy through mangrove restoration, sea, and river defense structures to prevent coastal and riverine erosion and ecosystem disruption
	NCCPSAP	Strengthening Climate Change resilience to prevent, reduce, or adapt to the negative impacts of Climate Change on key sectors, economic activity, society, and the environment through policies and strategic processes.
	ICZMP	Takes into consideration Blue Carbon sinks (mangroves and seagrass beds) initiatives / Mangrove restoration projects to mitigate the effects of climate change, and to ensure the delivery of coastal protection services especially in areas, such as the Central and Southern regions of Belize, which are highly prone to erosion and inundation.
<b>Component 4. Awareness Raising, Knowledge Dissemination and National Capacity Strengthening</b>		
4.1 Development of a National Climate Change Communication Strategy and Action Plan	Horizon 2030	Put in place effective communication systems to protect the environment while promoting sustainable social and economic development.
4.2 Development of training modules for best coastal adaptation practices	NDC	Enhance the capacity of the CZMAI and municipal authorities to ensure developments within the coastal and urban areas of Belize.
	Horizon 2030	Need to strengthen national capacities, e.g. engineers, urban and regional planners, architects, social scientists, environmental scientists, environmental lawyers, marine biologists, and those trained in integrated coastal zone management.
	NCCPSAP	Capacity building and networking across all implementing agencies
4.3 Strengthening of GIS capabilities of CZMAI and partners	ICZMP	Increase the technical and management capacity of both management and co-management agencies to ensure sound management practices
Other relevant aspects	Horizon 2030	Respect for the rule of law and human rights. Environmental protection laws will be enforced in a fair and just manner and, where needed, the legislation will be reformed (e.g. petroleum policy, mangrove legislation, and solid waste).
	GSDS	Eradicate poverty by 2030 and achieve more equitable income distribution / Tourism and agriculture, crucial sectors for the Belizean economy, dependent for their sustainability on the care of the environment and the integrity of Belize's ecosystems.

	ICZMP	Research to better capture the biomass, coverage, spatial distribution, and rates of change for mangroves in Belize and make this information available to support decisions on the issuing of mangrove alteration permits
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The Constitution of Belize does not mention or explicitly refer to Climate Change. There is no specific Climate Change legislation in Belize, there is however a National Climate Change Policy, Strategy and Action Plan which was approved in 2015 and is currently in the process of being updated. This policy is not legally binding but outlines goals and target actions for key production sectors, such as agriculture, fisheries, forestry, etc. There is also a wide range of environmental, planning, and natural resource legislation that are relevant to the effective mainstreaming of Climate Change in Belize. Impact assessments are specifically dealt with by the Environmental Protection Act and EIA Regulations. Another important area for Climate Change mainstreaming is land use planning, which is regulated through statutes such as the Land Utilization Act, the National Lands Act, and the Housing and Planning Act (MAFFESD & CCCCC, 2014). Table 50 lists the lead institutions of the AF project and the relevant environment-related legislation. The responsibilities assigned to the various Agencies stem, in some cases, from their statutory mandate e.g., PACT, which was established by the Protected Areas Conservation Trust Act. However, in some cases, laws may not exist to cover certain topics. In such cases e.g., NMS, the responsibility is assigned to a particular Minister by virtue of his appointment by the Governor General (on the advice of the Prime Minister), and portfolio subjects are assigned to the Ministry at the time of his appointment. The Coastal Zone Management Act is currently in the process of being updated.

*Table 50: The lead institutions for the AF Project and Legislative Framework (Adapted from NCCPSAP)*

*Table 53: The lead institutions for the AF Project and Legislative Framework (Adapted from NCCPSAP)*

Agencies	Portfolio Responsibility	Legislation/Policy
National Climate Change Office (NCCO)	Climate Change	NCCPSAP
Coastal Zone Management Authority and Institute (CZMAI)	Coastal Zone Management	Coastal Zone Management Act Cap 329
Protected Areas Conservation Trust (PACT)	Protected Areas Conservation	Protected Areas Conservation Trust Act Cap 2018
National Hydrological Service (NHS)	Management of water resources	National Integrated water resources Act No. 19, 2010
National Meteorological Service	Meteorological and climate-based products and services	Support implementation of Disaster Preparedness and Response Act Chapter 145
Ministry of Infrastructure Development and Housing	Regulation of land use, housing, and infrastructural development Approve building plans Issue building permits	Housing and Planning Act

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Regarding communication and awareness, this policy document points out that the growing awareness of the need to address Climate Change impacts is welcomed and expresses concerns about the coordination of effort. To be effective it is important that collaboration amongst ministries and departments takes place to make the best use of limited financial and human resources. Sufficient attention must be paid to the need for national coordination of Climate Change efforts. This will ensure that there is a coherent national

approach and avoid the duplication of policies and/or avoid conflicting policies regarding the inefficient use of resources.

### INSTITUTIONAL AND HUMAN RESOURCE CONSIDERATIONS

Belize has a strong institutional base for effective climate change adaptation. The National Climate Change Policy, Strategy and Action Plan coordinated by the NCCO and the Integrated Coastal Zone Management Plan of the CZMAI are key policy guidelines that provide the framework for the implementation of this Project to increase resilience.

While several institutions have responsibilities for the management of resources that are likely to feel the effects of Climate Change, there are overarching and sector-specific policies that are in line with each another. [Table 54](#) lists the institutional structure related to this AF project and its key responsibilities.

*Table 51 Institutional structure and key management responsibilities*  
*Table 54: Institutional Structure and Key Management Responsibilities*

Ministry	Key Agencies	Key Responsibilities
Ministry of Sustainable Development, Climate Change & Disaster Risk Management <sup>12</sup>	National Climate Change Office	Climate Change Coordination and Communication, UNFCCC Focal Point
	Coastal Zone Management Authority and Institute	Protection of the coastal zone and associated resources
	Protected Areas Conservation Trust	Preservation and protection of the Belize National Protected Areas System
	National Meteorological Service	Climate Change Research and Scientific Review, IPCC Focal Point
Ministry of Natural Resources	National Hydrological Service (NHS)	Water Industry (except water supply and services)
Ministry of Infrastructure Development and Housing	Housing and Planning Department Central Building Authority	Housing and Planning Department, Central Building Authority
		Regulation of land use, housing, and infrastructural development
		Approve building plans
		Issue building permits

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Belize’s institutional framework is backed up by knowledgeable and dedicated professionals. However, as the institutions have limited funding, and technologies progress over time, there is room for capacities to be strengthened to promote adaptation efforts and the effective implementation of technical solutions. Successful pilots exist but these need to be scaled up and strengthened, and opportunities for complementarity utilized to increase the impacts in the different areas of this AF proposal. Various policy

<sup>12</sup> Key responsibilities include forestry, coastal zone management, environmental protection and the sustainable development of Belize’s natural and cultural resources.

documents emphasize the need for stronger capacities, such as the 'need for technical capacity strengthening, especially CZMAI' in the Horizon 2030 and the NDC. The ICZMP mentioned that increasing and strengthening the capacity of the CZMAI will improve the success rate of climate change adaptation and mitigation.

Given the intensified climate hazard impacts in Belize, there is a need for urgent implementation of the strategies included in this project. Successful implementation will require a mélange of national and international expertise. [Table 54](#), ~~Table 52~~ depicts an overview of the sourcing of human resources for each component.

*Table 52 Review of human capacities sourcing*  
**Table 55: Review of Human Capacities Sourcing**

	Availability of required Human and Technological resources		Explanation
	National	International	
<b>1. Improving coastal land use for resilient habitation and sectoral activities</b>			
1.1. Development of the National Housing Policy and Building Codes for resilient habitation based on vulnerabilities	x	x	This component will require the integration of good practices and lessons learned from other countries. Working collaborations have been established with regional experts.
1.2. Strengthening the implementation of the Integrated Coastal Zone Management Plan and associated management guidelines for zonation	x	x	This component will require the integration of good practices and lessons learned from other countries. Local structures will be established: community wardens. Working collaborations have been established with regional and international experts.
<b>2. Coastal Vulnerability Monitoring</b>			
2.1. Strengthening data availability for the development of a national coastal saline intrusion program	x	x	The capacities are not in-country.
2.2. Develop and implement a National Beach Erosion Monitoring Program	x	x	This component will require the integration of good practices and lessons learned from other countries.
2.3. Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge	x	x	The capacities are not in-country. The NMS has pro-actively started discussions with an internationally leading institution in this area to have a better understanding of the process of establishing an EWS. <sup>13</sup>
<b>3. Beach stabilization of High-Risk Coastal Areas</b>			

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<sup>13</sup> An EWS is a preparedness measure that reduces the damages related to coastal flooding and storm surges. The development of a full EWS requires 4 phases. The AF proposal relates to implementation of Phase 1 – EWS development & Storm Surge modelling. This is a first step towards implementing Belize’s vision for establishing a full EWS. Flooding (coastal, riverine, pluvial, etc. or any combination) is a function of Hydrological Services and the mandate of NHS. Storm surge EWS is a function of Meteorological Services and the mandate of NMS. NMS and NHS will collaborate to have a joint system where the data from the storm surge monitoring system and coastal flood warning system are incorporated.

3.1 Implementation of beach recovery and stabilization through a pilot project in the high-risk coastal communities of Dangriga and Hopkins	x	x	Expertise possibly not in the country. Working collaborations have been established with regional experts.
3.2 Monitoring and evaluation of activities' effectiveness and documentation of lessons learnt	x	-	Expertise available in the country
<b>4. Awareness-raising, knowledge dissemination, and capacity strengthening</b>			
4.1. Implementation of a National Climate Change Communication Strategy and Action Plan	x	-	Expertise is available in the country. Certain existing channels for raising public awareness exist within NCCO and NMS. Partnerships should be utilized.
4.2 Development of training modules for best coastal adaptation practices for Belize	x	-	Expertise is available in the country
4.3 Strengthening of GIS capabilities within the CZMAI and partners	x	-	Expertise is available in the country. A certain extend of staff capacities exist within CZMAI and NCCO/REDD+. Partnerships should be utilized.

## RESEARCH AND TECHNOLOGIES

### ***1B Strengthening the implementation of the Integrated Coastal Zone Management Plan and associated management guidelines for zonation***

Since the inception of the 2016 ICZMP, marine spatial planning has been utilized to assess and quantify the protective services provided by natural habitats of nearshore environments and human use activities within the marine environment of Belize. While the lead agency for this subcomponent is the CZMAI, other associated agencies will also benefit from the availability of the technology as the related subcomponent on training envisions capacity strengthening of CZMAI and partners.

To carry out mapping, analysis, and data collection on human use activities occurring within the coasts, the utilization of ESRI Geographic Information Systems (GIS) Software, such as ArcMap, ArcGIS Pro, spatial extensions for analysis, and Drone2Map is needed.

Additionally, the utilization of such software under this project will ensure that CZMAI's key GIS staff have the capacity and resources to carry out field data collection, and mapping to efficiently generate and analyze baseline coastal development data. The data will be used to update coastal development guidelines and zoning schemes within Cayes and coastal areas outlined in the Belize Integrated Coastal Zone Management (ICZM) Plan.

ArcGIS, ArcMap, and ArcGIS Pro are all owned by ESRI, which is the international supplier of GIS software, web GIS, and geodatabase management applications. Collectively the suite of products is a powerful mapping tool that allows people to create maps, analyze data, compile and share geographic information. ArcMap is currently the main component of the GIS system, however ArcGIS Pro, which is the latest professional desktop GIS application that can explore, visualize, and publish data to ArcGIS Online. Users of ArcGIS Online can share information with field staff and field workers can use mobile apps for ArcGIS, like Collector and Survey123, which allow them to add data directly to a map from the field using a mobile device. Drone2Map is also one of the latest desktop applications, which combines a large amount of captured drone images to produce one seamless high-resolution orthomosaic of an area.



## **2.1 Development of a national coastal saline intrusion program**

Activities of the National Hydrological Service are detailed below.

### **Determine the salinity of soils.**

The goal of the national saline intrusion program is to assess and map soil salinity and link this to current and future crop productivity vulnerability and risk.

Shallow soil salinity is determined by measuring the electrical conductivity (EC) of the upper soil horizons by preparing a soil-water mixture and assessing it using an EC probe. Large surficial areas can be assessed more broadly by the completion of terrain conductivity surveys using depth-integrated measurements of electromagnetic readings that can extend several meters to 10s of meters into the subsurface for deeper reconnaissance. The higher the salinity of the soil and associated porewater, the higher the ability of the soil to conduct an electrical current. Soil salinity negatively impacts crop yields; therefore, with limited knowledge in this subject area, it is challenging for farmers to ascertain whether soil salinity is the culprit responsible for the reduction of their crop yields.

### **Conduct water quality analyses to determine the effect of water quality on coastal influences and agricultural activity.**

The goals of this task are to i) assess the occurrence and possible extent of saline water intrusion along with coastal areas, and ii) determine the levels of nutrients in the groundwater beneath the study area.

Saline water has a higher density than freshwater (i.e. 1.03 g/cm<sup>3</sup> versus 1.00 g/cm<sup>3</sup>). Along every coastline, there is an interface established between an upper layer of freshwater originating from the landward side and an underlying layer of seawater. This interface is dynamic and affected by long-term sea levels, storm surges, as well as disturbances from groundwater pumping. As such, there is the potential for saline water encroachment into freshwater systems (surface and groundwater) over time. Measuring the EC, chloride (Cl<sup>-</sup>) and, sodium (Na<sup>+</sup>) concentrations in shallow groundwater along coastal areas provides data on the extent of seawater intrusion (including the highest risk areas) and provides the basis for future projections regarding groundwater quality under various sea-level rise and groundwater use scenarios. This is also amenable to geophysical mapping (as outlined in goal No. 4). With respect to agricultural influences, common sources of influence include nutrients related to fertilizers, sewage effluents, and animal and food processing wastes. One of the primary constituents of concern to groundwater quality is nitrate (NO<sub>3</sub><sup>-</sup>), due to its mobility in the subsurface. Phosphate (PO<sub>4</sub><sup>3-</sup>) is also a concern given its potential to cause eutrophication in receiving water bodies.

### **Use of Geophysical Surveys.**

Completion of geophysical surveys will provide the spatial data density necessary to resolve the extent of saline water intrusion along the coastal areas. This will be accomplished by electromagnetic (EM) mapping or processing of multispectral satellite imagery.

### ***IIC Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge***

Detailed information about the data collection and storage that is envisioned by the National Meteorological Service and the technologies that will be utilized under component 2.3 are included hereafter.

### **Establishment of Weather Stations/Sensors along the coast**

- The weather stations will be capable of measuring rainfall, temperature, wind speed and direction, solar radiation, and water level.
- The data loggers will be capable of
  - using visibility sensors and ceilometers
  - 16 ports capable of Measuring single ended sensors,
  - 8 ports capable of differential measurements,
  - 10 pulse counting ports, 8 of which should be able to be configurable for digital input and outputs including but not limited to SDI-12<sup>14</sup>, RS232<sup>15</sup>, RS485
  - 4 excitation terminals
  - Connecting to satellite and mobile data modems for the transmission of stored data

### Early Warning System Development and Storm Surge Modeling

The establishment of a proper early warning system is a comprehensive intervention, consisting of a 4-phase approach: 1. EWS development & Storm Surge modeling, 2. EWS extension: wave modeling and wind enhancement scheme, 3. EWS extension: Coastal inundation and connection with a web-based management system, and 4. EWS extension: Offline analysis and update of coastal models.

Under this project the NMS will implement phase 1 and will utilize the following tools/technologies:

- Delft3D-FM (Flexible Mesh Suite) storm surge model will be developed for Belize's coastal area. The Delft3D FM can simulate storm surges, hurricanes, tsunamis, detailed flows and water levels, waves, sediment transport and morphology, water quality and ecology, and can handle the interactions between these processes. The suite is designed for use by domain experts and non-experts active in one or more of the stages of the design, implementation, and management cycle.
- Storm surge model validation - Include regional/seasonal water level variations from ocean models (HYCOM). The HYCOM model (Hybrid Coordinate Ocean Model) is used to simulate oceanographic conditions.
- Delft-FEWS based EWS - an initial set-up of the coastal EWS with Delft-FEWS. Delft-FEWS is an open data handling platform initially developed as a flood forecasting and warning system. Essentially it is a sophisticated collection of modules designed for building a hydrological forecasting system customized to the specific requirements of an individual organization.
- Numerical Weather Prediction (NWP) using NOAA GFS (National Oceanic and Atmospheric Administration Global Forecast System) and local products of Belize's Meteorological Service. The Global Forecast System is a weather forecast model through which numerous atmospheric and land-soil variables are available (e.g. temperatures, winds, precipitation, soil moisture, atmospheric ozone concentration).
- Early Warning Products in conjunction with PLUVO.AI. The NMS uses a combined suite of software called SURFACE/PLUVO to accomplish the following tasks:
  - SURFACE CDMS (Climate data management system) stores, manages, displays, and exports weather and climate data received from the observation network and is the CDMS developed and used by the NMS.
  - PLUVO.AI enables the creation and dissemination of early warning alerts based on information from multiple data sources such as weather and hydrological models, surface

<sup>14</sup> SDI-12 (Serial Digital Interface at 1200 baud) is an asynchronous serial communications protocol for intelligent sensors that monitor environment data. These instruments are typically low-power (12 volts), are used at remote locations, and usually communicate with a data logger or other data acquisition device. The protocol follows a master-slave configuration whereby a data logger (SDI-12 recorder) requests data from the intelligent sensors (SDI-12 sensors), each identified with a unique address.

<sup>15</sup> RS-232 and other protocols. RS-232, Recommended Standard 232 (RS-232) is a standard for serial communication transmission of data. It formally defines signals connecting between a DTE (data terminal equipment) such as a computer terminal, and a DCE (data circuit-terminating equipment or data communication equipment), such as a modem. The standard defines the electrical characteristics and timing of signals, the meaning of signals, and the physical size and pinout of connectors. The current version of the standard is TIA-232-F Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange, issued in 1997. The RS-232 standard had been commonly used in computer serial ports and is still widely used in industrial communication devices.

stations, and remote sensing data from satellites and radars combined with machine learning models to help users to identify life-threatening conditions related to severe weather and natural disasters.

The specifications for the geographic data sets that will be acquired for the Delft3D-FM storm surge model for Belize coastal area are indicated below.

#### Topography

- Digital land-sea boundaries (Lat-Lon coordinates) at for instance the level of Mean Sea Level (MSL) or Mean High Water (MHW). *Alternative source:* on-screen digitizing from Google Earth
- List of coastal areas of specific interests (e.g. low-lying and densely populated areas, airports, ports, critical industry). *Alternative source:* Google Earth

#### Bathymetry

- Digital depths from detailed bathymetry surveys along the Belize coast up to a distance of about 100km offshore (dwg or xyz format, including a description of applied horizontal and vertical reference datum). Of particular interest for the modeling is to have accurate bathymetry data of the reef slope (from deep water to the reef edge) and depths between the small islands on top of the reef.  
*Alternative source:* digital depth information from Nautical Charts or data from global ocean depth databases (GEBCO or ETOPO)
- Digital land heights/Digital Elevation Model (DEM) from topographic surveys or LIDAR, ideally with high-resolution of a few meters in populated areas.  
*Alternative source:* global database with land heights (e.g. SRTM)

#### Data for model validation

- Measured time-series of wind, air pressure, water levels, currents, or waves, including survey reports presenting measurement locations, instruments type, and settings. Ideally, these measurements are available for the same and recent periods and include measurements during hurricanes or other extreme events.  
*Alternative source:* satellite observations of significant wave heights e.g. from JASON or Sentinel satellites
- Locations or contours of maximum inundation extents during specific extreme events, or
- Storm reports, with quantitative/qualitative descriptions of the wind, water levels, storm build-up, inundation depths, inundation extents, etc.  
*Alternative source:* site visits
- Other available reports describing the governing physics in Belize coastal area and/or hydrodynamic modeling studies.

### **Component 3: Beach Stabilization of High-Risk Coastal Areas**

Under Belize's Fourth National [Report-Communication and First Biennial Update Report to the UNFCCC](#), [ee-financing](#) is being provided for the completion of assessments in Dangriga and Hopkins to be linked to this proposed project. GAMMA S.A. from Cuba will carry out the necessary assessments and make recommendations based on their findings. These recommendations will form the basis for work to be done in Dangriga and Hopkins and will lead to beach recovery and stabilization activities being implemented.

#### **1. Preliminary Research**

- Organization and assurance of the logistics for field, desk, and laboratory works.
  - Research on the coastal system functioning.
    - Preparation of basic information.

- Compilation and analysis of archive information regarding morphology, hydrology, hydrography, oceanography, geology, geophysics, and meteorology.
- Compilation of topographic and hydrographic information (topographic maps and nautical charts)
- Compilation of geodetic points of the cadaster.
- Inventory of the anthropogenic and natural transformations that occurred in the coastal zone.
- Characterization of coastal dynamics, maritime climate, and beach and river sediments.
- Inventory of hurricanes that have affected the area of interest.
- Study of the reanalysis of a wave affecting the study area.

## **2. Fieldwork**

### **2.1 Sea Research**

- Surveying of 36 km of the coastal front between Colson Point and Sittee Point, for the definition of the coastal system, as well as the collection of 10 sediment samples.
- Execution of 5 bathymetric/geophysical profiles on the 36-km coastal front, from The coastline to the keys (between 13 - 15 km per profile), to characterize the seabed (morphology and stratigraphy). Collection of 25 sediment samples (5 samples per profile).
- Checking and updating the existing bathymetric chart in the coastal fronts of Dangriga and Hopkins, 2 bathymetric profiles from the coastline to the keys (between 13 - 15 km per profile).
- Execution of a detailed bathymetric survey on the coastal fronts of interest.
  - Dangriga: 80 survey lines of 1 km in length on a 4-km coastal front, scale 1:5000.
  - Hopkins: 120 survey lines of 1 km in length on a 6-km coastal front, scale 1:5000.
- Survey to find sand deposits (borrow area) to be used for sand fills on Dangriga and Hopkins coastal fronts.
  - Carrying out of 100 diving stations, 10 stations per line of 10 km in length. Each diving station includes manual drilling of the seabed, collection of sediment samples (50 samples indicated), exploration within a 20-m radius, and description of the seabed.
  - Bathymetric/geophysical survey to characterize the identified borrow area.
- Mooring of 2 current meters to measure currents in the identified sand borrow area.
- Lifting of the 2 current meters.
- Inventory of the benthos in the identified sand borrow area.

### **2.2 Land Research**

- Establishment of a baseline and profile network along the coastal front of interest.
  - Dangriga: establishment and measurement of 16 profiles, as well as a collection of 8 sediment samples.
  - Hopkins: establishment and measurement of 24 profiles, as well as a collection of 12 sediment samples.
- Survey of the escarpment line at both sites (Dangriga and Hopkins).
- A sedimentological sampling of the hydrographic basins (5 samples) that contribute to the coastal area of interest.

### **3. Laboratory research**

- Grain size analysis of 110 sediment samples.
- Composition analysis of 35 sediment samples.

### **4. Design of the recovery and stabilization project and planning actions (Desk research)**

- Processing of the information measured and collected during the Field Works (surveys: topographic, bathymetric, sedimentological, geophysical, etc.)

- Application of mathematical models to simulate hydrodynamic processes: waves, currents, sediment transport, and post-storm evolution of the beach profile.
- Definition of the scheme for the coastal system functioning.
- Determination of the technical and design parameters of the proposed solution.
- Analysis of the suitability of the sand from the available sand borrow areas.
- Determination of the sand volumes necessary for beach recovery.
- Identification of the induced works that may be necessary.
- Feasibility analysis of the solution engineering alternatives.
- Analysis of the project's expected effectiveness.
- The approach of the ways for work execution (methodology).
- Estimation of the economic cost of project execution.
- Assessment of possible environmental impacts.
- Preparation of thematic maps, graphs, figures, and tables.
- Preparation of the Project (Descriptive Report and Graphic Memoirs.
- Preparation of Concept Note

Based on this ongoing research and its resulting recommendations, and using the technical and design parameters, NCCO will implement the selected engineering solutions for erosion control and shore protection, recovery and stabilization under component 3 of this Adaptation Fund project.

#### **Component 4: Awareness raising, knowledge dissemination, and capacity strengthening**

One of the technical interventions that the entities envision under this component, is raising awareness and strengthening capacities related to alternative livelihood opportunities, namely sargassum harvesting. Sargassum seaweed (is a species of brown algae), which is commonly washed up along the coastal regions throughout Belize, can be harvested and used in several products.

Anaerobic digestion (AD) is a technology that can provide a waste treatment solution for beached Sargassum. Available information on Sargassum natans and fluitans, the two species of primary concern across the Caribbean, is scarce. A regional study has indicated that 'old', beached Sargassum, when milled to a powder and digested, had an exceptionally low Biochemical Methane Potential at 61 m<sup>3</sup>/tonne Volatile Solids added (compare with food waste at 421 m<sup>3</sup>/tonne VS added). However, this research concluded that despite Sargassum's low Specific Methane Yield, it could still be treated through AD, as an amendment to a plant taking other wastes as its only feed. Regarding the economic viability of an AD approach to generate energy from sargassum, the study suggests that it should be possible to make a financial return on utilizing AD technology in this region. The percentage contribution to electricity and/or heat supply will be relatively small but significant. Varying levels of financial interventions will be needed to help sargassum-to-energy investment yield positive returns (CPI, 2017).

This intervention is linked to component 4.1 Communication and 4.2 Capacity building.

#### **Conclusions**

Having considered the data, the following has been concluded in this section:

- Belize has a sufficient legal and policy base for the implementation of this project. The most relevant policies and plans for this proposal -the NDC, Horizon 2030, GSDS, NCCPSAP, and ICZMP- have been considered and are in line with each other.
- The AF project integrates strategic alignment with national and sectoral development strategies as well as an obligation under international conventions to which the country is a Party.
- Under the new administration, four of the six lead entities to this project are situated under the same Ministry, which should facilitate inter-agency collaboration and decision-making.
- Coordination of effort is also crucial to climate change communications.

- The implementation of the project components will require utilizing a combination of national and international expertise, as well as national and sub-national, inter-agency, and intra-agency collaboration.
- The research and technologies envisioned under the components are feasible. Their utilization will require staff training.
- The utilization of Sargassum will contribute to eco-friendly crop production and energy sustainability.

## PART III: FINANCIAL CONSIDERATIONS

### Socio-economic analysis

The impacts of climate change in Belize will not only affect natural habitats, but it will affect human welfare in several ways, as well as the economy and the need for continued financial growth. Given that many sectors and industries in Belize rely on natural habitats, their services, and resources for economic purposes, then the impacts of climate change will drastically affect the nation. Scarcity of resources due to climate change and other factors will lead to conflicts. The nature of conflict will have to be understood and appropriate conflict resolution mechanisms put into place. Communication with stakeholders is required from the outset for those sub-sectors of the economy that are directly affected such as food producers and processors, manufacturers, the Belizean people, and their visitors.

### Agriculture

Agriculture is important for the economy of Belize. Economic performance in the agriculture sector is primarily dependent on traditional export crops such as sugar, citrus, and banana which currently account for about 60% of the earnings, with citrus exports being the principal source of income followed by sugar and banana. Rice, corn, and beans are the main domestic food crops.

Climate change is already affecting the agriculture sector: variability of yields/harvests for rainfed agriculture is already suffering from changes in the timing and amounts of rainfall and there is a widespread perturbation of the agricultural calendar. Intense rainfalls are causing problems of soil drainage and erosion and warmer temperatures are leading to the increased incidence of yield-reducing weeds, pests, and diseases. These impacts will then affect food security and the social and economic development of the country. Sea level rise will also cause flooding of agricultural land near the coast and lead to saltwater intrusion and salinization of groundwater and soil, thus affecting crop productivity as well.

### Fisheries

The fishing industry of Belize provides direct employment for 3000 licensed fishermen. Most fishermen are between the ages of 15 and 35 years and most of these fishers originate from impoverished rural and coastal communities. Fishermen cooperatives and the aquaculture farms also employ persons in the sector for processing, packaging, and administering the daily activities.

In coastal and rural communities, over the years young Belizeans have encountered reduced opportunities to pursue further education. Most of the fishers and plant workers are only equipped with primary school education. In some instances, youths are removed from school to fish commercially with their fathers and brothers to supplement the family income. The erosion of the traditional preferential markets for Belize's sugar coupled with the low prices have motivated many young sugarcane farmers in northern Belize to abandon their sugarcane fields and join the fishing industry.

Fisheries require healthy habitats to survive and reproduce, such as coral reef systems, wetlands, mangroves, seagrass beds; these are areas where fish spawn, breed, feed or grow to maturity. Rising sea levels could lead to a partial or complete disappearance of these habitats through inundation. Also, rising near-surface water temperature and increasing acidification may cause massive coral bleaching and

dieback of corals. Healthy reefs provide habitat and nutrients for numerous species, and fishermen rely on reefs for fishing as well, therefore, a decline in healthy corals will affect the livelihoods of many Belizeans.

Therefore, these impacts will lead to a decrease in fish production, thus making it more difficult for fishermen to capture the same number of fish that they are accustomed to catching and affecting their livelihoods.

Aquaculture production systems are also vulnerable to the impacts of climate change, mostly as a function of geography and changes in various water quality parameters on the migration and consequent availability of broodstocks for hatchery production. The primary climate change drivers affecting aquaculture production are the loss of land and mangrove as a function of sea-level rise, the consequent loss of sheltered locations, and impacts from hurricanes and extreme weather events.

### **Water**

The water sector will be critically affected by changes in precipitation patterns. Climate projections have shown that rainfall is projected to decrease and become more variable, leading to intense rains and flooding while also worsening drought conditions. Variability in rainfall will result in risks of flooding from excessive rainfall in the low-lying coastlands; and decreases in water supply with lower levels of rainfall. Less rainfall and increased temperature will also lead to increased evapotranspiration and loss of available freshwater. A decrease in precipitation will reduce groundwater and aquifer recharge, increase saltwater intrusion, and contamination of freshwater resources.

Despite water abundance in Belize, issues with water scarcity in some areas and water quality have been known to occur. Key issues with water vulnerability in Belize are the uneven distribution of water resources. The southern region (Toledo) has the lowest population, with the highest amount of freshwater availability, whereas the central and northern regions (Orange Walk and Corozal) both have much larger populations and much fewer water resources. Several Cayes have become popular tourist destinations but have low availabilities of freshwater. Caye Caulker is vulnerable to contamination of its underground water through poor sewer construction and intrusion of saltwater into aquifers. It has also been noted that there have been changes in precipitation and that this has led to severe droughts that have affected many parts of the country.

The lack of groundwater information, especially in northern Belize, where karstic conditions may promote the leaching of solutes and salinization, leads to difficulty in the management of future water resources under climate change and increases the vulnerability of communities. Belize consumes annually around 600 million m<sup>3</sup> of water. The demand for freshwater resources in Belize emanates from three (3) broad economic sub-sectors: agricultural, industrial, and domestic/residential. A growing population and economy will lead to greater competition amongst key sectors, namely agriculture, industry, and domestic/residential (including tourism) for increasingly lesser and lesser water supplies.

Sea level rise and storm surges will also affect the water sector through saline intrusions into coastal aquifers and soils, as well as flooding of coastal lowlands and communities; where many Belizeans live and base their livelihoods. A one-meter rise in sea level will impact 30% of Belize's wetlands and none of the remnant Cayes in Belize will have a source of potable water. Some coastal areas in Belize will experience high levels of saltwater intrusion and rising water tables, thereby reducing water quality. A decline in water quality due to the salinization of aquifers would lead to higher costs of water because Cayes and other coastal areas would need to invest in desalinization plants.

### **Tourism**

The tourism industry in Belize is developing at a fast rate, engaging a wide range of tourism operators and employment of significant numbers of Belize's population. Belize's tourism industry is the largest contributor to the gross domestic product and the largest source of foreign exchange.

Climate Change and climate-driven sea-level rise will most likely have important and severe impacts on the tourism industry of Belize. Increases in air temperature (2°C to 4°C) towards the end of the century may

make conditions unbearable, especially for the elderly retired tourist population, a major age group of tourists. The projected variability in precipitation will very likely lead to extreme conditions, namely increasing drought in the dry season, torrential rains and flooding in the rainy season, and water and food shortages or higher prices of local and imported food. Tropical storms and hurricanes, compounded by sea-level rise, are also likely to increase in numbers and intensity, causing flooding and erosion of coastlines, flooding will also likely cause damage to transport and other infrastructure. Moreover, these projected changes in climate will have indirect secondary and tertiary effects, including loss of beaches, properties, and public infrastructure, heat stress and other health impacts, loss of coral reefs due to temperature-induced bleaching, loss of food supply chains, and loss of coastal infrastructure.

These impacts will lead to a decrease in tourism activity due to a decrease in the aesthetics of the country as a travel destination, loss of natural resources will affect tourist arrivals. An increase in the intensity of tropical storms and hurricanes will also discourage persons from visiting Belize. Loss in tourism arrivals will have adverse effects on the livelihoods of many Belizeans employed in the tourism sector. There will also be coastal areas in Belize that experience high levels of saltwater intrusion and rising water tables, leading to a decrease in water quality.

The loss of beaches and coastline due to erosion, inundation, and coastal flooding, and loss of tourism infrastructure, natural and cultural heritage would reduce the amenity value for coastal users. The overall effect of the changing climate on Belize's tourism industry would be a loss of employment and higher insurance costs for properties in vulnerable areas.

#### **Health**

The health of people worldwide is impacted each year by the acute and long-term effects of climate. Public health depends on sufficient food, safe drinking water, secure shelter, good social conditions, and a suitable environment for controlling infectious diseases. All of these factors can be affected by climate. The basic requirements for good health are clean air and water, sufficient food, and adequate shelter and each of these conditions is likely to be affected by future climate changes. Acute Respiratory Infections - one of the leading causes of mortality and morbidity in Belize – will be exacerbated by extreme heat. Certain vector-borne diseases such as dengue and malaria, respiratory diseases such as asthma, and water-borne diseases such as cholera and dysentery may become more acute and prevalent in the future with Climate Change.

Tropical storms are known to cause death, illness, injury, psychosocial impacts, and destruction of health facilities and health services. Floods can cause drowning and physical injuries; heighten the risk of diseases transmitted through water, insect vectors, and rodents; damage homes and infrastructure and disrupt the supply of essential medical and health services. On the other hand, droughts can increase the risk of water and food shortages and malnutrition, necessitate greater reliance on contaminated water, and lead to diminished health among vulnerable members of the population. Droughts and floods also increase the risk of diseases spread by contaminated food and water and foodborne diseases such as Salmonella, Shigella, Campylobacter, and Escherichia Coli. The combination of extreme heat and drought are also important risk factors for causing wildfires, resulting in direct health and economic losses, and increased risk of respiratory illnesses due to smoke pollution.

#### **Beneficiaries**

The direct beneficiaries of this project are Belize's 27 coastal communities. These will participate directly in the project, and thus benefit from a comprehensive combination of pre-event risk management strategies: Prevention, Protection, Preparedness strategies.

The second tier of direct beneficiaries are the individuals and experts – local and international – who will be employed under this project; an estimated number of 62 persons (full-time staff, consultants, wardens, trainers, workers). Approximately 175 persons will be trained. The training will have long-term benefits, considering that each trainee will use the acquired skills ranging from 5-10 years in contributing to



adaptation efforts, before the knowledge becomes outdated or retired. During the recruitment/consultations/training process, consideration should be given to maintaining a gender balance.

Component 1.1 and 4 have nation-wide benefits. When considering both subcomponents, component 3 also benefits all coastal communities ([Table 56](#)~~Table 53~~).

*Table 53: Beneficiary overview*

*Table 56: Beneficiary Overview*

Beneficiaries	Indirect	Direct	Human Resources				Cost/Capita (In US\$)
			Staff/Consultants/workers				
			National			Int.	
			staff	tertiary	unskilled <sup>16</sup>		
<b>1. Improving coastal land use for resilient habitation and sectoral activities</b>	Nationwide	Coastal Comm.					
1.1. Development of the National Housing Policy and Building Codes for resilient habitation based on vulnerabilities	X & visitors	X		8	5	0.71	
1.2. Strengthening the implementation of the Integrated Coastal Zone Management Plan and associated management guidelines for zonation		X			12	1.59	
<b>2. Coastal Vulnerability Monitoring</b>							
2.1. Strengthening data availability for the development of a national coastal saline intrusion program		X & agriculture	50 persons trained	1		1 6.02	
2.2. Develop and implement a National Beach Erosion Monitoring Program		X	50 persons trained	4	4	1.86	
2.3. Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge		X	10 persons trained			4 2.25	
<b>3. Beach stabilization of High-Risk Coastal Areas</b>							

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<sup>16</sup> Unskilled labor, measured by educational attainment, refers to jobs that require a high school diploma only, or could be filled by a high school dropout who masters specific skills. Skilled labor requires additional skills or education.

3.1 Implementation of beach recovery and stabilization through a pilot project in the high-risk coastal communities of Dangriga and Hopkins		Dangriga & Hopkins		2	7 <sup>17</sup>	3	9.36
3.2 Monitoring and evaluation of activities' effectiveness and documentation of lessons learnt		Other coastal communities		1			
<b>4. Awareness-raising, knowledge dissemination, and capacity strengthening</b>							
4.1. Implementation of a National Climate Change Communication Strategy and Action Plan	X	X		3			0.30
4.2 Development of training modules for best coastal adaptation practices for Belize	X	X	50 persons trained	3			0.36
4.3 Strengthening of GIS capabilities within the CZMAI and partners	X	X	15 persons trained	1			0.24
Project Management				3			
Total			175	26	28	8	

The indirect beneficiaries for component 1.1 extend towards the population of Belize and visitors (approximately 419,199 inhabitants and 260,000 visitors) because the housing policy and building codes (i.e. the zone of influence of the project) will benefit everyone by increasing resilience. The cost per beneficiary of the housing component is US\$0.71 per person.

Calculation:

Cost per beneficiary = (Total Cost of the Component / Est. number of beneficiaries)

Ex. Component 1.1: Cost/beneficiary = 480,000/(419,199+260,000)

Component 1.2 and 2.2 mobilize local people from the coastal areas to make decisions regarding their resilience (coastal advisory committees), to play an active role in coastal zone monitoring (community wardens, community network). Through this process, communities/beneficiaries will have greater ownership of the coastal zone management process, and it will result in reduced implementation costs (e.g. field costs). This will be also be supported by the capacity building exercises under the various project components. The cost per beneficiary per component 1.1 and 1.2 are US\$1.59 and US\$1.86 per person respectively. While the calculated costs for component 2.1 comes down to US\$6.02 per person, because of its importance for the agriculture sector – which is not a per capita cost – the benefits are higher. The project cost for the early warning and storm surge component is US\$ 2.25. However, the actual cost for

<sup>17</sup> As the RRM under comp. 3 are to be determined during phase 1 (ongoing), these figures are an estimate. The contractor will be encouraged to hire local community members.

setting up this system is higher as this project only covers the first phase of establishing the EWS. The cost for component 3 is estimated at US\$9.36. However, the actual cost is lower, as – similarly to component 2.1- this calculation does not consider the benefits for the agriculture and tourism sector, nor the temporal aspects of this component. The costs for the project components 4.1, 4.2, and 4.3 are US\$ 0.30, US\$ 0.36, and US\$ 0.24 respectively which are very low. The average cost for the project is US\$2.83 which is low considering its significant contribution to Belize's climate change adaptation efforts and the project's contribution to strengthening professional, academic, and local capacities.

#### **Financial Strategies**

Based on Part I – Section III and the financial considerations thereof, the following strategies have been identified.

#### **Strategy I Affordable housing for low-income families and Indigenous and Tribal Peoples' (ITP) communities**

Ensuring effective implementation of disaster resilient housing requires (i) Local expertise and knowledge on risk reduction, which is valuable for building disaster resilient housing, (ii) improving local awareness and supporting the local economy are key essential parts to raise resilience, and (iii) applying planning and construction regulations through building permits is significant to ensure a resilient housing system. These findings also generate some policy implications related to the demand for improving governance mechanisms.

While the costs of housing construction are relatively low in Belize, the affordability of this investment in the status quo, and especially when building standards will be applied, will be beyond the reach of many rural families. Besides, the calculation of costs will be significantly impacted by the availability of credit, and potential interest rate calculations. It is essential that the Government of Belize (GoB) links these investments to appropriate land use regulation and associated investments in basic infrastructure and services. Successful housing projects should consider access to finance for the lower-income class. This project should aim to contribute to the safety and security of lower-income buildings when establishing the envisioned model home/building. Additionally, when developing the building codes, an assessment should be conducted on how the traditional housing structures (cultural heritage) of the Indigenous and Garifuna peoples will be integrated.

#### **Strategy II Investing in communication actions for a sustainable impact e.g. discourage investments in at-risk-areas, stakeholder buy-in for housing codes and alternative livelihoods opportunities**

Disasters, environmental degradation, and climate change pose significant and increasing threats to the achievement and sustainability of positive development outcomes. Synergies between these threats and development trajectories are complex. For example, increasing climate variability raises the magnitude, intensity, and frequency of extreme events, triggering more disasters. Failure to adequately account for disaster, environment, and climate change can leave coastal populations with increased exposure and vulnerabilities to disaster, climate, and environmental impacts. Hence the need for zonation guidelines, and the enforcement thereof. However, existing structures are usually permitted to stay within the buffer area and run the risk of being damaged in case of climate change hazards. As such, this component links to component 4.1, because it requires intensive communication about the risks of building in at-risk-areas. Additionally, stakeholder buy-in is expected to be limited if they do not understand the need for building standards as these raise the initial costs of construction. Anthropogenic causes also function as drivers of environmental degradation. Hence the importance of informing local communities about alternative livelihood options and training them in these, e.g. seaweed farming.

#### **Strategy III Investing in disaster preparedness risk reduction measures**

Natural disasters can result in people losing their lives, major damage to residential housing and public-sector property, agriculture, and infrastructure (irrigation, transport, power, and telecommunications). The Government of Belize, the private sector, and donors absorb some of these losses, but there is still an estimated large resource gap between available financial resources and post-disaster expenditure

requirements. Additionally, there are no local insurance policies that cover the costs of damage caused by climate hazards.

While more research is required to quantify the average size of losses in recent years, this is likely a combination of (i) the values of residential, commercial, and industrial properties, public infrastructure, tourism, and agricultural assets (including perennial crops) exposed to risk, (ii) the timeliness of the warning, (iii) the frequency and intensity of climate hazards. Ensuring all investment flows are disaster-resilient presents a substantial opportunity to reduce rather than generate risk, an increase which could slow development and economic progress. Investing in disaster preparedness risk reduction measures is therefore a sound prevention strategy that in this project is targeted via saline intrusion monitoring, beach erosion monitoring, and the first steps towards the establishment of an early warning system.

#### **Strategy IV Investing in Coastal Protection**

The construction of a seawall, in general, is a capital-intensive intervention. The cost of the project may even exceed the economic value at risk. This intervention may require a heavier lift with the public than others. For example, while it may face opposition as waterfront leaseholders' properties are usually be directly affected by a seawall, supporters argue that it may capture revenue from tourists as important users of the Seawall. A port may apply a cruise ticket surcharge, and with the revenue going towards the cost of the seawall maintenance.

The financial and economic analysis of mangrove regeneration and restoration based on several assumptions: i) investment inputs (2 options: regeneration and replanting); ii) the total economic value of mangroves; iii) the rotation period of mangroves: 20 years with no conversion and damages. A cost/benefits analysis is not a sufficient indicator of the benefits from regenerating and replanting mangroves as environmental benefits are very site-specific values. Regeneration and reforestation of mangroves greatly contribute to the mitigation of climate change impacts in coastal areas such as coastline erosion, damage reduction for sea dykes system, and reduction of impacts of sea wave on production and lives of local communities. Implementing a mangrove component also contributes to job generation by engaging local people in mangrove related activities. Other impacts are that the capacity of local people and officials are enhanced through training. Livelihoods of local people will be improved through enhanced capacities on sustainable livelihoods practices (e.g. Sargassum use/[harvestingfarming](#), aquaculture farming, harvesting of fishery sources in mangrove areas). Payment for Ecosystem Services, PES, is a topic with increasing significance in Belize – especially in the context of REDD+. If in future Belize implements PES, local communities can be compensated financially – provided that they practice sustainable management of forests/mangroves.

In contrast, sand renourishment is usually a repetitive process. Large scale nourishment involves a large financial investment, and usually an additional commitment to future nourishment campaigns. Most projects would require a large international dredger with high mobilization costs. High erosion rates may also render nourishment financially impractical. Once the sediment that was lost through drift or erosion is replaced from other sources, this intervention is likely to be repeated, because nourishment mitigates the effects of erosion, but does not remove the causes. However, the benefits derived from tourism and job creation may be sufficient to warrant repetition. A gentle environment (i.e. without extreme currents, temperatures, etc.) increases the interval between nourishment projects, reducing costs.

#### **Strategy V Investing in national capacities for long-term in-house and national expertise**

Improving institutional and technical capacities is the key to achieving successful adaptation in Belize. Building national capacities is central to this project – not only strengthening the public sector, but also the community members and the next generation of professionals. Oftentimes, local and national capacities -if available- are a good alternative to international professionals. The project will continue to mobilize local people from the target communities to take decisions regarding their resilience, to play an active role in the implementation of the measures, and support them in implementing this process. Through this, community beneficiaries will have greater ownership of the process of building resilience and will result in reduced implementation costs. Researchers at the University of Belize have expressed interest in participating in

the project and accommodating students. The project partners are open to this possibility of collaboration, and -considering the analysis set out in the national policies (Horizon 2030, NDC)- need to strengthen their staff capacities as well.

**Strategy VI Cost-effectiveness, ownership, and other long-term benefits through strategic partnerships**

Local participation is crucial. The project will be implemented in close partnership with communities and local institutions. This implementation approach will reduce implementation costs by using community workers instead of external contractors, procuring local materials where they are available. Moreover, the ownership and long-term impact of the interventions will be improved with community participation.

Inter- and intra-institutional collaboration are also important. By pooling and coordinating the resources of institutions, partnerships will maximize results. For example, there is much existing capacity and experience on GIS utilization within CZMAI. Since these are crucial components of the project it is recommended to leverage the power of partnerships to enhance staff capacities within institutions, and also with other institutions (e.g. NMS, NHS). Additionally, coordination of efforts in communication will ensure that there is a coherent national approach and avoid the duplication of efforts, thus promoting the efficient use of resources.

Considering that the project makes progress in the areas of an early warning system but does not complete the full set of four stages it is recommended to pursuing co-financing possibilities. A strength of the proposal is that it builds on existing structures ~~and co-financing options~~ which already have financing without duplicating them (components 1.1, 2.2, 2.3, 3, 4.1).

The activities presented in the AF proposal feasible within the project budget. Awaiting the recommendation resulting from the ongoing research related to component 3, a reservation has been made for its implementation.

**PART IV: CONCLUSIONS**

Despite it being a carbon sink, Belize is vulnerable to Climate Change impacts. Following the comprehensive analysis of the national mechanisms and ongoing initiatives of the Government of Belize, the implementation of the Adaptation Fund project is determined to be feasible (Table 57) and will have a considerable impact on the country in the achievement of climate resiliency through adaptation

*Table 54: Feasibility Assessment*  
*Table 57: Feasibility Assessment*

Criteria	Feasibility scale			Summary findings
	Not Feasible	Possible /Needs Action	Yes, is feasible	
Relevance		X		The project incorporates prevention, protection, and preparedness strategies. The preliminary exploration of protection measures for Dangriga and Hopkins (component 3) as included in this document is not final

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				and will be further considered through the comprehensive research conducted by GAMMA S.A.
Policy and legislation			X	The project components are important contributions in climate change preparedness and in line with government policies, and there is a sufficient legislative policy base to facilitate implementation.
Human resources			X	The successful implementation of the project components, particularly under component 4, will require utilizing a combination of national and international expertise, skilled and unskilled labor as well as national and sub-national, inter-agency, and intra-agency collaboration.
Research and technologies			X	Utilization of the research and technologies envisioned under the components are deemed feasible. The technologies will benefit the country through enhanced capacities of government staff, as building new capacities among youth, through collaborations with the University of Belize.
Beneficiaries			x	This project is required because people living in coastal regions, as in Belize, are particularly vulnerable in different ways. Populations in these regions are vulnerable to death and injury and destruction of not only their public health infrastructure from increasingly severe tropical storms but also salinization of water resources and agricultural land from sea level rise. Components 1.1 and 4 extend benefits to a national level, not just coastal communities.
Cost			X	The cost per beneficiary ranges from US\$0.30 per person (component 4.1) to US\$9.36 per person (component 3). The average cost for the project is US\$2.83 which is low considering its significant contribution to Belize's climate change adaptation efforts and the project's contribution to strengthening professional, academic, and local capacities.
Sustainability			X	Six strategies have been incorporated in the Proposal to achieve cost-effectiveness as well as a long-term impact: Strategy I Affordable housing for low-income families and Indigenous and Tribal Peoples' (ITP) communities, Strategy II Investing in communication actions to discourage investments in at-risk-areas and stakeholder buy-in for housing codes, Strategy III Investing in disaster preparedness risk reduction measures, Strategy IV Investing in Coastal Protection, Strategy V Investing in national capacities for long-term in-house expertise, Strategy VI Cost-effectiveness and ownership through local participation.

## ANNEX III STAKEHOLDER CONSULTATION REPORT

### PART I STAKEHOLDER ENGAGEMENT

#### Introduction

As a part of the project development process, a series of consultations were conducted to help to gather information on resource use and the effects of climate change in the coastal areas. A social and gender assessment was also done to determine if there are differences in access and use of coastal resources based on demographics and gender. The stakeholder engagement process began in September 2020 and concluded in November 2020. The process faced several challenges due to its timing such as the COVID-19 pandemic, national elections, and tropical storms. Because of the current COVID-19 restrictions, there are limits on the number of persons that can gather in any location at the same time. As a result, three persons from each of the target communities will be asked to represent their community in the consultations. At least one community representative had to be female. Consultations were held by the district beginning in Corozal. COVID-19 precautions were taken at all the consultations. The target communities are listed below ([Table 58](#)~~Table 55~~ *Table 55: Target communities for consultations.*)

*Table 55: Target communities for consultations*

**Table 58: Target Communities for Consultations**

Corozal District	Belize District	Stann Creek District	Toledo District
Corozal Town	Belize City	Dangriga	Punta Gorda Town
Altamira	St. Georges Caye	Hopkins	Barranco
Consejo	Ladyville	Sittee River	Cattle Landing
Chunox	San Pedro Town	Independence	Forest Home
Copper Bank	Caye Caulker	Seine Bight	Punta Negra
Sarteneja	Gales Point	Placencia	Monkey River
	Mullins River	Riversdale	
		Maya Beach	

**Methodology**

The advent of COVID-19 in Belize required that the traditional mechanisms for consultation and stakeholder engagement be revisited and adapted to comply with the requirements of the advisories and regulations put out and/or instituted by the Government of Belize. During the inception meeting and initial engagement with the lead agencies, several options were proposed to address the various scenarios that were envisioned based on the regulations that were or could be in effect during the consultations. Four options were presented that were designed to be flexible and responsive to changes in Belize's COVID-19 regulations and advisories. The consultations were done using the two options presented below. The other two options were designed specifically for in-person consultations if the number of persons allowed at gatherings was changed.

Each option had its challenges that were addressed as they presented themselves. The following consultation methodologies were used in combination:

- Option 1: Conduct all the meetings and consultations virtually. Participants to a virtual meeting were invited by the district or organization. It was planned that all the communities in the district would form part of a simultaneous virtual consultation. The number of persons that could be invited to participate in a virtual consultation would depend on the virtual platform available, the resources available (devices, internet access), and the extent to which potential participants were able to use the technology. This option required much planning to identify the resources available in each community and persons who were knowledgeable in the use of the technology. It also required that background information be provided to potential participants before the meeting to ensure that they conversant with the material.
- Option 2: Conduct in-person meetings with gatherings restricted to 10 persons or less. This option was in response to the COVID-19 regulation that limited gatherings to a maximum of 10 persons. The communities were grouped into clusters of two or three based on proximity and/or ease of travel. Each community was then be asked to select three participants to represent that community and a consultation session would be convened in a central location. A focus group type consultation would be conducted in each of the central locations where information was provided, and participants directly engaged. Mechanisms would be put in place to ensure that all the requirements for social distancing and hygiene were practiced. Meetings would be kept as short as possible to limit the exposure of the participants. A listing of proposed community groupings is presented below in Table 55.

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The COVID-19 regulations that were in place at the time of the consultations required that gatherings be limited to a maximum of ten persons. It also required strict social distancing and the wearing of masks. Adjusting to those regulations, it has become necessary to do increased planning in the communities before the consultations were held. All communities were contacted through the NAVCO, DAVCO, the most active NGO, or another social partner in their area to identify potential participants from the respective communities. In addition to the standard contact information, prospective participants were asked to provide information on their ability to use current online meeting technology and whether they owned the required hardware.

Government agencies and NGOs were invited to identify one person to represent their organization. Most organizations indicated that they preferred to participate in virtual consultations. This suggestion was taken on board and all those consultations were done virtually.

## PART II: PLANNING, CHALLENGES, AND RESULTS

### Planning and Challenges

Following the schedule that was prepared and revised, several meetings and consultations were held with communities, agencies, and organizations across the country. A combination of in-person and virtual meetings was held. Option 1 was used for NGO and Government of Belize consultations while a combination of Options 1 and 2 were used for the community consultations. Most communities wanted to have in-person meetings. However, it was not possible to hold in-person consultations in some communities because of COVID-19 restrictions that curtailed movement into and within those communities, notably San Pedro Town and Caye Caulker Village. The communities were grouped into twos and threes, and each community was asked to identify three persons to represent the community. The community leaders were contacted through the National Association of Village Councils and the Association of Mayors. The agencies were contacted through the person identified as the contact for the project. NGOs were contacted through their executive directors. For several reasons, it was not possible to meet with all the communities or organizations on the list. Some organizations were added because during the consultations it was found that their participation would add to the consultative process. Attempts were made to reschedule the meetings that were missed. [Table 56-Table 59](#) outlines the meetings that did not materialize, the reasons, and responses.

The consultations were planned to last no more than three hours. They included three short presentations and two interactive sessions in which feedback was solicited from those present. Responses were captured in a table and synthesized below by district.

*Table 56: Communities that could not be consulted*

*Table 59: Communities that could not be Consulted*

Community or Organization	Date scheduled	Reason for not meeting on the scheduled date	Follow-up Response (Rescheduling attempt)
<i>Alta Mira</i>	3 <sup>rd</sup> October 2020	After initial confirmation, no one attended the scheduled session, no formal response was provided.	One attempt was made to reschedule the session, however, there was no response from the community focal point.
<i>Punta Gorda, Forest Home, Cattle Landing</i>	10 <sup>th</sup> October 2020	Only one individual (from the Forest Home community) attended the session, due to communication deficiencies. Many persons that were invited to the	Two attempts were made to reschedule the session. The first attempt, an in-person session for the 7 <sup>th</sup> November 2020, was disrupted by Hurricane Eta, which resulted in

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		session indicated that the Covid-19 deaths in the community may have contributed to the poor attendance.	heavy rainfalls and flooding in Central America and Belize. The second attempt, a virtual session scheduled for the 9 <sup>th</sup> November 2020, was disrupted by the preparation for the General elections.
<b>Barranco</b>	10 <sup>th</sup> October 2020	There was a communication deficiency between the contact person and the community members. The livelihood of many community members also limited the days within which the community could be engaged, as the engagement sessions were scheduled during the peak of the lobster and conch fishing season.	There were two attempts at rescheduling. However, due to the availability dates, Covid-19 deaths in the community, and preparations for General Elections, the meeting never materialized.
<b>Hopkins</b>	24 <sup>th</sup> October 2020	No one attended the scheduled session, no formal response was provided.	Two attempts were made to reschedule the session. During the first rescheduled session, on the 9 <sup>th</sup> November 2020, the community experienced technical problems and the session was further rescheduled to the 12 <sup>th</sup> November 2020. The community did not attend the second rescheduled session
<b>Sittee River</b>	24 <sup>th</sup> October 2020	After initial confirmation, no one attended the scheduled session, and no formal response was provided. No further contact was made with the community.	No further contact was established after the first confirmation was given.
<b>Independence</b>	24 <sup>th</sup> October 2020	The community formally requested that they be engaged virtually.	Rescheduling attempt to a virtual modality was successful.
<b>Seine Bight</b>	24 <sup>th</sup> October 2020	After initial confirmation, no one attended the scheduled session, and no formal response was provided. No further contact was made with the community.	No further contact was established after the first confirmation was given.

## Results

For the communities that were consulted, copies of the attendance sheets are attached as Annex 5, (a) – (h).

Issues that were highlighted during the consultations include:

- i) Participants felt that the project did not focus enough on the individual needs of all communities. It was explained that the project was designed to address national climate change issues across coastal communities as it relates to affected Belize. It was pointed out that the coastal communities would be the direct beneficiaries of the deliverables of the project in the form of improved data, better land-use planning, better early warning for storm surges and floods, and community participation in the entire process.
- ii) Communities were generally concerned that for previous national projects/programmes the consultative process concluded with project development. Limited to no engagement with communities occurred during the implementation of the projects. Communities were reassured of the entities' commitment to continuous and active stakeholder engagement through the communications strategy to be implemented under the project. It was further explained that through this project communities would be directly involved and could take ownership through the training and monitoring that was an integral part of the project under Components 2 and 4.
- iii) First Prominent Issue Expressed by Communities - Coastal erosion is an issue communicated by every community consulted. Communities expressed relief that the problem was being

addressed after it was originally reported to national entities. Communities expressed concerns regarding the selection of only two target communities, Dangriga and Hopkins. It was explained that those communities were selected following initial assessments by the partner agency GAMMA S.A. from Cuba; these assessments followed recent work completed in those areas. It was also explained that under Component 3 of the project the information and technology obtained from the two pilot sites, would be used as a guide to possibly scale-up engineering recommendations in other communities that were severely affected.

- iv) Second Prominent Issue Expressed by Communities - Land use was another issue vocalized in participating coastal communities. Community members voiced concerns on issues relating to land tenure, which in their opinion was inappropriate for the type of development planned for and eventually executed on land. Development in these environmentally significant areas resulted in the cutting of mangroves, dredging, and other activities that posed a threat to the natural environment. It was felt that erosion was exacerbated by the improper use of coastal resources or the lack of proper planning and environmental impact assessment. It was explained that the project intends to address such issues through the implementation of the Coastal Zone Management Plan under Component 1. Concerns related to the inequality in the issuing of land or the activities that were permitted in coastal areas were also voiced. Communities also pointed out the need to address the enforcement of existing national legislations such as the mangrove and land use regulations.
- v) Need for Building Codes  
The development of building codes for the coastal zone is viewed as beneficial to communities. Most communities felt that the development of building codes for the coast was long overdue action to guide development. Two concerns were expressed by the communities, with an urge for them to be addressed by the project:
  - a. In addition to a relevant design, provide information on appropriate building materials that would be suitable for coastal buildings.
  - b. Make sure that all income levels were taken into consideration when developing the model buildings.
- vi) Communities also expressed the need for more autonomy in the national process and the ability to enforce building codes and land use regulations at the municipal level (towns and village councils) as this is where most of the effects of climate change and bad land-use planning are seen.
- vii) Flooding monitoring and flood early warning were applauded as very necessary in most coastal communities.
- viii) Participants also brought up climate change issues that directly affected them. These are mentioned by the district below.
- ix) Most participants asked if they could be consulted on the final document that was sent to the Adaptation Fund.

### Consultation synopsis by Stakeholder group

*Table 57: Consultation Synopsis*

*Table 60: Consultation Synopsis*

Stakeholder/Community	Objective	Outcome	Conclusion
NGOs & Independence community Virtual, 28 Oct. 20	Inform about the project concept and receive feedback on relevant aspects,	Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment. Ngo's collaborative support for implementation was obtained.	Relevant information was obtained and integrated into the Project Proposal and Annexes

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	including their interventions.		
Javier Sabido – NAVCO Virtual, 11 Sept. 20	Inform the national village council and request support to organize community consultations.	NAVCO is positive about the project and supports to organize community consultations in villages received.	Consultations were supported by NAVCO
IHCANTIABRIA/IDB Virtual, 16 Sept. 20	Map lessons learned from other projects/ assess synergies	Relevant aspects of Belize's Disaster Risk Profile research integrated into feasibility analysis (Annex 2)	Relevant information was obtained and integrated into the Feasibility Study
Timothy Hawthorne (UCF) Virtual, 10 Dec. 20	Learn about UCF's PGIS research at Hopkins	Relevant aspects of UCF PGIS research were considered, and UCF was identified as a potential partner.	Relevant information was obtained and integrated into the Project Proposal and Feasibility Study
Stakeholder Session (Corozal) Chunox, Sarteneja Copper Bank Chunox, 3 October 2020	Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.	Recommendations: GoB needs to monitor and ensure compliance. housing codes need to enforce the mangrove regulations; coastal zone management. Indicate the need for communications.	Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment.
Stakeholder Session (Corozal) Corozal Town/Altamira, Consejo, Corozal Town, 3 Oct. 2020	Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.	Recommendation: Consider alternative energy sources that are less expensive. Worried about groundwater contamination. Indicate the need for communications.	Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment.
Stakeholder Session (Belize District) San Pedro Town, Belize City Virtual, 22 Oct. 2020	Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.	Recommendations: Proper development planning, zoning; collaboration, and communication with local authorities. Worried about flooding and advocate EWS& mangroves. Positive about beach nourishment. Indicate the need for communications. Useful to have the GIS capabilities in the CZMAI.	Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment.
Stakeholder Session (Belize District) St. George's Caye, Belize City, Ladyville Belize City, 17 Oct. 2020	Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.	Recommendations: Need for protection and management of mangrove areas; development of a management plan for the cayes; development plans and land use laws, zoning regulations; improved governance structures at the central and local levels;  monitoring and compliance; Legislation that includes building codes; a minimum standard for building construction in the city for people who don't have the resources; Awareness and education. Need flood/shoreline protection.	Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment.
Stakeholder Session (Belize District) Gales Point, Mullins River Gales Point, 17 Oct. 2020	Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.	Worried about water due to droughts affecting supply. Want erosion controlled.	Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment.

Stakeholder Session (Stann Creek) Placencia Placencia, 24 Oct. 2020	Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.	Highlights: Want to collaborate.	Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment.
Stakeholder Session (Stann Creek) Riversdale, Maya Beach Maya Beach, 23 Oct. 2020	Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.	Highlights: Suffering from Climate Change impacts& saltwater intrusion; no zoning regulation.	Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment.
Stakeholder Session (Stann Creek) Dangriga Dangriga, 24 Oct. 2020	Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.	Highlight: Advocate for decentralization and collaboration. Suffer from saltwater intrusion. Happy that the town was chosen as a pilot. Advocate for control of man-made causes. Indicate the need for communication.	Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment.
Stakeholder Session (Toledo) Forest Home Punta Gorda, 10 Oct. 2020	Inform about the project concept and receive feedback on relevant aspects, vulnerability, social, and gender.	Highlight: Want more consultations with council chair present.	Relevant information was obtained and integrated into the proposal, feasibility study, safeguards assessment.

### Conclusions

The COVID-19 pandemic has dictated that new and innovative ways need to be found to ensure that stakeholders are engaged in the consultative process. Being one of the first consultations to be conducted under the new regulations, several challenges were encountered that needed to be addressed *in situ*. Nonetheless, the results from the consultations were informative and of much value. The following points are offered in conclusion:

- There was also a thread of common concerns across all the coastal communities that involved land use, how approvals are given for development, and the inability of local communities to adequately respond to infractions that impact the communities.
- Erosion is an issue that most communities feel is not being adequately addressed by the people in authority.
- The NGO community is actively involved in working on issues impacting the coastal zone and have a wealth of information that could be useful in addressing the
- There is a need for increased communication between agencies and communities to ensure that there is a constant flow of relevant information that can be used in decision-making.
- Communities want a bigger role in deciding on and managing the activities that impact them.
- Communities are hoping that the project will have some direct tangible benefits.
- The communication strategy needs to ensure that communities are engaged at all times and that the responses to their concerns are highlighted at every opportunity.

### PART III: PARTICIPANTS LISTS

#### Adaptation Fund Project Proposal Development Stakeholder Consultation Session

Date: 3 October 2020

Location: Corozal Town Council

Name	Position	Organization Community/	Email	Contact Number	Gender	Signature
1 Mr. Rodolfo Narva	Councillor	CTC	Mitra-rodol@gmail.com	670-7637	Male	
2 Janet Johnston	Rotary	Sgt of Arms	bythesc23557@gmail.com	672-1949	Female	
3 Alicia Torres	Chair lady	Consejo Village	all:820@hotmail.com	638-3987	Female	
4 Cynthia Lara	Residence	Consejo Village	cynthialara218@gmail.com	6389908	Female	
5 Romm Arena	Uice chairman	Consejo Village	arromm@hotmail.com	6307284	Male	
6 DWIGHT METZ	CONSULTANT	ECCD		622-5067	Male	
7 Tanya Santos	Consultant	ECCD	tanyasantos76@hotmail.com	623-5086	Female	

MONKEY RIVER 9/10/2020

#### Adaptation Fund Project Proposal Development Stakeholder Consultation Session

Date:

Location:

Name	Position	Organization	Email	Contact Number	Gender	Signature
1 Marid Muschamp	President	Monkey River Watershed Assoc	Presidentmrwa@gmail.com	671-6568	M	
2 Paula Williams	Chair lady	Punta Negra		6554714	F	
3 Consuelo Lira		puntanegra		650-2330	F	C. Lira
4 Suzette Jacob	Secretary	Punta Negra		6695726	F	
5 Godwin Coleman		Monkey River		664-0790	M	
6 Deborah Burgess	voice secretary	monkey river		669-5584	F	DBURGESS
7 Leonardo Castro	Chair Person	Monkey River	Leo62811@gmail.com	621-5263	M	

#### Adaptation Fund Project Proposal Development Stakeholder Consultation Session

Date: 10 October 2020

Location: Punta Gorda

Name	Position	Organization Community/	Email	Contact Number
1 Rockel Romero	Councillor	Forest Home Village	romerorockel927@gmail.com	634-0749



MONKEY RIVER 9/10/2020

Adaptation Fund Project Proposal Development Stakeholder Consultation Session

Date:

Location:

Name	Position	Organization	Email	Contact Number	Gender	Signature
1. Maria Muschamp	President	Monkey River Watershed Assoc	President maria@gmail.com	671-6568	M	
2. Paula Williams	Chairlady	Punta Negra		6554714	F	
3. Consuelo Lira		punta negra		650-2380	F	C. Lira
4. Suzette Jacobs	Secretary	Punta Negra		6695726	F	
5. Gordon Coleman		Monkey River		664-0790	M	
6. Deborah Burgess	voice secretary	monkey river		6695580	F	D Burgess
7. Leonard Castro	Chair Person	Monkey River	Leecastro10@gmail.com	624-5265	M	



Adaptation Fund Project Proposal Development Stakeholder Consultation Session

7<sup>th</sup> OCTOBER 2020

Date:

Location:

BELIZE CITY

Name	Position	Organization	Email	Contact Number	Gender	Signature
1. Jovan Lopez	CHAIR	SGCUC	SGCUC13@sgcuc.org	610 0840	M	
2. CHRISTOPHER DESIBARD	SECRETARY	SGCVC	christopherb@gmail.com	612 5974	M	
3. Denise Swamy	CC Tech Officer	PACT	cc.tech@pactbel.org	822-3637	F	
4. Firdel Cel	Multimedia Officer	PACT	celfo@pactbel.org	"	M	
5. Cardyn Trench	Advisor	SGCVC	cardyntrench@gmail.com	670-0509	F	
6. Shaheed Gentry		Homeowner	shaheed.gentry@gmail.com	607-2272	F	
7. Edison Andrus		Homeowner	@gmail.com	"	M	
8. Neal Neal		Civil Servant	neal.neal@gmail.com	623-9112	M	
9. Aniyah Benitez		Ladyville	anayahbenitez@gmail.com	610-5813	F	
10. Brittnay Galvez			brittnay.galvez01@gmail.com	632-7198	F	
11. Chelsea Galvez			galvez.chelsea01@gmail.com	633-6801	F	
12. DOLGHA NEAL	FACILITATOR	BELIZE CHANGES	dolghaneal@gmail.com	622-5067	M	
13. ANIYA SANTOS	FACILITATOR	BELIZE CHANGES	aniya.santos70@hotmail.com	6255286	F	

17 OCTOBER 2020

Adaptation Fund Project Proposal Development Stakeholder Consultation Session

Date: 17 October 2020

Location: Gales Point Manatee + Mullins River

Name	Position	Community/Organization	Email	Contact Number	Gender	Signature
1 Sumner Anderson	Water board Chairman	Gales Point Manatee		672-0888	M	Sumner Anderson
2 Viston Myers	M.S. Treasurer			665-2989	M	Viston Myers
3 TeSarah Myers		Gales Point	tesarahmyers84@gmail.com	672-0888	F	TeSarah Myers
4 Ryzden Thomas	Secretary	Mullins River		650-6478	M	Ryzden Thomas
5 Edward Havers	Chairman			667-6814	M	Edward Havers
6 Rudolph Bastidas		Mullins River		651-2117	M	Rudolph Bastidas
7 Sandra Elverson	Vice Chairman	Mullins River		653-4660	F	Sandra Elverson
8 Jason Attchaff	Chairman	Gales Point Manatee		651-0425	M	Jason Attchaff
9 Tanya Santos	Consultant	ECGD				Tanya Santos

Date: 24 October 2020

Location: Placencia Community Center

Name	Position	Organization	Email	Contact Number	Gender	Signature
1 Dora Villanueva	Village Chair	PVC	placenciavillagecouncil@gmail.com	615-4049	F	Dora Villanueva
2 Mariko Wallen	President	BWSFA	wallenmariko@gmail.com	671-1222	F	Mariko Wallen
3 Gilbert Carbido	V Chair	PTGA Placencia Tinguatun ACC	gilbertcarbido@gmail.com	669-8225	M	Gilbert Carbido

Invite me to next meeting BWSFA - Belize Women Seaweed Farmers Association Email BWSFA 2019 @ J Mariko Wallen 1.71-1222 i.ihatsop

Adaptation Fund Project Proposal Development Stakeholder Consultation Session

Date: 23 Oct 2020

Location: Stann Creek

Name	Position	Organization	Email	Contact Number	Gender	Signature
1 Dora Young		Dora's Services	tdora@stanncreek.gov.bz	670-4130	M	Dora Young
2 Tanya Williams	Director	Bayside Ltd	baysidelimited@gmail.com	604-8910	F	Tanya Williams
3 Aaron Krohn	Hotel Manager	NIAA RESORT & SPA	aaronkrohn@niamanresort.com	610-0036	M	Aaron Krohn
4 Steve Faria				603-1000		Steve Faria
5 Dora			95dora@gmail.com	622-8715	F	Dora
6 Tanya Santos						Tanya Santos
7 Dwight Neal						Dwight Neal



Date: 24. Oct 2020

Location: Dangriga

Name	Position	Organization/Community	Email	Contact Number	Gender	Signature
1. Akeem Bayona	DIC Ref		akeem@blue.com	625 3958	M	
2. Roselin Zampori	Rep. BTTA	BTTA	blue.mountain.lodge@eme.com	610-5789	F	
3. Julissa Boyd	Blue Marlin Boat - Tour Guide	Blue Marlin	Julissaboyd@gmail.com	615 2243	F	



Adaptation Fund Project Proposal Development Stakeholder Consultation Session

Date: 15<sup>th</sup> February 2021

Location: Hopkins Village

Name	Position	Organization	Email	Contact Number	Gender	Signature
1. Barbara Nunez	Principal RC	Holy Family School	holyfamily518@gmail	613-9919	F	
2. Andrew Castillo	VP-NGO	National Garifuna Council	mickcastillo@gmail.com	653-0643	M	
3. Orlando Augustine	Hopkins Village Chair	Hopkins V.C.	hopkinsvillage@gmail	622-5881	M	
4. Clyde Martinez	Secretary	Hopkins Indigenous Group	Clyde9658@gmail	650 7731	M	
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6. Casimir H. Augustine	Hopkins Farmers COOP	AFCS	casimirh83@gmail.com	674 0173	M	
7. Jerry Murray	Hopkins Village Treasure		murphy2380@gmail.com	622-0081	M	
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11.						
12.						

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<a href="#">Sandra Miranda</a>	<a href="#">Belize National Indigenous Council</a>	<a href="#">Member</a>	
<a href="#">Timoteo Mesh</a>	<a href="#">Belize National Indigenous Council</a>	<a href="#">Member</a>	

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## **Annex IV Demonstrating Compliance with the Adaptation Fund's Environmental and Social Policy through the Environmental and Social Management Plan**

### **Purpose**

The purpose of this overview is to demonstrate compliance of the project with the Environmental and Social Safeguards (ESS) of the Adaptation Fund. This section provides an overview of the measures taken in the project design phase to ensure that the project enhances environmental and social benefits, and prevents, reduces, or mitigates adverse environmental and social risks and impacts considering the 15 Adaptation Fund principles. This section also details the measures put in place to uphold the principles throughout the project implementation.

### **Compliance Process**

ESS is vital to prevent and mitigate the potential for undue and unintended harm that could arise from project activities. In line with the Adaptation Fund's Environmental and Social Policies, the project partners have conducted risk screenings and impact assessments of all activities even though they have a negligible risk of causing unintended harm. To ensure that the project complies with the Environmental and Social Policy of the Adaptation Fund, all project activities have been screened against the 15 environmental and social principles, as defined in the Environmental and Social Policy of the Adaptation Fund. Where risks have been identified, this annex analyses the potential for impact and describes the measures that have been built into the project to avoid or mitigate risks and their impacts. To make sure that the project is in line with the Adaptation Fund Gender Policy, a social and gender assessment was conducted, and a gender action plan developed, the results of which have been outlined separately. This assessment also integrates the results of the two aforementioned gender assessments. This section provides a baseline that has been integrated into the project's results framework. This analysis integrates the insights acquired from the desk research of relevant literature and consultations with communities and other stakeholders to identify disaster-related risks and strategic opportunities for the project related to the environment and social issues. The initial concept of this proposal was verified with the stakeholders and their insights obtained for strengthening the components.

Table 61± Environmental and Social Risk Screening and Categorization

Checklist of Environmental and social principles	No further assessment for compliance	Potential impacts and risks- further assessment required for compliance	Explanation why principle has been triggered (or not)
<b>Compliance with the Law</b>	X		All project components comply with the law (Feasibility Study Part II)
<b>Access and Equity</b>	X		The project components have integrated a policy approach based on inclusiveness and participation and showcases/pilots.
<b>Marginalized and Vulnerable Groups</b>	X		Several project interventions encompass intrinsic benefits for marginalized and vulnerable groups.
<b>Human Rights</b>	X		The project is in accordance with various human rights principles: the right to shelter; the right to safe housing; the right to participation, the right to use law right to work. It also supports the SDGs: climate change actions (SDG 13), decent employment (SDG8), safe water (SDG 6), gender equality (SDG 5), and resilient settlements (SDG 11)
<b>Gender Equity and Women's Empowerment</b>		X	While the impacts of climate change affected everyone equally, our stakeholders indicated that during natural disasters women, particularly those who were heads of households were affected disproportionately. As such, this project, through enhanced resilience of the coastal communities resilience, will have a positive impact on the lives of women.  The project partners will purposefully seek Gender Equity and Female participation in consultation and project activities. Monitoring of gender-balanced participation and distribution of benefit is crucial. Payscale within the project will be regardless of gender.
<b>Core Labor Rights</b>		X	The project will use – through a contractor- some community labor to do unskilled construction tasks. Appropriate risk mitigation measures are required to ensure that there is no exploitation of people providing their labor to the project.
<b>Involuntary resettlement</b>	X	X	There is no risk of involuntary resettlement arising from the project. However, there may occur temporarily inconvenience by the establishment of the risk reduction measures under component 1.1 & 3. This needs to be monitored and mitigated if necessary.
<b>Indigenous Peoples</b>		x	Dangriga and Hopkins are Garifuna communities. Engagement strategies will be respectful of traditional/indigenous leaders and communities and traditional customs (Free Prior and Informed Consent). The development process for the building codes will include an assessment of the traditional housing structures (cultural heritage) of the Indigenous and Garifuna peoples and their implications for and integration into the housing policy and building codes.
<b>Protection of Natural Habitats</b>		X	While damage to natural habitats and threats to biological diversity are unlikely, there is a possibility that –depended on the selected risk reduction measures- dredging, construction work undertaken or reforestation measures may adversely impact local biodiversity (Component 3). Depending on the selected RRM, an EIA may need to be conducted.
<b>Conservation of Biological Diversity</b>	X		No realistic risks to biological diversity. The AF Project will enhance close collaboration NHS-CZMAI- NHS and integration in ICZMP & guidelines and benefit flora, fauna, and man.
<b>Climate Change</b>	X		This project is inherently an adaptation project and as such, no maladaptation is foreseen.
<b>Pollution Prevention,</b>		X	The project will ensure that waste materials are properly being disposed of. All workers engaged under component 3 will be – through the contractor- informed on proper

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Checklist of Environmental and social principles	No further assessment for compliance	Potential impacts and risks- further assessment required for compliance	Explanation why principle has been triggered (or not)
<b>Resource Efficiency</b>			procedures to dispose of waste materials generated during the construction, to ensure that there is no risk of improper disposal. Monitoring will be required.
<b>Public Health</b>		X	Occupation health and safety training will be monitored for construction works, and necessary safety equipment, such as boots and hard hats will be provided by the contractor.
<b>Physical and Cultural Heritage</b>		X	Although no physical or cultural heritage impacts are foreseen; however, this will have to be reviewed when the activities are being taken place on-site for surrounding influence.
<b>Lands and Soil Conservation</b>		X	The project has no specific geographical target area yet. However, for the location of the weather stations, pilot social house, and risk reduction measures under component 3 further assessment will have to be done about their impacts.

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The monitoring of environmental and social risk will be conducted periodically by the PIU and the EEs. The staff of the PIU will be responsible for the implementation of the environmental and social risk measures through hired consultants/contractors. Member of PIAG along with the PIU will conduct period site supervision and monitoring of the ESMP's implementation. A dedicated Environmental Expert will provide further support for the monitoring of the project activities in adherence to the ESMP and the Environmental and Social Policy of the Adaptation Fund. Training will be provided to the PIU staff to effectively enable the implementation of the ESMP and for the achievement of environmental and social safeguard monitoring responsibility. Direct management responsibility of the ESMP will be under the Project Manager.

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Table 62: Environmental and Social Management Plan

Checklist of Environmental and social principles	Potential impacts and risks Explanation why principle has been triggered (or not)	Environmental and Social impacts and risks / Component	Probability of Risks	Mitigation measures	Mitigation Action Plans	Monitoring Roles and Responsibilities
<b>Compliance with the Law</b>	All project components comply with the law (Feasibility Study Part II)	All Components	Low/No Risk	The project will monitor compliance with international and national laws	Due diligence to ensure compliance with national and international laws	NIE, PIU
<b>Access and Equity</b>	The project components have integrated a policy approach based on inclusiveness and participation and showcases/pilots.	Some groups are disenfranchised by project activities (Components 1, 3, and 4)	Low/No Risk	The project will ensure that men, women, youths and vulnerable groups are engaged effectively	Women, men and vulnerable groups will be given equal opportunities to be engaged under the project.	NIE, EEs and Key Partner Agencies

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Checklist of Environmental and social principles	Potential impacts and risks Explanation why principle has been triggered (or not)	Environmental and Social impacts and risks / Component	Probability of Risks	Mitigation measures	Mitigation Action Plans	Monitoring Roles and Responsibilities
				throughout the life-span of the project.	Project components will not exacerbate existing inequities, particularly with respect to marginalized or vulnerable groups.	
<b>Marginalized and Vulnerable Groups</b>	Several project interventions encompass intrinsic benefits for marginalized and vulnerable groups.	Some groups are disenfranchised by project activities (Components 1, 3, and 4)	Low/Moderate Risk	The project will ensure that men, women, youths and vulnerable groups are engaged effectively throughout the life-span of the project.	The Project will monitor to ensure that the project follows best-practice guidelines for the involvement of marginalized and vulnerable groups.  Project components will not adversely affect marginalized or vulnerable groups.	NIE, EEs and Key Partner Agencies
<b>Human Rights</b>	The project is in accordance with various human rights principles: the right to shelter; the right to safe housing; the right to participation; the right to use law right to work. It also supports the SDGs: climate change actions (SDG 13), decent employment (SDG8), safe water (SDG 6), gender equality (SDG 5), and resilient settlements (SDG 11)	Some human rights may not be respected during implantation (All Components)	Low/No Risk	The project will monitor human rights throughout implementation	Due diligence to ensure compliance with national and international human rights legislations.	NIE, PIU
<b>Gender Equity and Women's Empowerment</b>	While the impacts of climate change affected everyone equally, our stakeholders indicated that during natural disasters women, particularly those who were heads of households were affected disproportionately. As such, this project, through enhanced resilience of the coastal communities resilience, will have a positive impact on the lives of women. The project partners will purposefully seek Gender Equity and Female participation in consultation and project activities. Monitoring of gender-balanced	Not all groups are engaged (Components 1, 2, 3, 4)	Medium	The project will ensure that men, women, youths and vulnerable groups are engaged effectively throughout the life-span of the project.	Women, men and vulnerable groups will be given equal opportunities to be engaged under the project.  The Project will monitor to ensure that the project follows best-practice guidelines for gender-balanced participation.  PACT is an equal opportunity employer and will not discriminate against protected characteristics (gender, age, sexual orientation, race,	NIE and EEs

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Checklist of Environmental and social principles	Potential impacts and risks Explanation why principle has been triggered (or not)	Environmental and Social impacts and risks / Component	Probability of Risks	Mitigation measures	Mitigation Action Plans	Monitoring Roles and Responsibilities
	participation and distribution of benefit is crucial. Payscale within the project will be regardless of gender.				nationality, ethnicity, religion, disability)  NCCCSAP for information-sharing. Community engagement meetings for FPIC and decision-making.	
<b>Core Labor Rights</b>	The project will use – through a contractor- some community labor to do unskilled construction tasks. Appropriate risk mitigation measures are required to ensure that there is no exploitation of people providing their labor to the project.	Labor rights may not be respected when contracting communities (Components 2.2, 3, and 4.1)	Low/No Risk	The project will monitor international and national labor laws for any work that may be carried out concerning the project	All contracts will be reviewed by the Ministry of Labor and the Contractor General to ensure these and the project activities comply with both national law and international standards, including ILO labor standards.	NIE, PIU
<b>Indigenous Peoples</b>	Dangriga and Hopkins are Garifuna communities. Engagement strategies will be respectful of traditional/indigenous leaders and communities and traditional customs (Free Prior and Informed Consent). The development process for the building codes will include an assessment of the traditional housing structures (cultural heritage) of the Indigenous and Garifuna peoples and their implications for and integration into the housing policy and building codes.	The traditional rights of communities not respected (Components 1.1, 1.2 and 3)	Low/Moderate Risk	Engagement strategies will be respectful of traditional/indigenous leaders and communities and traditional customs (Free Prior and Informed Consent). The Maya Peoples and the Government of Belize have established engagement protocols.	Indigenous Communities will be engaged via their respective committees.  Indigenous Committees will also form an integral part of the TAC for project implementation.	NIE, EEs and Key Partner Agencies
<b>Involuntary Resettlement</b>	There is no risk of involuntary resettlement arising from the project. However, there may occur temporarily inconvenience by the establishment of the risk reduction measures under component 1.1 & 3. This needs to be monitored and mitigated if necessary.	Communities affected by erosion can be driven to resettle in other areas if proper climate adaptive measures to reclaim eroded land is not in place.	Low/No Risk	Communities will be fully and regularly briefed on the nature and progress of the establishment of the risk reduction measure before they begin, including the expected duration, the disruption expected, and the grievance mechanism.	All possible alternative to avoid resettlement will be examined under the project, due to loss of land.  Engagement of communities to ensure that information is disseminated in a timeline manner, in order to avoid possible inconveniences.	NIE, EEs and Key Partner Agencies, PIU

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<u>Checklist of Environmental and social principles</u>	<u>Potential impacts and risks Explanation why principle has been triggered (or not)</u>	<u>Environmental and Social impacts and risks / Component</u>	<u>Probability of Risks</u>	<u>Mitigation measures</u>	<u>Mitigation Action Plans</u>	<u>Monitoring Roles and Responsibilities</u>
<b><u>Protection of Natural Habitats</u></b>	While damage to natural habitats and threats to biological diversity are unlikely, there is a possibility that –depended on the selected risk reduction measures- dredging, construction work undertaken or reforestation measures may adversely impact local biodiversity (Component 3). Depending on the selected RRM, an EIA may need to be conducted.	Damage caused to habitat during the sourcing of materials (Component 3)	Low/Moderate Risk	Depending on the selected risk reduction measures under Component 3 the work undertaken may adversely impact local biodiversity. Depending on the selected Risk Reduction Measure, an EIA may need to be conducted. This is a requirement by Belizean law for an infrastructure project with hard coastal protection measures (e.g., Canalization or flood relief works).	Where required national process such as those required under the EIA regulations will be adhered to.  Areas pinpointed as sources for the extraction of materials for project interventions will need to be comprehensively surveyed and approved by the Department of Environment. Alternative sources will be considered.  The project includes community consultation and involvement in identifying and protecting natural habitats. If it is recommended that the Dangriga / Hopkins protection measures consist of mangroves, the mangrove species will be tested for sustainability based on community participation because mangrove species that are not indigenous may affect the existing local ecosystem.	NIE, EEs and Key Partner Agencies, PIU
<b><u>Conservation of Biological Diversity</u></b>	No realistic risks to biological diversity. The AF Project will enhance close collaboration NHS- CZMAI- NHS and integration in ICZMP & guidelines and benefit flora, fauna, and man.	Damage caused to habitat during the sourcing of materials (Component 3)	Low/No Risk	The project will monitor all possible adverse impacts to biodiversity resulting from activities	Project components will be required to comprehensively assess any potential impacts to biodiversity and avoid all activities that would result in harm.	EEs, Key Partner Agencies and PIU
<b><u>Climate Change</u></b>	This project is inherently an adaptation project and as such, no maladaptation is foreseen.	All components	Low/No Risk	The project will monitor all possible climate change impacts resulting from activities	All project activities will be properly examined to avoid maladaptation	EEs, Key Partner Agencies and PIU
<b><u>Pollution Prevention, Resource</u></b>	The project will ensure that waste materials are properly being disposed of. All workers engaged	Pollution resulting from malpractice	Low/No Risk	The project will monitor the utilization of material and their	The contractor(s) will be required to closely monitor the production and disposal of all waste	EEs, Key Partner

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<u>Checklist of Environmental and social principles</u>	<u>Potential impacts and risks</u> <u>Explanation why principle has been triggered (or not)</u>	<u>Environmental and Social impacts and risks / Component</u>	<u>Probability of Risks</u>	<u>Mitigation measures</u>	<u>Mitigation Action Plans</u>	<u>Monitoring Roles and Responsibilities</u>
<u>Efficiency</u>	under component 3 will be – through the contractor- informed on proper procedures to dispose of waste materials generated during the construction, to ensure that there is no risk of improper disposal. Monitoring will be required.	(Component 1.1 3)		disposal in line with national regulations to control pollution and effluent discharge.	materials from the implementation of project components.	Agencies and PIU
<u>Public Health</u>	Occupation health and safety training will be monitored for construction works, and necessary safety equipment, such as boots and hard hats will be provided by the contractor.	A lack of occupational health and safety standards and procedures could result in injuries to workers or community members. (Component 3)	Low/No Risk	The project will monitor health and safety standards for any work that may be carried out concerning the project	The contractor(s) will be required to provide occupation health and safety training, and necessary safety equipment, such as boots and hard hats.	PIU
<u>Physical and Cultural Heritage</u>	Although no physical or cultural heritage impacts are foreseen; however, this will have to be reviewed when the activities are being taken place on-site for surrounding influence.	Damage to physical or cultural heritage resulting from the selection of improper sites (Components Component 1.1, 2.3, 3)	Low/No Risk	The project will carefully select sites for project activities avoiding an damage to physical or cultural heritage.	Areas will be properly surveyed to ensure that there are no physical or cultural heritage in selected sites.  Alternative sites will be selected if original site contains physical or cultural heritage.	EE, and Key Partner Agencies, PIU
<u>Lands and Soil Conservation</u>	The project has no specific geographical target area yet. However, for the location of the weather stations, pilot social house, and risk reduction measures under component 3 further assessment will have to be done about their impacts.	Negative impacts to lands and soils (Component 1.1, 2.3, 3)	Low/Moderate	The project will carefully select sites for project activities in compliance with local legislations and regulations.	All sites identified for project interventions will be properly surveyed and assessed to ensure no damage to land or soil.  Alternative sites will be selected if original site may be damaged significantly.	EEs, Key Partner Agencies, PIU

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Table 6.3.2 Compliance with the ESP part 1 of 5

Project Outcomes	Compliance with the law	Access and equity	Marginalized and vulnerable groups
<b>Component 1. Improving coastal land use for resilient habitation and sectoral activities</b>			
1.1 Development of the National Housing Policy and Building Codes for resilient habitation based on vulnerabilities	Housing and Town Planning Act Ch. 182: Regulation of the use and subdivision of urban and rural lands, considering: (a) in the case of urban land the location and dimensions of the lots, the conditions of accessibility and the supply of public goods and services; (b) in the case of rural lands, water catchment areas, conservation of vegetation, prevention of erosion, easements of public domain lands, among others.	Limited stakeholder buy-in to the implementation of these standards as they raise initial costs of construction. MITIGATION: The pilot social home: Examples of good practices are expected to support the acceptance of building codes and laws.	There are accounts of low-income families in Belize that construct houses that do not comply with the regulations. MITIGATION: The pilot social home: Examples of good practices are expected to support the acceptance of building codes and laws.
1.2 Strengthening the implementation of the Integrated Coastal Zone Management Plan associated management guidelines for zonation	Coastal Zone Management Act Cap 329: Establishes the legal framework for coastal zone management for cross-sectoral integration and coordination of resilience-building management interventions. The plan applies both Ecosystem Services Valuation and Marine Spatial Planning approaches to map, zone, and allocate permissible human uses that promote a balanced mix of conservation and utilization. It examines the tradeoffs of three future management scenarios: Conservation, Development, and Informed Management, and the consequent impacts on key habitats and the delivery of ecosystem benefits.	ICZMP and guidelines help to maintain shoreline access by regulating development in the immediate seafront area.	Setbacks do not protect structures in the buffer area.
<b>Component 2. Coastal Vulnerability Monitoring</b>			
2.1 Strengthening data availability for the development of a national coastal saline intrusion program	National Integrated water resources Act No. 19, 2010: This Act concerns the management and conservation of water resources in Belize. Conservation measures also aim at the prevention of pollution of water resources. The Act establishes the National Integrated Water Resources Authority as a body corporate. It shall enforce the policy of the Government for the orderly and coordinated development and use of Belize's water resources, to conserve and protect such resources for the benefit of present and future generations of Belizeans.		Coastal saline intrusion research enhances the development of coastal areas with lower risk. It might contribute to impoverish the coastal areas with higher risk due to hesitation among investors. MITIGATION: Identification/Promotion of alternative opportunities, e.g. seaweed harvesting The lack of groundwater information, especially in northern Belize, where karstic conditions may promote the leaching of solutes and salinization, leads to difficulty in the management of future water resources under

Project Outcomes	Compliance with the law	Access and equity	Marginalized and vulnerable groups
	and to provide the Belizean public with a safe, adequate and reliable supply of water.		climate change and increases the vulnerability of communities. MITIGATION: Component 2.1 Strengthening data availability.
2.2 <i>Develop and implement a National Beach Erosion Monitoring Program</i>	The establishment of land use guidelines requires good quality data, which is not always available.	If good quality data related to hazards is lacking, the established buffer either provides too little protection or are too restrictive to shoreline development.	
2.3 <i>Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge</i>	Disaster Preparedness and Response Act Chapter 145: Provides for the organization of State actions for the mitigation of, preparedness for, response to, and recovery from disasters in Belize. It includes requirements for public inquiries in the decision-making process of plans, programmes, and policies.	The EWS relies on the available means of communication which is not equally efficient everywhere.	
<b>Component 3. Beach Stabilization of High-Risk Coastal Areas</b>			
3. Beach Stabilization of High-Risk Coastal Areas	Environmental Protection Act Cap 328: The enabling legislation provides the Government with the comprehensive environmental protection authority it needs to address modern environmental pollution problems. The Act grants the Department of the Environment broad regulatory and enforcement authority for the prevention and control of environmental pollution, conservation and management of natural resources, and environmental impact assessment.		Promotion of beach tourism through beach widening.
<b>Component 4. Awareness Raising, Knowledge Dissemination and National Capacity Strengthening</b>			
4.1 <i>Development of a National Climate Change Communication Strategy and Action Plan</i>			A high level of awareness is crucial to enhance cooperation between the government and the public.
4.2 <i>Development of training modules for best coastal adaptation practices</i>		High level of effectiveness due to the availability of manuals and programs, which have been successfully implemented in Belize.	
4.3 <i>Strengthening of GIS capabilities of CZMAI and partners</i>			

Project Outcomes	Compliance with the law	Access and equity	Marginalized and vulnerable groups
OTHER	<p>In December 2019, the Government of Belize voted to implement an indefinite moratorium on all new oil exploration in its waters, to safeguard the marine environment and further promote dive tourism. By doing so, it became one of the first developing countries to turn away from oil and seek to embrace environmentally sustainable development pathways by protecting the ocean environment.</p> <p>Sufficient legal and policy base for the implementation of this project. Nationally Determined Contribution (NDC) presented in 2015 before UNFCCC, the Horizon 2030 Vision (2010-2030), Growth and Sustainable Development Strategy, The National Climate Change Policy, Strategy and Action Plan (NCCPSAP) 2015-2020, and The Integrated Coastal Zone Management Plan (2016).</p>	<p>There is a potential risk of conflict when project engagement is limited to a limited number of people, and questions could rise (why them, not us).</p>	
Mitigation Measures	<p>The project does not carry any realistic risk of failing to comply with the law. All investments will be set up with the consent of the landowner or government agency responsible for the buildings and permits. When and where applicable (e.g. NMS- weather monitoring stations, NCCO – coastal protection) the entities will check the status of the land-use and rights, conduct consultations with the rightsholders and communities and collaboratively identify workable solutions. All required permits will be obtained.</p>	<p>A participatory approach has been integrated into the process design (e.g. coastal advisory committees, community wardens, beach erosion monitoring network, knowledge transfer, data availability) and will be applied throughout the project. By sharing the lessons learned in Dangriga and Hopkins, component 3 will also benefit communities that could not be included under this proposal. By establishing a model social house, with due diligence to IP cultural rights-stakeholders will witness evidence and more will become convinced. ICZMP and guidelines help to maintain shoreline access by regulating development in the immediate seafront area.</p>	<p>The model social house provides a showcase for low-income households. The promotion of alternative livelihood opportunities e.g. sargassum use/farming will have a positive impact on vulnerable stakeholders, as will beach widening, by acting as a catalyst for small and medium local entrepreneurs, and it will also make life in the two Garifuna communities (every man/woman/child/person with a disability/ elderly) somewhat safer from climate hazards. Strengthening data on saline intrusion will enhance business growth and create more employment opportunities. Lastly, a grievance redress mechanism will be in place to address any conflicts that may arise.</p>

Table 6.4.2 Compliance with the ESP part 2 of 5

Project Outcomes	Human rights	Gender equality and women's empowerment	Core labor rights
<b>Component 1. Improving coastal land use for resilient habitation and sectoral activities</b>			
1.1 Development of the National Housing Policy and Building Codes for resilient habitation based on vulnerabilities	Right to shelter: A National Housing Policy with a clear specification for coastal habitation and Building codes with a specification for the coastal zone will help the sustainability of structural integrity and safeguard construction quality and reduce building vulnerability.		The project will use – through a contractor-some community labor to do unskilled construction tasks.
1.2 Strengthening the implementation of the Integrated Coastal Zone Management Plan associated management guidelines for zonation	Erosion rates have increased in Belize. Additionally, land titles were granted before the 66-foot buffer was legally binding. MITIGATION: Intensive communication about the risks of building in the buffer area.		
<b>Component 2. Coastal Vulnerability Monitoring</b>			
2.1 Strengthening data availability for the development of a national coastal saline intrusion program	Coastal saline intrusion research informs water allocation and improves decision making for water resources management.		
2.2 Develop and implement a National Beach Erosion Monitoring Program			
2.3 Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge			Skilled and experienced staff is necessary for EWS development and implementation.
<b>Component 3. Beach Stabilization of High-Risk Coastal Areas</b>			
3. Beach Stabilization of High-Risk Coastal Areas	Right to information: Low public awareness that beach nourishment has a temporary nature needs to be corrected through communications.		The project will use – through a contractor-some community labor to do unskilled construction tasks.
<b>Component 4. Awareness Raising, Knowledge Dissemination and National Capacity Strengthening</b>			
4.1 Development of a National Climate Change Communication Strategy and Action Plan			
4.2 Development of training modules for best coastal adaptation practices			
4.3 Strengthening of GIS capabilities of CZMAI and partners			The implementation of each risk reduction measure requires a high level of technical knowledge that needs to be learned and updated as new technologies are continuously developed. Training enhances the intrinsic capability of the system to generate new skilled professionals.

Project Outcomes	Human rights	Gender equality and women's empowerment	Core labor rights
OTHER		<p>Firstly, women leaders in the communities, Government, and NGOs ensure female participation. Belizean women are increasingly becoming better equipped to undertake the roles that are more academically biased. SECONDLY, this means that they play an important role as decision-makers in the communities. Women participate in micro and small enterprises as entrepreneurs (cooking, handicraft, shops, hairdressers. Etc.), but there is still some undervaluing of women's labor in monetary terms. THIRDLY, there are no gender-specific roles within any of the project components. In that regard, the project provides a host of opportunities for anyone with the requisite training and skill. FOURTHLY, Women in the target villages tended to adhere more closely to the culturally/traditionally assigned gender-specific roles. FOURTHLY, Women in some of the communities want equal standing with men when it comes to land ownership, leadership roles and decision-making. FIFTHLY, It was felt that while the impacts of climate change affected everyone equally, during natural disasters women, particularly those who were heads of households were affected disproportionately. They are tasked with the bulk of the preparation, evacuation coordination, care during the disaster and the post-disaster recovery work that needs to be done. Additionally, because of their role as caregivers, anything that impacted the home or the immediate environment normally placed undue stress on them. The planned activities for the project could be done by</p>	<p>The implementation of each risk reduction measure requires a high level of technical knowledge that needs to be learned and updated as new technologies are continuously developed. Training enhances the intrinsic capability of the system to generate new skilled professionals.</p>

Project Outcomes	Human rights	Gender equality and women's empowerment	Core labor rights
		<p>anyone who was properly trained to carry out the work, particularly the coastal monitoring and flood watch because they were mostly at home in the community. IN CONCLUSION, the result of the analysis suggests that in most communities, women prefer not to assume what are considered to be non-traditional roles. Culturally, gender roles have been clearly defined over time and most communities prefer to keep it that way. However, in communities where there were younger women who attended school up to the tertiary level, they expected that there would be a greater role for women to play in the project.</p> <p>IMPLICATIONS FOR THE PROJECT, The results of the community consultations indicate that participants were supportive of the project and felt that the proposed activities were beneficial to coastal communities. It was felt that all of the activities could be considered gender-neutral and would not adversely impact one gender, ethnic group, or demographic over the other. The project was seen as providing opportunities for communities to become more involved with the adaptation to climate change and sea-level rise. The request for increased consultation and participation is an implementation detail that should be addressed with the understanding that there are clear gender based roles within these communities that are slowly changing with the increased access to education by young women and girls</p>	
mitigation Measures	The project is in accordance with various human rights principles: the right to shelter; the right to safe housing; the right to participation, the right	in most communities, women prefer not to assume what are considered to be non-traditional roles. Culturally,	Appropriate risk mitigation measures are required to ensure that there is no exploitation of people providing their labor to the



Project Outcomes	Human rights	Gender equality and women's empowerment	Core labor rights
	to use law right to work. It also supports the SDGs: climate change actions (SDG 13), decent employment (SDG8), safe water (SDG 6), gender equality (SDG 5), and resilient settlements (SDG 11).	gender roles have been clearly defined over time and most communities prefer to keep it that way. However, in communities where there were younger women who attended school up to the tertiary level, they expected that there would be a greater role for women to play in the project. Payscale within the project will be regardless of gender. Women will be encouraged to apply for project jobs.	project. Additionally, The implementation of each risk reduction measure requires a high level of technical knowledge that needs to be learned and updated as new technologies are continuously developed. Training enhances the intrinsic capability of the system to generate new skilled professionals.

Table 654 Compliance with the ESP part 3 of 5

Project Outcomes	Indigenous people	Involuntary resettlement	Protection of Natural Habitats
<b>Component 1. Improving coastal land use for resilient habitation and sectoral activities</b>			
<i>1.1 Development of the National Housing Policy and Building Codes for resilient habitation based on vulnerabilities</i>	Building codes may not comply with cultural heritage designs. MITIGATION: An assessment of the traditional housing structures (cultural heritage) of the Indigenous and Garifuna peoples and their implications for and integration into the housing policy and building codes.		
<i>1.2 Strengthening the implementation of the Integrated Coastal Zone Management Plan associated management guidelines for zonation</i>		Existing structures are usually permitted to stay within the buffer area. If existing structures are significantly damaged or destroyed, they are to be reconstructed in line with the new regulation. Project will NOT result in involuntary resettlement. Land use regulations are widely used globally and also used nationally (e.g. Punta Negra, Dangriga), but are currently moderately enforced in Belize.	ICZMP and guidelines help to sustain the natural appearance of the coastline and protect natural shoreline dynamics.
<b>Component 2. Coastal Vulnerability Monitoring</b>			
<i>2.1 Strengthening data availability for the development of a national coastal saline intrusion program</i>			
<i>2.2 Develop and implement a National Beach Erosion Monitoring Program</i>			
<i>2.3 Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge</i>			
<b>Component 3. Beach Stabilization of High-Risk Coastal Areas</b>			

Project Outcomes	Indigenous people	Involuntary resettlement	Protection of Natural Habitats
3. Beach Stabilization of High-Risk Coastal Areas	There is also a potential risk of failure if traditional leaders in the Garifuna communities (Dangriga and Hopkins) are not engaged.		Damage of seafloor with potentially high ecological value in the dredging area. Construction work also has risks MITIGATION: Conduct EIA.
<b>Component 4. Awareness Raising, Knowledge Dissemination and National Capacity Strengthening</b>			
4.1 Development of a National Climate Change Communication Strategy and Action Plan	Communication actions in indigenous communities according to a rights-based approach can come at a high cost. MITIGATION: Proper cost planning and continue to respect indigenous FPIC rights		
4.2 Development of training modules for best coastal adaptation practices			
4.3 Strengthening of GIS capabilities of CZMAI and partners			
OTHER			Anthropogenic causes in Dangriga and Hopkins (e.g. river mining)
Mitigation Measures	The development process for the building codes will include an assessment of the traditional housing structures (cultural heritage) of the Indigenous and Garifuna peoples and their implications for and integration into the housing policy and building codes. Communication and engagement with indigenous leaders needs to occur in accordance with FPIC protocols.	There is no risk of involuntary resettlement arising from the project. However, there may occur temporarily inconvenience by the establishment of the risk reduction measures under component 1.1 & 3. This needs to be monitored and mitigated if necessary.	An EIA may need to be conducted depending on the recommended RRM under component 3.

Table 665 Compliance with the ESP part 4 of 5

Project Outcomes	Conservation of biological diversity	Climate change	Pollution prevention and resource efficiency
<b>Component 1. Improving coastal land use for resilient habitation and sectoral activities</b>			
1.1 Development of the National Housing Policy and Building Codes for resilient habitation based on vulnerabilities			
1.2 Strengthening the implementation of the Integrated Coastal Zone Management Plan associated management guidelines for zonation	Wide beaches protect against coastal flooding and erosion, they are a valuable coastal habitat for many highly specialized plants and animals.	ICZM is an effective method & low-cost alternative to minimize property damage due to coastal flooding and erosion.	
<b>Component 2. Coastal Vulnerability Monitoring</b>			

Project Outcomes	Conservation of biological diversity	Climate change	Pollution prevention and resource efficiency
2.1 Strengthening data availability for the development of a national coastal saline intrusion program	Coastal saline intrusion does not reduce the hazard risk by itself. Without proper mitigation measures, the information is useless. MITIGATION: AF Project with close collaboration NHS-CZMAI and integration in ICZMP & guidelines		
2.2 Develop and implement a National Beach Erosion Monitoring Program	Early erosion detection and the maintenance of ecosystems retain the ecological value of the beaches.		The improvement of beach areas at a lower cost. Without an early erosion detection program, maintenance of beach width is likely limited to the availability of large volumes of sand.
2.3 Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge	An EWS is useful for many purposes e.g. to inform coastal works, fishing, and navigation.	The EWS alone does not reduce the hazard impacts. Its effectiveness depends on the public's responses, on the coordination between local communities and state agencies, and intergovernmental coordination.	
<b>Component 3. Beach Stabilization of High-Risk Coastal Areas</b>			
3. Beach Stabilization of High-Risk Coastal Areas			Disposal option for maintenance dredging of harbors and channels
<b>Component 4. Awareness Raising, Knowledge Dissemination and National Capacity Strengthening</b>			
4.1 Development of a National Climate Change Communication Strategy and Action Plan			
4.2 Development of training modules for best coastal adaptation practices			Training has a relatively low cost when incorporated into a formal education curriculum.
4.3 Strengthening of GIS capabilities of CZMAI and partners			
OTHER			The project will ensure that waste materials are properly being disposed of.
Mitigation Measures	The AF Project will enhance close collaboration NHS-CZMAI- NHS and integration in ICZMP & guidelines and benefit flora, fauna, and man.	ICZM is an effective method & low-cost alternative to minimize property damage due to coastal flooding and erosion.	The project will ensure that waste materials are properly being disposed of.

Table 676 Compliance with the ESP part 5 of 5

Project Outcomes	Public Health	Physical and cultural heritage	Land and soil conservation
<b>Component 1. Improving coastal land use for resilient habitation and sectoral activities</b>			
1.1 Development of the National Housing Policy and Building Codes for resilient habitation based on vulnerabilities	Building codes outline standard requirements for commercial, industrial, and residential structures design and construction according to an acceptable safety level.		
1.2 Strengthening the implementation of the Integrated Coastal Zone Management Plan associated management guidelines for zonation			Well-maintained coastal structures and wide beaches, as well as healthy mangroves effectively prevent coastal erosion and flooding.
<b>Component 2. Coastal Vulnerability Monitoring</b>			
2.1 Strengthening data availability for the development of a national coastal saline intrusion program		Saline intrusion monitoring reduces the risk of damage to properties.	A basic tool for Integrated Coastal Zone Management and it strengthens other planning and prevention measures (establishing production zones, tourist facilities, water resource management, agricultural planting decisions) and preparedness measures (early warning systems, emergency and contingency plans).
2.2 Develop and implement a National Beach Erosion Monitoring Program		Beach erosion monitoring reduces the risk of damages to assets.	
2.3 Building the infrastructural capacity of the NMS to develop a coastal early warning system and model storm surge	EWS minimizes losses particularly human lives. It improves the timing and efficiency of some flood control measures (e.g. storm surge barriers, temporary flood defenses, sandbags) and promotes timely evacuation. The EWS might encourage the development of areas-at-risk where the system is implemented. MITIGATION: Communicate about the existing risks despite this RRM.	EWS is a preparedness measure that reduces the damages related to coastal flooding and storm surge.	
<b>Component 3. Beach Stabilization of High-Risk Coastal Areas</b>			
3. Beach Stabilization of High-Risk Coastal Areas			Sand re-nourishment protects the area at the back of the renourishment against coastal flooding and erosion. However, the renourished area usually continues to be vulnerable to coastal flooding and erosion. MITIGATION: Maintenance Plan.

Project Outcomes	Public Health	Physical and cultural heritage	Land and soil conservation
<b>Component 4. Awareness Raising, Knowledge Dissemination and National Capacity Strengthening</b>			
<i>4.1 Development of a National Climate Change Communication Strategy and Action Plan</i>			
<i>4.2 Development of training modules for best coastal adaptation practices</i>			
<i>4.3 Strengthening of GIS capabilities of CZMAI and partners</i>			
OTHER	A lack of occupational health and safety standards and procedures could result in injuries to workers or community members		
Mitigation Measures	Occupation health and safety training will be monitored for construction works, and necessary safety equipment, such as boots and hard hats will be provided by the contractor.	Component 2 reduces the risk of damages to assets.	The ICZM and guidelines promote land soil conservation. The project has no specific geographical target area yet. However, for the location of the weather stations, pilot social house, and risk reduction measures under component 3 further assessment will have to be done about their impacts.