Prepared with support from
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**Introduction**

Adaptation is a critical element of Jamaica’s action on climate change. This is especially relevant with the growing effects of climate change, evidenced in increased average temperatures, changes in rainfall patterns, rising sea levels and more extreme hydrometeorological events. This must be addressed comprehensively and in a sustainable manner for the country’s development aspirations to become a reality, and for Jamaica to fulfil its vision to be “the place of choice to live, work, raise families and do business”.

Jamaica’s growth and prosperity rely on enhanced resilience and capacity to adapt to climate change as aptly captured in the Vision Statement of the draft Climate Change Policy Framework 2022:

> “Jamaica achieves its goals of growth and prosperity for its people while meeting the challenges of climate change as a country with enhanced resilience and capacity to adapt to the impacts and to mitigate the causes of climate change.”

Jamaica’s AdCom is prepared so as to contribute to the technical assessment that will inform the First Global Stocktake (GST) of the Paris Agreement scheduled for completion in 2023. The GST will “take stock of the implementation of [the] Paris Agreement”, and particularly, progress in achieving its purpose and long-term goal. With Jamaica being Party to the Paris Agreement since 2017, the AdCom represents an opportunity to communicate progress in adaptation action, and critically, highlight the gaps that remain in adaptation finance, technical capacity, and technology. This will enhance recognition of Jamaica’s progress in adaptation action and the gaps that constrain adaptation action and addressing limits to adaptation.

Jamaica’s first Adaptation Communication (AdCom) will complement and support national progress on adaptation action. It will be used as a basis for “coherent and enhanced support” for adaptation action that is to be provided to developing countries (Article 7, para 13 of the Paris Agreement) by highlighting some of Jamaica’s current and projected adaptation priorities as well as, implementation and support needs. The AdCom will continue to elevate the importance of adaptation, catalysing wider incorporation of climate change considerations in national and sectoral development polices, strategies, and programmes. It will provide an important opportunity to highlight loss and damage, particularly as the implications of the limits to effective adaptation are clearly recognised as growing threats to sustainable national development.

As we stand on the decision threshold that will determine the quality of life for future generations, it is the hope of the Government of Jamaica that this AdCom will lend its weight to the contributions made by other countries, to provide impetus for taking stronger action globally to scale up adaptation finance while making significant reductions in greenhouse gas emissions to limit the temperature increase to 1.5 °C target as per Article 2a of the Paris Agreement.

**National Circumstances**

**Geography and Geology**

Jamaica is located in the Caribbean region at latitude 18° North and 77° West. Its topography is comprised of coastal and inland plains as well as a rugged interior which extend across the island from east to west. The majority of the island is composed of white limestone bedrock which facilitates the transportation and storage of rainwater, whether through surface flows or underground channels. Groundwater sources contribute an estimated 84% of the island’s local water supply. Replenishment of surface and underground freshwater resources are usually dependent on consistent rainfall patterns and seasonality. Hence, low periods of rainfall result in reduced surface flow and affect water availability. Other sections of the island consist of volcanic and cretaceous deposits, as well as alluvium and yellow limestone. The island’s rugged interior also dictates the organization of human settlements, critical infrastructure, and economic activities along the coastline (approximately 1,022 kilometres). These are generally exposed to storm surges, and coastal inundation. As a Small Island Developing State (SIDS), Jamaica is classified among the most vulnerable to hydro-meteorological hazards such as droughts, hurricanes, floods, landslides, and tropical depressions, etc. Generally, this heightened sensitivity to climatic hazards is due to the island’s location within the hurricane belt of the north Atlantic region, its small size and
rugged topography.

Climate Variability and Change
For Jamaica, dependence on the predictability and consistency of the climate is a significant element in the fabric of its existence and economic and social development. Variability and change in the climate system often disrupt and threaten the country’s key socio-economic and environmental sectors and by extension, its ability to achieve development targets. According to Mora et al. (2013), tropical regions like Jamaica are expected to experience climate departures an estimated 15 years earlier than other parts of the world. It is projected that Jamaica will experience climate departure by 2023. Downscaled climate projections produced nationally (such as the State of the Jamaican Climate 2019) plus global climate models show that variability and change will continue in the short to long terms, with various parts of the country experiencing varying degrees of change. As an example, eastern parishes which typically received the highest volumes of annual rainfall are expected to see a drying trend.

Environment
Often described at the ‘land of wood and water’, Jamaica hosts a rich natural environment. It has a dense riverine system, the majority of which originate from the hilly interior and flow in a northerly or southerly direction — except the Plantain Garden River which flows in an easterly direction. There are 10 Hydrological Basins which accommodate 26 watershed management units. These are managed as areas providing key sources of water for domestic use and environmental purposes. The island’s physical topography and micro-climates accommodate a wide range of flora and fauna, several of which are endemic to the island (500 endemic species of snails, 31 endemic birds, over 900 endemic plant species etc.) (STATIN 2017). The coastal zone also supports diverse habitats including wetlands, mangroves, coral reefs, and offshore cays. Both terrestrial and marine environments provide ecosystem services that are crucial the island’s economy and livelihoods, some of which includes the protection of coastlines, source of food, income, and support to coastal fishing communities.

Population
Jamaica’s total population at the end of 2020 was estimated at 2,735,400 of which 50.6% (1,384,100) were females and 49.4% (1,351,300) were males (PIOJ 2021). Data revealed a rising dependent elderly age group (65+ years) which accounted for an estimated 13.9% of the total population, increasing from 12.4% in 2017. Characteristically dominated by women (52.4%), the elderly population has been projected to double by 2050, while the child population will continue to decline. The island continues to host a relatively large working age population (15–64 years), accounting for 69.4% of the total population. Men tend to dominate a greater share of the total labour force. Their participation rate is also markedly higher where in 2019 it was recorded at 71% in comparison to 58.5% for women (PIOJ 2021). However, this was impacted by the COVID-19 pandemic, resulting in a labour force contraction of 2.4%. With regards to the spatial distribution of the population, 54% of Jamaicans reside in urban areas. This is projected to increase to 57.7% by 2025 (PIOJ 2019). The island’s rural areas often feature higher poverty levels (PIOJ 2017, Carby 2012). This may be due to low incomes, limited opportunities linked to poor rural development, low educational levels, among others. Between 2012 and 2015, the national poverty prevalence increased from 19.9% to 21.2%, affecting vulnerable groups such as women, children, youth, elderly, and the disabled (PIOJ 2017).

Economy
Jamaica is classified as an upper middle-income country. Various fiscal measures have been pursued over the years to address consistently low GDP growth and high levels of public debt. In the last decade, government policy through cooperation with international financial agencies has successfully reduced debt and prompted an economic turnaround. However, the impact of the COVID-19 pandemic has eroded some of the gains; the real GDP for 2020 was estimated to have contracted by 9.9% (PIOJ 2021). Nevertheless, Jamaica’s economy is expected to rebound to some degree (barring significant shocks), including through key economic sectors such as tourism and agriculture. Tourism is one of the country’s largest sources of foreign exchange, where in 2019 it represented 31% of the island’s total economic GDP (Collister 2020). According to the IDB’s Tourism Dependency Index, Jamaica ranks as the 13th most tourism-dependent economy in the
world. The agriculture sector remains a key sector in the employment of the labour force, promotion of exports, food security, establishing self-sufficiency and the sustaining rural livelihoods. Strategies such as strengthening and diversifying production systems, technological innovation and investment in value chain development are required. The nation’s narrow production base and dependence on extractive and climate-sensitive sectors makes it vulnerable to disruptions associated with external economic and climatic shocks.

Climate Threats
In recent decades, the island has experienced the impacts – directly and indirectly – of more intense storms and hurricanes, including at category strengths 4 and 5, while floods and droughts have increased in frequency since the 2000s. The island’s rainfall pattern remains affected by tropical storms, hurricanes, frontal systems, and troughs, which often produce sustained rainfall. Furthermore, the occurrence of flood events has mirrored the island’s bimodal rainfall pattern with the majority of floods occurring in the late rainy season. There has also been an increased frequency of seasonal drought events (short-term) compared to perennial drought periods. The coastal zone has been more prone to the effects of both.

Downscaled climate projections for Jamaica as documented in the State of the Jamaican Climate 2019¹ show that these observed trends will continue and worsen. Regardless of the development trajectory and consequent rate of increase of greenhouse gas (GHG) emissions, temperatures will increase. A drying trend is expected, especially from the mid-2030s, with spatial variations such that the south and east of the country will experience the highest decreases in precipitation. The east, particularly the parish of Portland, historically receives the highest volume of rainfall for the country. This shift towards dryer conditions will therefore have significant consequences for socio-economic activities. There will also be a continued rise in sea levels and the threats from stronger storms (categories 3 and higher) that will impact the entire coastline.

Coherence and Synergies in the Governance Landscape
Vision 2030 Jamaica – National Development Plan
The Vision 2030 Jamaica-National Development Plan defines the country’s long-term strategic development goals towards an inclusive, sustainable, and prosperous future for its people. The guiding principles of this development plan is anchored by its National Vision Statement: “Jamaica, the place of choice to live, work, raise families and do business”. It rests on four strategic social, economic, and environmental goals that are the basis on which development targets will be realised. The 4th National Goal “Jamaica has a healthy natural environment” is actualised through three interrelated National Outcomes; the sustainable management of the environment and natural resources, hazard risk reduction (HRR) and adaptation to climate change (CCA), and sustainable urban and rural development.

Medium Term Socio-Economic Policy Framework (MTF) reports evaluate and report on the implementation of prioritized policies, strategies, projects, and programmes, over successive three-year planning periods, until 2030. Each MTF is informed by a robust results-based monitoring and evaluation mechanism that tracks the performance of established development targets.

Vision 2030 Jamaica—National Development Plan, the Medium-Term Socio-Economic Policy Framework (MTF) and sectorial policies are strongly aligned with the Sustainable Development Goals (SDGs). The National Development Plan articulates either a full or partial alignment, with 91% of the 115 SDG targets considered applicable to the country.

Established Institutional arrangements t supports the provision of strategic guidance on, and implementation of, Vision 2030 Jamaica. Among them is the Hazard Risk Reduction and Adaptation to Climate Change (HRRCC) Technical Working

Group (TWG). The TWG members represent the government, civil society, private sector, academia, and the International Development community. At present, the TWG is co-chaired by the Climate Change Division and the Office of Disaster Preparedness and Emergency Management (ODPEM).

The Climate Change Policy Framework for Jamaica, 2015

The National Climate Change Policy was developed through an inclusive, consultative process. It was developed in alignment with Vision 2030 Jamaica and informed by various policy-relevant reports and research, including Jamaica’s Second National Communication on Climate Change to the United Nations Framework Convention on Climate Change (UNFCCC)\(^2\). The Climate Change Policy Framework seeks to, *inter alia*, create a sustainable enabling environment to facilitate the development, coordination, and implementation of measures to address the impacts of climate change; and to assign responsibility for the achievement of national climate change policy goals to a designated implementing entity, the Climate Change Division. The Policy defines the performance criteria and standards by which the implementing entity will be assessed. Institutional arrangements established and supported under the Policy include the Climate Change Division, the Climate Change Advisory Board, and the Climate Change Focal Point Network. The policy is being updated.

Institutional Framework Enabling Climate Change Adaptation Planning

The Climate Change Division (CCD) in Jamaica was established in 2013. It has strategic responsibility for putting in place a mechanism to facilitate and foster integration of climate change responses in the development of policies, plans and actions across sectors and all levels of society. The CCD is also responsible for the implementation of the Climate Change Policy Framework which includes forging strategic partnerships and facilitating resource mobilization that are essential for success.

The **Climate Change Advisory Board** (CCAB) consisting of representatives from academic institutions, civil society organizations, youth and relevant government ministries, departments, and agencies, duly approved by the Cabinet. Their main role is to provide advice to the Government of Jamaica on issues relating to climate change through the Minister with responsibility for climate change and annual reports to the Cabinet of Jamaica (Mahlung 2021, 26). The CCD is the Secretariat for the CCAB.

The integration and mainstreaming of climate change across sectors is one of the main functions of the **Climate Change Focal Points**. It is currently comprised of duly nominated representatives from government ministries, departments, and agencies. The focal points are charged with the responsibility of ensuring that climate change considerations are considered in the development and implementation of their respective sectoral strategies and actions, polices, plans, and programmes. The CCD is the Secretariat for the Network, and facilitates its functioning through, *inter alia*, meetings, training and capacity building sessions, and study tours.

Various institutions and actors contribute to climate action and therefore are key players in the institutional arrangements. Among them is the **Planning Institute of Jamaica (PIOJ)**, strategically responsible for national policy coordination, development planning and implementation\(^3\). The PIOJ was established specifically to strengthen the planning capability of the Government and to initiate and coordinate the development of policies, plans and programmes for the sustainable development of Jamaica. The PIOJ has, and continues to play a critical, strategic, coordinating and enabling role in climate change adaptation planning and capacity development through the execution of large climate change programmes and projects, maintaining a registry of all climate change projects and programmes implemented in Jamaica, and coordinating the monitoring and evaluating their implementation. Important also is the PIOJ’s role as the host of the Vision 2030 Jamaica Secretariat and a focal point for the Sustainable Develop Goals.

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\(^2\) The Climate Change Policy Framework was prepared under a GoJ/EU/UNEP Climate Change Adaptation and Disaster Risk Reduction (CCADRR) Project.

National Adaptation Plan (NAP)⁴

Jamaica is in the preliminary stages of developing its first NAP, having received approved financial resources from the Green Climate Fund (GCF) readiness and preparatory support programme, in April 2021. The overall goal of the NAP project is to develop an inclusive, systematic, and participatory national adaptation planning and implementation framework for Jamaica by 2025.

The NAP preparation process will be used to advance Jamaica’s national adaptation planning framework, building on existing governance and coordination mechanisms, strengthening capacities of sectors, and enhancing institutions already putting appropriate systems in place to monitor and evaluate adaptation benefits. As a complement to the NAP, a financing strategy and investment plan as well as a private sector engagement strategy will be developed.

Nationally Determined Contribution

Jamaica’s updated National Determined Contribution (NDC) was submitted to the UNFCCC in June 2020⁵. The update provided for a more economy-wide approach to reducing greenhouse gas emissions and enhancing sinks. This includes a focus on the energy and land use sectors (including forestry). Important also is the inclusion of adaptation co-benefits of these measures. In October 2021, Jamaica’s NDC Implementation Plan was launched. It sets the framework for support to be provided and consequently, the adaptation co-benefits to be realised.

Long term strategy – adaptation resilience

Long-term strategy for Low Carbon Emissions and Climate Resilient Development (LTS) will be developed with consideration of both mitigation and adaptation options. Through its LTS, the GOJ will develop a more robust climate change strategy that considers options for both mitigation and adaptation together in an integrated long-term planning framework to 2050. Based on the projections of future hazards, the LTS Report will offer short and long-term adaptation and mitigation recommendations for, inter alia, energy, industry, transport, environment, infrastructure, agriculture, forestry, tourism, health, and housing. It will also include possible institutional framework and technical support that will be necessary to implement the strategy.

Disaster Risk Reduction

At the international level, climate change adaptation is considered in national disaster risk reduction strategies as part of the guidance provided by the Sendai Framework for Disaster Risk Reduction (2015 – 2030). At the national level, Jamaica’s Office for Disaster Prevention and Emergency Management (ODPEM) has collaborated with the Caribbean Disaster Emergency management Agency (CDEMA) to incorporate climate change considerations into Jamaica’s national comprehensive disaster management (CDM) country work programme.⁶ The Government of Jamaica is taking steps to ensure that the synergy between national disaster risk management and climate change adaptation mandates continues and is updated and strengthened to reflect the priorities of the Sendai Framework for resilient and sustainable development institutional arrangements.

Regional Climate Change Plans

At the regional (Caribbean) level, a series of strategically designed initiatives has provided support for the development of long-term, strategic, capabilities for the implementation of the Caribbean’s vision of resilient development in the face of climate variability and change. The Caribbean Community Climate Change Centre (CCCCC) was established as an

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⁵ https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Jamaica_First/Updated_NDC_Jamaica_-_ICTU_Guidance.pdf
articulated network of centres of excellence, facilitating the enhancement of the capabilities of organisations to contribute to national and regional efforts in climate change adaptation planning. The origins include, *inter alia*, the University of the West Indies Climate Studies Group Mona (Jamaica Campus) and Computer Centre (Barbados Campus), the Caribbean Institute of Meteorology and Hydrology, the Caribbean Agricultural Research & Development Institute, INSMET (Cuba), and the Caribbean Public Health Agency. Jamaica currently serve as chairs the Board of Governors of the CCCCC.

**Other Considerations**

Though the AdCom is focused on climate change adaptation, the relationship between climate change and disaster risk management (DRM) should not be overlooked. Their connection has been particularly evident in designing national and regional intervention policies, investment portfolios and methodological frameworks used to shape decision making processes and mainstream resilience packages. The relationship of the two area presents an opportunity for maximizing resources and improving efficiency in action.

The GOJ has committed to the 2005 Hyogo Framework for Action from the UN Conference on Disaster Reduction, and the CDERA Action Plan, both of which seek to mainstream gender into disaster risk management policies and programmes. Moreover, the 2011 National Policy for Gender Equality acknowledged the need to minimize the differential effects of climate change and natural disasters on gender by actively involving women in various levels of environmental decisionmaking, as well as integrating gender concerns and perspectives in policies and programmes.

Similarly, Jamaica’s Third National Communication to the UNFCCC (TNC) recommended the establishment of a registry and data management system to facilitate the collection of sex – disaggregated data, to help ensure that the gender dynamic can be supported with more data, as well as to inform decision-making and policymaking in responding to climate change impacts (GOJ 2018, 13 and 45). More recently, the Green Climate Fund, through its readiness programme, approved resources to support the “Facilitating a gender responsive approach to climate change adaptation and mitigation in Jamaica” project⁸. In summary, the project is building on work already being pursued, to better integrate gender through assessments, strengthening dialogues among gender and climate change focal points, and preparation of a Gender and Climate Change Strategy and Action Plan.

Jamaica launched its Climate Change Research and Technology Development Agenda in July 2021. It is the first formalized agenda that outlines the roadmap for research and technology to support the NDC and selected adaptation priorities. Its implementation will address problems related to climate variability and change, and to consolidate, streamline, and expand on previously implemented climate actions. Other key research areas include *inter alia*: (a) the ongoing development and refinement of the capabilities of the Climate Studies Group Mona (CSGM) in downscaling climate change projections to guide Jamaica’s climate policy, planning, and adaptation decisions; (b) establishing a high-performance computing and storage system for climate modelling to facilitate the processing of ‘big data’ for Jamaica and the small island states (SIDS) in the Caribbean, and (c) the expansion of the national real-time data collection system of rain gauges, stream gauges, and sea level tide gauges, and automatic weather stations for enhanced data collection/research and the operation of effective hydro-meteorological early warning systems.

Within the wider UNFCCC and Paris Agreement transparency and reporting system, Jamaica has successfully submitted the following:

- First⁹, Second¹⁰ and Third¹¹ National Communications

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⁹ https://unfccc.int/sites/default/files/resource/Jamaica%20INC_0.pdf
¹⁰ https://unfccc.int/sites/default/files/resource/snc2_Jamaica.pdf
¹¹ https://www4.unfccc.int/sites/SubmissionsStaging/NationalReports/Documents/578491_Jamaica-NC3-1-TNC_Final_December132018.pdf
National Communications have been valuable resources for Jamaica, providing data and information on the impact of climate change on various aspects of society and selected vulnerable sectors. Work is underway to prepare the fourth national communication and second BUR. As previously stated, a NAP is also being prepared. With sufficient support, Jamaica will continue to improve on its transparency reporting including the biennial transparency reports (BTRs) which are required starting in 2024.

**Impact, Risk and Vulnerabilities**

As a climate-sensitive country, Jamaica’s social and economic sectors are highly susceptible to extreme hydro-meteorological events such as storms, hurricanes, flooding, coastal inundation, saltwater intrusion, and droughts. This often leads to the damage of infrastructure, the disruption of livelihoods, decreased economic output, loss of production systems and the disruption of social services such as access to water for sanitation and hygiene. Due to their vulnerability and risk to climatic impacts, the sectors listed below were selected as areas of priority for the AdCom. Jamaica’s National Communications have also acknowledged these sectors as critical for Jamaica’s growth and development strategy, as well as highlighted the need to address the severe disruption and major threats posed by climate change. Therefore, adaptation planning at the local, national, and sectoral levels is an attempt to reduce the vulnerability of sectors, communities, and social and economic assets to climate impacts, while facilitating the social and economic development essential to national growth and survival.

**Tourism**

As a climate-sensitive sector, changing climatic conditions are expected to have significantly adverse impacts on the tourism industry. Considering that the island’s coastline is densely populated with hotels and tourist facilities, it is estimated that “a 1 m. rise in seal level will impact about 8% of major resorts in Jamaica, while a 2m rise will have an impact on 18% of these resorts” (ODPEM 2015). These buildings and infrastructure are also highly exposed to the impacts of hydro-meteorological events such as tropical storms, and hurricanes. Projected to increase in frequency and intensity, these events threaten tourist facilities and the wider sector through various physical, social, environmental, and economic impacts.

**Agriculture and Fisheries**

The island’s agriculture sector is extremely sensitive and vulnerable to climate change. It is a key socio-economic sector, contributing 7.8% of GDP (PIOJ 2021) and accounting for some 16% of the labour force (STATIN 2021). Increasingly, growth experienced in the sector is sometimes eroded by the impacts of extreme hydro-meteorological events, including storms and drought that result in crop losses and a decline. In 2019, for example, a few thousand farmers lost crops directly due to drought as well as fires exacerbated by drought conditions13. The damage and loss in the agriculture sector continues to be significant, jeopardizing livelihoods, economic returns, and production growth.

Changing climate is expected to further exacerbate declines in the fisheries sector, impacting livelihoods, as well as the location, abundance, and availability of fishable resources. The projected increase in the frequency and intensity of storms and hurricanes will adversely affect fisheries infrastructure and equipment, fish stocks, and fishing habitats. Coastal fishing communities will become increasingly vulnerable to storm surges, beach erosion, coastline retreat and coastal inundation.

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12 https://unfccc.int/documents/180654
13 Economic and Social Survey Jamaica, 2019
Health

“The Jamaican health system and economy are susceptible to the direct and indirect effects of climate change” (WHO 2017). Over the last decade, the island has been impacted by intense tropical storms and hurricanes causing loss of life through flooding and landslides. Critical health facilities are situated along the coastline, thus increasing their vulnerability and exposure to infrastructural damage from strong winds, heavy rains, and flooding. Efforts are underway to shore-up the health system and infrastructure through training, retrofits and awareness raising programmes, among others. However, significant gaps remain in these areas and others such as the collection and use of applicable data and information for the sector.

Water, Sanitation and Hygiene

Jamaica’s local water resources are expected to be significantly impacted by changing climatic conditions. The island has already been experiencing increased variable rainfall, prolonged drought conditions, increased evapotranspiration, and saline contamination of groundwater resources; all leading to a decline in the supply and distribution of water across rural and urban landscapes (CSGM 2017; GOJ 2015a). Hence, communities are often affected by water lock-offs or the intermittent provision of water service due to increasingly frequent dry spells and drought conditions (GOJ 2019a, 9). In periods of heavy rainfall events, the sector has also been affected by high levels of siltation and damage to pipelines.

Natural Resource (terrestrial, coastal, and marine, biodiversity)

Jamaica’s economy and the social wellbeing of its citizens is dependent on, and is mediated by, the state and condition of its limited endowment of natural resources. This heavy dependence on finite natural resources means that the impact of climate change can adversely affect the quality and quantity of natural resources on which other sectors, communities, or society depend. It is for this reason that efforts to adapt to climate change include, and take cognisance of these resources, particularly noting the pressures of the changing climate and potential thresholds and tipping points that are yet to be fully understood. It is in this context that natural resources have been treated in this summary report as a separate thematic sector in its own right.

The degradation of ecosystems and natural habitats increases their susceptibility to changes in climatic conditions such as higher air and sea surface temperatures, more intense storms and hurricanes, droughts, floods, ocean acidification, and sea-level rise. This will result in further losses of biodiversity and ecosystem services. Rising temperatures are projected to affect reproduction of sea turtles since sex is determined by temperature; coral reef bleaching reduces their ability to withstand impacts of extreme events and also leads to habitat loss for reef fish and their eventual decline.

Human Settlements and Infrastructure

Most of Jamaica’s major towns, cities, housing, and key infrastructures are concentrated on the coastline. Between 2011 and 2015, residence in coastal communities and/or within 5km of the coastline increased from 60% to 82% (GOJ 2015a; World Bank 2011). The Human Settlement and Infrastructure sector usually suffers from extensive loss and damage during extreme hydro-meteorological events. In 2004, an estimated 14% of the country’s housing stock was significantly damaged by Hurricane Ivan, with loss and damage being valued at JMD$11,163 million (PIOJ 2004). Informal settlements characteristically occupy high risk and/or disaster-prone areas in rural, urban, and coastal areas. Approximately 55% of informal settlements are located on flood plains and along the coast; 17% are located on moderate slopes, while 6% occupy very steep slopes (GOJ 2019b). Extreme hydro-meteorological events heighten the probability of individuals being displaced, communities being isolated by landslides, floods, and the destruction of transportation infrastructure.

Energy

The impacts of changing climatic conditions can adversely affect energy supply and distribution (CSGM, 2017). The transmission and distribution of electricity across the island is dependent on the continued operation of the island’s main electricity provider. However, most of the infrastructure including load centres, generating plants, service stations wind farms and power lines are mainly located along the coast, leaving them highly exposed to the impacts of extreme hydro-
meteorological events. Likewise, increase in temperatures will likely increase energy demand for cooling, and increase inefficiencies, while sea level rise is likely to affect coastal power stations (CSGM 2017). Furthermore, the aging infrastructure of fossil fuel plants (some over 30 years old) are also threatened by the passage of intense storms and hurricanes (TNA 2020).

Transportation

Jamaica’s transportation sector is already being affected by extreme weather events. Frequent damage to roads, bridges, drains and other infrastructure has become the norm during the passage of tropical cyclones and the occurrence of intense seasonal rainfall. According to PIOJ (2017), “since 2001, damage and loss related to infrastructure has cumulatively accounted for $54.8 billion or 42.65 of the overall costs related to extreme weather events. Of this amount, damage to transportation infrastructure accounted for 87%”.

Vulnerable Groups

- Women, Youth and Children

Women, men, rural households, female-headed households, and the younger population all have different levels of vulnerability to disasters. This has been supported by research, including local academic institutions. Climate change will, therefore, affect genders differently and exacerbate the gender roles and structural inequality between men and women that prevail within the society (GOJ 2018, 45). Gender-responsive, participatory, inclusive, and transparent approaches are therefore being mainstreamed into climate change adaptation and resilience building measures.

Children will bear an undue burden on account of climate change. Climate related impacts will disrupt educational, recreational, and health related services and activities. Children in poverty and hazard-prone areas are even more vulnerable. Twenty-two (22) of Jamaica’s national policies, strategies and plans assessed found that under 20% of the policies explicitly highlighted the linkages between climate, environment, energy, and children (UNICEF 2020). The current widespread acknowledgement of the vulnerability of children to changing climatic conditions has become integral to conventional development plans. One of the interventions that has been initiated across the country is the mainstreaming of climate change issues in primary and secondary level curricula.

- Persons with Disabilities

Persons with disabilities (PWDs) are among the vulnerable groups whose needs are often not considered in development priorities, plans and strategies. According to the 2011 census, approximately 22.5% (607,393) of the Jamaican population have some form of disability. PWDs often experience climate related impacts more severely. Mobility, communications, and access to information are challenges that PWDs may experience when attempting to prepare for extreme hydrometeorological events, and in the immediate aftermath of a disaster. Difficulty accessing emergency shelters, or health care services for routine care during and after extreme climatic events may place PWDs at heightened risk. The vulnerability of the disabled, homeless, women and girls, is increased by exposure to abuse in emergency shelters. The Jamaica Disaster Response system is being progressively reviewed and updated to address the needs of PWDs. Independent projects and programmes have made attempts to fill these gaps and additional, continued support would further advance on this effort.

Loss and Damage

There is growing recognition that mitigation and adaptation measures will be insufficient to prevent or alleviate all climate change impacts (Kreienkamp and Vanhala. 2017). Despite mitigation and adaptation action, loss and damage is expected to occur and increase due to the cumulative nature of adverse climate change impacts (GIZ, 2017). Various planning instruments have implicitly and explicitly included action on loss and damage, but this is a growing area of concern to be further expanded and explored. Jamaica’s Mid-term Socio-Economic Policy framework 2018-2021 (MTF 2018-2021), as an example, recognises that whilst “…prevention and mitigation efforts are indispensable steps to build resilience, no country can fully insulate itself against losses from adverse natural events.” (PIOJ 2018, 312). The implication of certain, “residual
effects” of climate change that cannot be avoided through mitigation or adaptation, necessitates additional considerations and mechanisms to address this issue.

Jamaica’s Climate Change Policy Framework (2015) is explicit in referencing loss and damage as an important element of climate change action and provides the policy directive for current and future consideration of this issue in national development and sectoral planning processes. It is expected that in the imminent revision of the Climate Change Policy Framework, the issue of loss and damage will remain a priority, (CCD 2019, 6).

Since 2000, Jamaica has been affected by natural hazards on average every two years. Estimates of the economic impact from extreme events since then average about 1.3% of GDP per year, costing cumulatively well over $136 billion. The impact has been extensive on infrastructure, productive sectors and social sectors; there has also been a toll on the natural environment though costing the impact has been challenging. Numerous persons have died or been injured, and hundreds of communities have been affected. The impact of slow onset events such as sea level rise has been growing; Jamaica currently does not have the ability to cost this type of impact, but evidence show a growing impact, with loss of territory, cultural and heritage sites as well as consequential displacement (human mobility). Permanent displacement has occurred in several locations, where the coastline has eroded to render previously habitable areas, unlivable.

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<tr>
<th>Box 1: Jamaica’s Adaptation Progress</th>
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<tbody>
<tr>
<td>Since becoming a Party to the UNFCCC in 1995 and subsequent participation in regional initiatives, Jamaica has strengthened its drive towards reducing climate risks and expanding its capacity to adapt. An adaptation stocktake conducted in 2020 highlighted over 150 adaptation initiatives implemented across the island, supporting and aligning with national development policies and plans. Adaptation progress has been made possible through collaboration with the academic community, state MDAs, the private sector and civil society. Hence, progress in climate change adaptation may be reflected in:</td>
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<tr>
<td>• The institutional framework designed to coordinate, implement, and mainstream climate change adaptation into development strategies and plans</td>
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<td>• The strengthened partnerships, collaboration and information sharing among stakeholders</td>
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<td>• The improved technological innovations across sectors (eg. installation of marine, meteorological, and hydrological data collection systems; shoreline protection with hard and soft technologies; installation of water-harvesting systems; installation of early-warning systems; tools for climate resilient decision-making; coral reef monitoring etc.)</td>
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<tr>
<td>• The acceleration of climate-smart techniques (eg. sustainable farming practices)</td>
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<td>• The capacity-building of diverse stakeholders (eg. trainings; climate modelling; vulnerability, adaptation, and risk assessments etc.)</td>
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<tr>
<td>• The advanced communication and awareness of climate issues and environmental sustainability (eg. use of natural ecosystems for coastal protection; improved watershed management; land protection etc.)</td>
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Priority Implementation and Support Needs
There have been ongoing adaptation efforts across various sectors over the past few decades. Some are outlined in this section. Also highlighted is a summary of the implementation and support needs which remain. This complements needs identified in the previous section; for example, capacity to adequately assess loss and damage from a wider range of hazards, and to respond accordingly.
Tourism
There has been steady work on building resilience in the sector through a number of initiatives: vulnerability assessments of selected vulnerable areas; drafting of plans and strategies for national and resort level action; workshops and training of key sector interests, including the private sector; and concrete activities to protect coastal resources (beaches and coral reefs, etc) on which the sector relies. Nonetheless, these are areas for which work is iterative; other needs include: continued screening for climate risks; implementing climate-proofing measures; and support to further identify and address risks to the tourism product including infrastructure and natural assets and value chains.

There is an opportunity to strategically consolidate the data, information, and lessons that have been generated to date. With the objective of conserving the quality of the national tourism-product and ensuring the medium- to long-term viability of Jamaica’s tourism sector, the tourism sector, will develop by 2025, a tourism sector climate change adaptation strategy and implementation roadmap.

Agriculture and Fisheries
The sector has made significant progress but is still at high risk due to the increasing effects of climate change and the inability of technology and relevant capacities to keep pace. Much has been done in, for example, introducing climate smart agriculture to farmers and retooling extension services. There is also ongoing research on climate-resilient crops and options for risk transfer. Much has also been done to increase awareness and use of climate data and forecasts to reduce losses. Nonetheless, these measures need to be scaled up and expanded, particularly in areas yet to benefit. Risk transfer options such as insurance is yet to be mainstreamed but is an important one for vulnerable farmers and fisherfolk. Some specific areas include:

- Financing and technical capacity to increase research on heat tolerant crop varieties as well as their economic viability in local conditions
- Expanding the use to alternative/renewable sources of energy in drip-irrigation, storage facilities, cooling systems in the livestock sub-sector and transportation
- Financing and technological support to increase use of crop modelling and pest management forecasting software
- Financing and technical capacity to increase adoption and application by farmers of agro-ecological principles pest management, soil conservation, water conservation and environmental protection.
- Financing for the materials and logistics to implement Climate Smart Agriculture (subsidies required to better access appropriate tools and equipment, and technical capacity)
- Improve and expand the use of information and communication technology (ICT), including with respect to relaying climate/weather-related data and messages to and among farmers and fishers
- Technical capacity to incorporate Blockchain technology in production systems to improve linkage among producers, buyers, and suppliers.

Health
The health sector has made strides in assessing its vulnerability and implementing measures accordingly. In recent time, assessments were conducted of healthcare facilities and supporting systems including emergency power supply and drainage systems; costing was also done. A critical need therefore is financing the action needed to address the vulnerabilities identified. Improving the capacity of healthcare professionals has also been a priority, facilitated by training and other activities. With respect to the planning landscape, a National Adaptation Plan (NAP) specific for the health sector is to be developed; standards for infrastructure are also being updated to include climate considerations. Support will be needed to implement the relevant and appropriate activities as outlined in this instrument. Additionally, specific areas for support include:
• Funding for expansion of real-time data gathering technology, e.g., early warning systems for vector-borne diseases (mosquito), heat stress and other morbidities, as well as capacity to ensure system maintenance and data management
• Funding to expand community outreach and intervention programmes with specific inclusion of climate change considerations; e.g., the Extension of Community Healthcare Outcome (ECHO) programme
• Addressing the risk and displacement of women and girls and other vulnerable groups during and post disasters.
• Financing to retrofit health facilities to meet climate change standards, including protection against wind, and floods, as well as increase water storage capacity during dry spells
• Support research capacity on heat stress (including youths and outdoor workers), to document evidence and support local interventions, and other health-related issues.

**Water, Sanitation and Hygiene**

Water is critical to every other sector; the vulnerability of the sector itself therefore has far-reaching implications. A number of adaptation initiatives is underway, spanning reduction in non-revenue water, awareness-raising programmes for household-level storage and conservation, and programmes targeting developers to install water-saving devices, among others. Several rainwater harvesting systems have been installed across communities, schools, agriculture networks, inter alia. The policy landscape has also improved with the promulgation of the Water Sector Policy in 2019. Undergirding these activities are improvements in the collection, storage and analysis of hydro-meteorological data including real-time data collection stations across the island. Nonetheless, there is a “moving target” with respect to making the sector resilient as the effects of climate change; this demands continuing the work already underway while also pursuing new and innovative options for adaptation. Selected additional activities include:

• Funding to improve the design and expand locations for implementing water capture and storage facilities, including micro dams
• Funding for pilot project or use of incentive to study the reuse of treated industrial effluent and other wastewater sources
• Expanding the implementation of artificial recharge systems in appropriate locations, including site identification, construction and incorporating the use of renewable energy
• Support to increase the resilience of water intake works (infrastructures) located in sensitive watershed areas subjected to extreme weather condition.
• Technical support to implement innovative methods/technologies such as early warning systems/probes to protect downstream assets from flooding

**Natural Resource (terrestrial, coastal, and marine, biodiversity)**

The rich biodiversity of the country is being threatened by climate change, but also is an important element of our adaptation response. From policy and planning measures to concrete interventions, various options for creating and sustaining healthy natural resources have been and are being pursued. Selected adaptation needs include the following:

• Increasing technical capacity and funding to sustain and expand ecosystem and wildlife habitat restoration programmes, including for engineered and nature-based solutions.
• Conducting vulnerability assessments and modelling projected loss and damage, to inter alia, evaluate feasibility of restoration and conservation interventions in various coastal areas.
• Technical and financial support to build capacity and ongoing education of fisherfolk and coastal community members to increase their involvement in mangrove and coral reef protection
• Funding for the implementation phase of the REDD+ initiative
• Technical assistance, financing, and technological development to support the inclusion of underrepresented groups (youth, women etc.) associated with gathering climate data for citizen science.
• Financing and technical support to expand the role of technology in monitoring post disaster response, environmental management, and enforcement.
Human Settlements and Infrastructure

Settlements and infrastructure are among the most affected from extreme events. One important adaptation measure in the past few years was the promulgation of building codes which have resilience integrated as well as the recent Draft National Housing Policy (Green Paper) that supports and promotes sustainable and climate resilient housing developments within the national climate change arena. Supporting this is training of sector specialists as well as various projects that aim the build resilience of urban, rural, and coastal communities. Nonetheless, this capital-intensive sector requires consistent maintenance, redesigns, and retrofits, in addition to:

- Ongoing technical support to develop climate resilient strategy for infrastructures that are culturally and historically valuable.
- Technical support to mainstream climate resilient strategies, including water harvesting structures and innovative designs
- Financial and technical support to record archaeological sites which are threatened by climate change (including SLR) and resources to address the risks

Energy

The resilience and recovery capacity of the energy sector is central to national economic and social wellbeing. In order to establish an energy sector that is resilient in the face of climate change and climate variability, a comprehensive, data-driven, science-based, approach to climate risk identification, reduction, recovery, and restoration, is being adopted.

Progress has been made in assessing the levels of exposure, susceptibility, and risk of elements of the sector’s energy generation, transmission, distribution, and storage infrastructure, to climate change and climate variability. This vulnerability and risk assessment has been undertaken through the application of the Systemic Risk Assessment Tool (SRAT) developed under a Coalition of Climate Resilience Investment (CCRI) pilot initiative. Furthermore, training, capacity, development and emergency response and recovery assistance has been provided. Technical support to explore the best ways to build resilience in the generation and transmission of electricity is ongoing, but remaining needs include:

- Technical and financial support to improve the location of electrical networks against wind damage and flooding
- Technical and financial support to explore appropriate design of energy facilities located along the coastline and susceptible to extreme events and SLR. Technical assistance to develop the methodological framework that will provide the enabling environment to facilitate adaptation projects/investment

Transportation

Efficient and reliable transportation is dependent on sufficient, structurally sound, infrastructure (roads, bridges, and ports), that is protected by systems of secondary infrastructure (drains, culverts, retaining walls, etc.). The effectiveness of these protective systems is dependent on appropriate design, and the impacts of land use practices in surrounding areas. Regardless of the scale of a disaster, transportation is central to effective response, recovery, and restoration efforts. Affective adaptation in the transportation sector requires coordinated action across a number of sectors. Several vulnerability assessments and public infrastructure improvements have taken place. Preliminary infrastructure designs and ecosystem-based adaptation recommendations based on hazard and vulnerability assessment studies have been developed. However, as a capital-intensive sector, the mobilization of financing has been constraining climate change adaptation efforts. Specifically, the following are key areas for support:

- Conduct detailed, location-specific, climate vulnerability and risk assessments for each of Jamaica’s main air and sea ports, using the time-slices, and climate change projections employed in the State of the Climate Reporting process.
• Use the findings of the climate change and vulnerability and risk assessment to develop, cost, select, and implement adaptation options.
• Technical support to mainstream capacity-building efforts in disaster risk reduction and climate change adaptation across institutions
• Deploy the validated Systemic Risk Assessment Tool as a shared platform for assessing and tracking, inter alia, transportation infrastructure exposure, susceptibility to climate hazards.

Vulnerable Groups
It is essential that all adaptation efforts are inclusive and informed by the needs of all stakeholders. Therefore, sustained effort by organisations responsible for disaster risk management and climate change adaptation planning, is required to engage representatives from vulnerable groups in the climate risk management and planning processes and provide unhindered access to decision making processes. However, Jamaica has made strides in addressing the risk of climate change on vulnerable groups. This includes the collection of disaggregated data on gender, the development of assessments to better inform policy and programme design towards addressing the concerns of climate change impacts on groups such as children, youth, and persons with disabilities, as well as the piloting of early warning and emergency alert communication systems for persons with hearing and visual impairments.

Gender Responsive Climate Change
• Technical support to mainstream awareness of gendered dimensions of CCA/DRR
• Technical support to institutionalize gender-responsive approaches to CCA/DRR
• Technical support to mainstream accountability and transparency within the M&E framework for institutions implementing gender-responsive approaches to CCA/DRR
• Technical support to expand capacity-building efforts in CCA/DRR across institutions

Children and Youth
• Technical support to mainstream awareness on youth and children’s vulnerability, needs, and safety with CCA/DRR planning efforts
• Technical and financial support to improve data gathering mechanisms and research repository on youth and children in relation to climate change issues
• Technical support to explore the best ways to expand the engagement of children and youth in CCA/DRR, as well as building their resilience to climate risks.
• Technical support to explore the best ways to mobilize innovative financing mechanisms to target resilience building efforts for youth and children.

Persons with Disabilities
• Technical support to mainstream disability considerations throughout CCA/DRR planning and resilience building efforts.
• Technical support to explore appropriate ways to expand awareness and access to CCA/DRR information for PWD.
• Technical and technological support to expand and improve early warning and emergency alert communication systems for PWD.
• Technical support to mainstream PWD appropriate operating protocols for infrastructures and first responders that support CCA/DRR efforts
Box 2: Adaptation Barriers and Gaps

Despite the progress made in mainstreaming climate change adaptation strategies and action plans, further advancements will require resolving various barriers and gaps relating to:

- Establishing a comprehensive central repository for accessing and archiving documents (project reports, research etc.) that can help in the sharing of knowledge and lessons and also accelerate the dissemination of climate information, vulnerability, and risk assessments, as well as multi-scalar adaptation initiatives.
- Increased capacity of local researchers specializing in climate science.
- Sufficient socio-economic and environmental forecast based on climate projections or modelling scenarios (crop yields, coastal inundation, energy demand, freshwater availability, forest productivity etc.).
- Increased integration of climate change considerations into national financing mechanisms, public infrastructure, and security plans.
- Greater participation of the private sector in climate adaptation initiatives, including a focus on:
  - Awareness and knowledge of climate risks;
  - Knowledge of mitigation and adaptation options;
  - Technical and financial capacity to implement;
  - Social attitudes toward mitigation and adaptation;
  - Access to financing for climate change adaptation from international sources.

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