



CHAPTER FIVE

PROTECTING AGAINST CLIMATE CHANGE AND BIODIVERSITY LOSS

The adverse and potentially catastrophic impacts of climate change are already being experienced in Guyana. Since the 1960s, the country has observed marked increases in temperature, sea level, and the frequency and intensity of extreme rainfall events. The impacts on Guyanese people, the economy, and the environment during flooding and droughts are examples of the devastation climate change may cause.

The first half of 2021 saw catastrophic flooding and impacted large parts of the population. Over 74,000 acres (43,473 acres of cash crops and 30,684 acres of rice) of farmlands and over 20,000 farmers were affected. The 2021 flood is likely to be comparable to the 2005 flood which affected close to 37% of the population and caused economic damage equivalent to 60% of GDP. Some areas experienced 120-150 centimetres of standing water, which remained for several days. A socio-economic assessment of the damage and loss caused by the 2005 flood revealed major impacts on the agriculture sector, particularly in the regions of West Demerara/Essequibo Islands, Demerara/Mahaica, and Mahaica/West Berbice. Region Four was most severely affected in the 2005 flood (though less affected in the 2021 flood), experiencing close to 55% of the total damage, followed by Regions Two (23%) and Five (19%). Considerable losses were recorded in the sugar, rice, livestock, and other crops (fruits, vegetables, roots and tubers, and herbs and spices) subsectors.

Floods are not the only climate emergencies that Guyana faces. Following an extended period of dry weather in late 2014 and early 2015, the hinterland was facing drought conditions by April 2015. Region Nine (Upper Takutu-Upper Essequibo) and parts of Region One (Barima-Waini) were particularly affected, resulting in a reduction in the agricultural output in the Regions, a reduction in available water supply, and increased dust pollution, among other issues. The lack of rainfall caused decreased water levels in the wells, lakes, ponds, rivers, creeks and other water sources. Frequent bush fires destroyed several farms at Aranaputa. Local communities experienced limited access to potable water for domestic and agriculture use. Residents were forced to go to local

rivers, including the Rupununi River, for untreated water for domestic use. There were reports of an increase in the number of people suffering from vomiting, and diarrhoea. The drought conditions were also linked to a resurgence of pests, including acushi ants and caterpillars, which attacked the few remaining crops. Dasheen, cassava, eddo and other cash crops were particularly severely impacted by the drought.

With increases in the number of dry spells, drought conditions and changing rainfall patterns, stress on Guyana's internal water resources, aquifers and rivers is increasing. With resources from the Guyana-Norway Partnership, Guyana developed a Climate Resilience and Adaptation Strategy to set out a comprehensive and overarching framework for adapting and building resilience to climate change impacts. This chapter summarises elements of that strategy. The CRSAP built on the work that had been undertaken in Guyana over previous years and identified key climate risks and priority resilience actions.

In 2021, work re-started to implement the strategy. Specifically:

- The most important elements of the CRSAP are being brought up to date.
- Funding will be allocated to the priority climate resilience programmes - summarised below.
- A strategy to finance the remainder of the CRSAP - from ecosystem services payments and other sources - will be put in place and launched in 2023.

Sea Defense Enhancement and Maintenance

Of Guyana's c. 214,970 km² in land area, approximately 90 percent of the population live on the 15,000 km² close to the low-lying coastline of approximately 459 km the majority of the coastal zone is below sea level and relies largely on engineered (seawalls and rip raps) and natural (mangroves) sea defense structures to provide protection from the Atlantic Ocean. In Regions Two, Three, Four, Five and Six, sea defense structures protect approximately 244 km of the coastline; 22.81 km are in either poor or critical condition. Mangroves are highly vulnerable to climate change, in particular sea level rise, which could destroy or damage mangroves and, with it, coastal habitats and fisheries infrastructure such as landing sites.

Despite significant investments to rehabilitate sections of Guyana's sea defense system, the 2014 survey of Guyana's sea defense structures, which covered 91.2% of the total length, showed the urgent need for investment as set out in the following table.

This will deliver on the following outcomes:

1. Guyana's sea defence system is more resilient to a changing climate.
2. Sea defence systems are restored and retrofitted.
3. Mangroves are restored and protected.
4. Coastal communities are protected against coastal flooding.
5. Improved awareness of the importance of the mangrove eco-system to the sea defence mechanism and livelihood among the general public, including the fishing community.



Strengthening Drainage and Irrigation Systems

Closely interlinked to the challenge of sea defenses is the drainage and irrigation (D&I) system which is connected to over 150 sluice gates/kokers which are located at the seawalls. With sea-level rise consequentially limiting the number of low tide days, the opening of the sluice gates/kokers to expel water out to sea is becoming increasingly restrictive, hence increasing the risk of flooding and further exposing Guyana's population and assets located in low-lying coastal regions. Additionally, blocked drains and disabled pumps exacerbate the problem of water expulsion. Therefore, the functional relationship between the D&I system and the seawall needs to be optimised for both to efficiently perform their critical roles. A fault in one could compromise the integrity of the other and efforts are underway to address some of the shortcomings of the D&I system.

Multiple economic activities, livelihoods and communities are dependent on D&I systems. These systems are critical not only for flood control and surface water drainage but also to provide water for agricultural, domestic and other purposes.

To carry out the dual role of drainage and irrigation, the systems are operated through the concept of nearly constant water levels. A large proportion of Guyana's coastal lands lie below sea level and drainage by gravity is possible only during low tides, which makes the systems prone to flooding during extreme rainfall events. The losses and damage from the 2005 floods in Georgetown and the surrounding region exposed the system's limitations in terms of handling a greater intensity of rainfall combined with tidal inflow.

Building Climate-Resilient Agriculture Systems

Agriculture in Guyana contributes approximately 31.9% to non-oil GDP, employs about 17% of the labour force and generates almost 21.3% of Guyana's non-oil export earnings in 2020. The two largest subsectors are rice and sugar, with a combined contribution to GDP of 7% or 24.8% of agriculture GDP over the period 2016-2020. The fisheries industry is also vital to Guyana's economy and dietary intake. It contributed on average, 0.8% of GDP over the period 2016-2020.

However, the conditions associated with a changing climate will have adverse effects on these sectors and by extension Guyana's economy. Sea level rise could increase water salinity in rice fields; temperature increase could reduce rice yields; changes in growing conditions can result in increased weed and pest infestation; the intensity and frequency of droughts are projected to increase, resulting in reduced yields. For sugar, the increase in temperature at night-time, affects the ripening of the crop and, coupled with a drought period, can affect yields. Increased rainfall reduces the days available for planting and reaping. Floods from more frequent and intense rainfall, due to over-topping and sea-level rise, reduce the discharge window available for coastal drainage and impact output negatively.

The 2005 floods resulted in damages to the agricultural sector amounting to US\$52.6 million. The sub-sectors hardest hit were sugar, US\$11.2 million; and rice, US\$8.1 million. Non-traditional Agricultural Commodities sustained damages of US\$28.8 million and livestock, US\$2.9 million. With overall costs of US\$29 million and US\$14.7 million respectively, the droughts of 1997 and 2010 resulted in damages to the rice and sugar industries resulting in losses in export earnings to the country and income for many households. More than 1,500 Amerindian families in Southern Guyana, reliant on agriculture were affected and several rice farmers were forced to leave 35% of their rice fields uncultivated. Losses to the other subsectors of livestock and non-traditional agricultural commodities were numerous. In the 2021 floods, over 74,000 acres (43,473 acres of cash crops and 30,684 acres of rice) of farmlands and over 20,000 farmers were affected.

In accordance with the LCDS 2030, the Government will:

- Strengthen sea and river defense systems
- Improve flood control and water management (drainage/ kokers)
- Address drought prevention (including in Hinterland regions)
- Implement climate-smart initiatives
- Strengthen institutions such as the NDIA, Sea Defence, Hydrometeorological Department, etc.
- Improve response capability for climate events

Public Health Adaptation to Climate Change

Guyana's health sector already faces challenges including a limited number of health care professionals, shortages of equipment and supplies, and poor physical access to health facilities for some of the population. Health facilities (e.g., hospitals, health centres), which are vital to responding to risks in vulnerable communities, are themselves currently vulnerable to climate change impacts, such as flooding, due to their locations. In addition, it is widely accepted that climate change may exacerbate the incidence of vector and waterborne diseases, including malaria, dengue and chikungunya. Greater rainfall intensity increases the number of potential breeding grounds for mosquito species. Further, untreated pools of contaminated water are breeding grounds for the vector species identified above. These diseases represent a significant economic burden for Guyana's economy and society. Prevention has significant benefits not only by improving the length and quality of people's lives but also by reducing the costs which would arise from treatment and lost productivity.

In accordance with the LCDS 2030, the Government will support:

- Improving public health adaptation infrastructure
- Improving planning and response capability of the health sector to climate-related impacts
- Developing and implementing programmes to tackle climate-related illnesses

This will deliver on the following outcomes:

1. The disaster risk preparedness and management capacity of the health sector is improved.
2. The health sector in Guyana is better equipped to recover from weather-related extreme events, particularly flooding.
3. Communities have better access to clean water and sanitation facilities and improved food hygiene.
4. The incidence of water and vector-borne diseases, such as malaria, dengue, and chikungunya, is reduced.
5. Critical health infrastructures are resilient to a variable and changing climate.
6. Health practitioners in Guyana are trained and prepared to respond to extreme events and climate change.
7. The public is sensitised about the risks of climate-related health impacts, including at the community level.

Emergency and Extreme Events/Flood Control and Management

In view of the current threats that climate variability and longer term climate change pose to water resources management in Guyana, the State will:

- Review current national legislative procedures, and guidelines for combining water-use and land-use planning.
- Develop and strengthen legislation to make environmental and social impact assessments mandatory in all significant developmental projects.
- Minimise the effects of climate variability and change as well as institute measures to mitigate the effects of, and prevent damage caused by extreme hydrological events (floods and droughts) in keeping with the National Climate Change Action Plan (2001).
- Draft Climate Resilience Strategy and Action Plan 2016

The Government will also take steps towards:

1. Undertaking comprehensive development and management of the main rivers by means of a system of structural and non-structural measures.
2. Assessment of end use of the resource and climate change impacts at source (for domestic and consumption) and for ecosystem availability.
3. Developing early warning and flood-proofing systems to manage natural disasters like floods and droughts.
4. Developing water resources of the major rivers for multipurpose use, including irrigation, fisheries, navigation, forestry, and aquatic wildlife.
5. De-silting watercourses regularly to maintain navigation channels and proper drainage.
6. Delineating water-stressed areas based on land characteristics and water availability from all sources for managing dry season demand.
7. Initiating actions to protect the water quality and ensure efficiency of its use.
8. Designating flood-risk zones and taking appropriate measures to provide desired levels of protection for life, property, vital infrastructure, agriculture and wetlands. Ensuring that land-use planning/building regulations are adequate and enforced in respect of waterways and flood-prone areas.
9. Providing water conservation structures of adequate capacity after carrying out environmental assessments taking into account multiple uses (e.g. fisheries and tourism) and removing conflicts (e.g. fencing of intakes in dams to allow for restricted fishing).
10. Ensuring rainwater harvesting techniques are incorporated into the building code and enforced.
11. Ensuring implementation of mitigation strategies in consultation with stakeholders.