National Integrated Disaster Risk Management Plan and Implementation Strategy for Guyana

Integrated Disaster Risk Management Plan

Commissioned by:
Civil Defence Commission

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ACRONYMS

AAL	Average Annual Loss
AusAID	Australian International Development Agency
BCP	Business Continuity Plan
CARICOM	Caribbean Community
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CDB	Caribbean Development Bank
CDC	Civil Defence Commission
CDEMA	Caribbean Disaster Emergency Management Agency
CDERA	Caribbean Disaster Emergency Response Agency
CDM	Comprehensive Disaster Management
CHPA	Central Housing and Planning Authority
CIA	Central Intelligence Agency
CIDA	Canadian International Development Agency
CIMH	Caribbean Institute for Meteorology and Hydrology
Cm	Centimetre
COOP	Continuity of Operations Plan
CRMI	Caribbean Risk Management Initiative
DANA	Damage and Needs Assessment
DDI	Disaster Deficit Index
DEM	Digital Elevation Model
DFID	United Kingdom Department for International Development
DM	Disaster Management
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DRRC	Disaster Risk Reduction Centre (University of the West Indies)
ECLAC	Economic Commission for Latin America and the Caribbean
EDWC	East Demerara Water Conservancy
EIA	Environmental Integrated Assessment
EOC	Emergency Operations Centre
EPA	Environmental Protection Agency
ER	Economic Resilience
ERN	*Evaluación de Riesgos Naturales en América Latina*. Consulting Firm.
EWS	Early Warning Systems
GDP	Gross Domestic Product
GEF	Global Environment Facility
GFC	Guyana Forestry Commission
GG&MC	Guyana Geology and Mines Commission
GHG	Greenhouse Gas Emissions
GINA	Guyana Information Agency
GIS	Geographical Information System
GL&SC	Guyana Lands and Surveys Commission
GNP	Gross National Product
GoG	Government of Guyana
GPL	Guyana Power and Light
GT&T	Guyana Telephone and Telegraph Company
GWI	Guyana Water Incorporated
GYD	Guyana Dollars
HRVA	Hazard, Risk and Vulnerability Analysis

IDB	Inter American Development Bank
IDRM	Integrated Disaster Risk Management
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
JICA	Japan International Cooperation Agency
Km	Kilometres
Km^2	Square kilometres
LDI	Local Disaster Index
LFA	Logical Framework
LIDAR	Laser Imaging Detection and Raging
M&E	Monitoring and Evaluation
MCE	Maximum Considered Event
MLG&RD	Ministry of Local Government and Regional Development
MOA	Ministry of Agriculture
MOE	Ministry of Education
MOH	Ministry of Health
NARI	National Agriculture Research Institute
NDIA	National Drainage and Irrigation Authority
NEOC	National Emergency Operations Centre
NGO	Non-governmental Organization
NIDRMP	National Integrated Disaster Risk Management Plan
Mi^2	Square mile
OAS	Organization of American States
OCHA	Office of the Coordinator of Humanitarian Assistance (United Nations)
OECD	Organisation for Economic Co-operation and Development
OP	Office of the President
OPM	Office of the Prime Minister
PAHO	Pan American Health Organization
PMF	Performance Measurement Framework
PML	Probable Maximum Loss
PVI	Prevalent Vulnerability Index
PRP	Pure Risk Premium
RMI	Risk Management Index
SO	Strategic Objective
SOP	Standard Operating Procedures
TWC	Tapakuma Water Conservancy
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
UNISDR	United Nations International Strategy for Disaster Reduction
US$	American Dollar (United States currency)
USAID	United States Agency for International Development
USAR	Urban Search and Rescue Team
WDWC	West Demerara Water Conservancy

GLOSSARY

Climate Change
The Intergovernmental Panel on Climate Change (IPCC) defines climate change as: "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forces or to persistent anthropogenic changes in the composition of the atmosphere or in land use. (…) The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods."[1]

Comprehensive Disaster Management (CDM)
CDM includes planning for all and responding to all hazards and threats (both natural and man-made) during all phases of the disaster cycle (mitigation, preparedness, response and recovery). It involves all levels of and sectors of society in an integrated management approach. It requires continuous engagement of political and other decision-makers.

Disaster
A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources.[2]

Disaster Management (DM)
The continuous process, based on a previous assessment of hazard, vulnerability and risk information and response capacity resources, of multi-sectoral identification, promotion, planning, implementation, coordination, monitoring, evaluation and improvement, of preventive, preparedness, response and recovery activities executed in order to reduce and/or eliminate the effects of a hazard or a group of hazards on the vulnerable elements of a well-defined specific area.[3]

Disaster Risk Management (DRM)
The systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and nonstructural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards.[4]

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[1] United Nations International Strategy for Disaster Reduction (UNISDR). (2009). *2009 UNISDR Terminology on Disaster Risk Reduction*.
[2] *Idem.*
[3] Caribbean Community (CARICOM) & University of the West Indies (UWI). (1998). *Disaster Management Workshop. Technical Cooperation Agreement México*.
[4] Caribbean Disaster Emergency Management Agency (CDEMA). (2010). *Comprehensive Disaster Management. CDM Glossary*.

Disaster Risk Reduction (DRR)
The conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (Prevention) or to limit (Mitigation and Preparedness) the adverse impacts of hazards, within the broad context of sustainable development. DRR involves:

- Risk awareness and assessment including hazard analysis and vulnerability/capacity analysis;
- Knowledge development including education, training, research and information;
- Public commitment and institutional frameworks, including organizational, policy, legislation and community action;
- Application of measures including environmental management, land-use and urban planning, protection of critical facilities, application of science and technology, partnership and networking, and financial instruments;
- Early warning systems (EWS) including forecasting, dissemination of warnings, preparedness measures and reaction capacities[5]

The concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.[6]

Emergency Management
The organization and management of resources and responsibilities for addressing all aspects of emergencies, in particular preparedness, response and initial recovery steps.

Hazard
A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Mitigation
The lessening or limitation of the adverse impacts of hazards and related disasters.

Natural Hazard
Natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Preparedness
The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from the impacts of likely, imminent or current hazard events or conditions.

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[5] Caribbean Disaster Emergency Management Agency (CDEMA). (2010). *Comprehensive Disaster Management. CDM Glossary*.
[6] All further terms are extracted from: United Nations International Strategy for Disaster Reduction (UNISDR). (2009). *2009 UNISDR Terminology on Disaster Risk Reduction*.

Prevention
The outright avoidance of adverse impacts of hazards and related disasters.

Recovery
The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors.

Resilience
The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.

Response
The provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected.

Retrofitting
Reinforcement or upgrading of existing structures to become more resistant and resilient to the damaging effects of hazards.

Risk
The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions. Conventionally risk is expressed by the notation Risk = Hazards * Vulnerability. Some disciplines also include the concept of exposure to refer particularly to the physical aspects of vulnerability.

Beyond expressing a possibility of physical harm, it is crucial to recognize that risks are inherent or can be created or exist within social systems. It is important to consider the social contexts in which risks occur and that people therefore do not necessarily share the same perceptions of risk and their underlying causes.

The combination of the probability of an event and its negative consequences.

Risk Assessment
A methodology to determine the nature and extent of risk by analyzing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend.

Risk Transfer
The process of formally or informally shifting the financial consequences of particular risks from one party to another whereby a household, community, enterprise or state authority will obtain resources from the other party after a disaster occurs, in exchange for ongoing or compensatory social or financial benefits provided to that other party.

Structural and Non-structural Measures
Structural measures: Any physical construction to reduce or avoid possible impacts of hazards, or application of engineering techniques to achieve hazard resistance and resilience in structures or systems;

Non-structural measures: Any measure not involving physical construction that uses knowledge, practice or agreement to reduce risks and impacts, in particular through policies and laws, public awareness raising, training and education.

Vulnerability
The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.

1. PART I – BACKGROUND AND CONTEXT

1.1. Introduction

In recent years, Guyana has suffered greatly from the impact of floods. The country had severe floods in 1996, 2005, 2006 and 2008 and a drought in 1998. The floods in January-February 2005 affected 62% of the population and represented a loss of 93.022 billion Guyanese Dollars (GYD)[7], which represents 59.49% of the gross domestic product (GDP) for the year 2004. Less than a year later, the floods of December 2005-February 2006 then incurred costs of another 6 billion GYD[8].

The Government of Guyana (GoG), with the assistance of regional and international donors has been taking measures to reduce the impact of hazards such as floods. Among them, in June 2006, the GoG with the support of the donor community, including the Inter-American Development Bank (IDB) and the World Bank , initiated the development of a comprehensive long-term strategy for flood management in the country.

The IDB is currently providing the GoG non-reimbursable technical support through the technical cooperation project "Design and Implementation of an Integrated Disaster Risk Management Plan" (GY-T1050). This project has three components: 1) Country risk indicators and flood risk evaluation; 2) Strengthening national and local capacity for integrated disaster risk management (IDRM), and 3) Design of an investment programme in flood prevention and mitigation. It is under Component 2 that a *National Integrated Disaster Risk Management Plan* (NIDRMP) and a corresponding Implementation Strategy (herein referred to as "the Strategy" and presented in a separate document) were then developed.

This document represents the NIDRMP. The Plan is herein presented as follows:

- Part I: Background and Context: Includes an Introduction, a Profile of Guyana and an Overview of Current Trends in terms of Disaster – mostly focused on natural disasters, which pose the greatest threats to Guyana – for the region and for Guyana in particular;

- Part II: Overview of DRM in Guyana: Presents a brief discussion of key terminology and paradigms in DM; as well as a presentation of the DRM system and current status of implementation of DRM in the country. Guyana's National Disaster Preparedness and Response Structure, the National Emergency Operations Centre (NEOC) and key organizations such as the Civil Defence Commission (CDC) are discussed, including a brief note on their limitations. The section also briefly presents the key projects and activities currently ongoing or recently undertaken for the five components of IDRM: Risk Identification, Prevention and Mitigation, Financial Protection and Risk Transfer, Preparedness and Response, and Recovery.

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[7] Economic Commission for Latin America and the Caribbean (ECLAC). (2005). *Macro-Socio Economic Assessment of the Damage and Losses Caused by the January –February 2005 Flooding*. 1 GYD = 0.00489120 US$ as per 2013-06-25.

[8] Economic Commission for Latin America and the Caribbean (ECLAC). (2006). *Guyana. The Impact on sustainable livelihoods caused by the December 2005- February 2006 Flooding*.

- Part III: Introduction to and Rationale for a NIDRMP: Presents the rationale for the NIDRMP, in particular in light of the context presented in sections 1 and 2. This section also describes the NIDRMP's scope, approach (including a discussion about limitations) and general management, as part of an introduction to the NIDRMP.

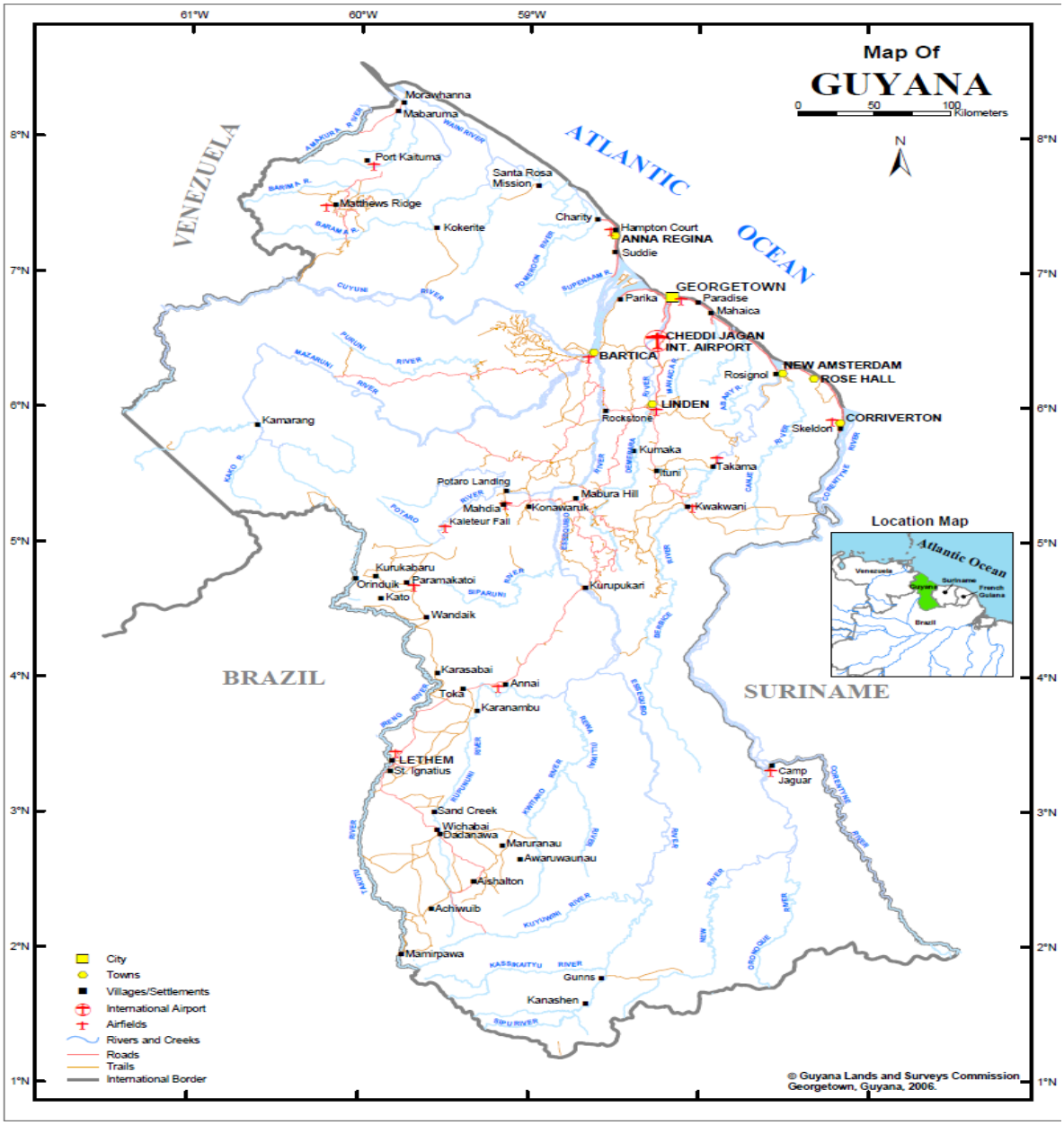
- Part IV: Assessment and Gap Analysis: Presents a review and an analysis of key gaps and challenges regarding IDRM in Guyana drawing on the results of the IDB's *Indicators of Disaster Risk and Risk Management Report* (2012), the CDC *Flood Risk Modelling Report* (2012), the United Nations Development Programme (UNDP) *Institutional Capacity Assessment* (2009), the Caribbean Disaster Emergency Management Agency (CDEMA) *CDM Country Baseline Report for Guyana* (2010) as well as the results of the United Nations Environment Programme (UNEP) & the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) *Geotechnical and Hydraulic Assessment of the East Demerara Water Conservancy (EDWC) Dam* (2005). The section also presents an overall institutional assessment drawing on the aforementioned assessments as well as a review undertaken during the development of the NIDRMP. The section concludes highlighting the key needs, gaps and priorities to move IDRM forward in Guyana and the activities that become the basis for the NIDRMP are demonstrated as being inextricably linked and to directly address those highlighted gaps and priorities.

- Part V: The NIDRMP 2013-2023: Presents the NIDRMP vision, goal, strategic objectives (SOs), expected outcomes and activities. The regional and international programming context is also defined to help further explain the content of the NIDRMP.

1.2. Profile of Guyana

This section briefly presents the profile[9] of the country, Guyana, shown in figure 1 below.

Figure 1. Map of Guyana[10]



[9] This section was built on information provided in the Civil Defence Commission of Guyana (CDC). (2012). *National Multi-Hazard Preparedness & Response Plan*; the Government of Guyana (GoG). Bureau of Statistics. (2007). *Population and Housing Census 2002. National Census Report*. and Central Intelligence Agency (CIA). (2013). *The World Factbook*. [online].; and the International Monetary Fund (IMF). *Guyana and the IMF*. [online].

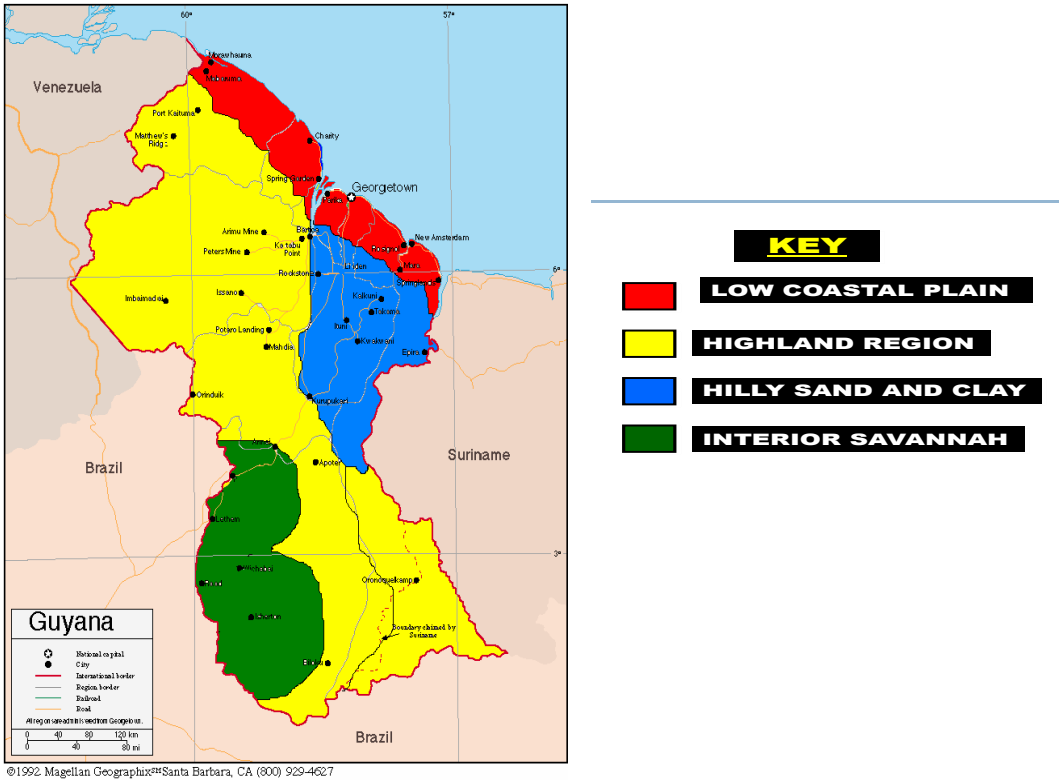
[10] Civil Defence Commission of Guyana (CDC). (2012). *National Multi-Hazard Preparedness & Response Plan*.

1.2.1 Geography

Guyana is located in the northern part of South America (10˚ to 8½˚ North Latitude and 56½˚ to 61½˚ West Longitude). It is bordered on the north by the Atlantic Ocean; on the south by Brazil; on the east by Suriname and on the west by Venezuela and Brazil. The area of the country is 215,000 square kilometres (km²) (83,000 square mile (mi²)).

Guyana is divided into four natural regions as follows: the low coastal plain; the hilly sand and clay area; the highland region, and; the interior savannah.

Figure 2. Guyana's Topography[11]



The low coastal plain, which occupies about 5% of the country's area, is home for more than 90% of its inhabitants. The plain spans between five and six kilometres (km) in width and extends from the Courantyne River in the east to the Venezuelan border in the northwest. The coastal plain is made up largely of alluvial mud swept out to sea by the Amazon River, carried north by ocean currents, and deposited on the Guyanese shores. A rich clay of great fertility, this mud overlays the white sands and clays formed from the erosion of the interior bedrock and carried seaward by the rivers of Guyana. Because much of the coastal plain floods at high tide, efforts to dam and drain this area have been undertaken since the 18th century. This is a particularly highly vulnerable area of the country.

[11] Civil Defence Commission of Guyana (CDC). (2012). *National Multi-Hazard Preparedness & Response Plan.*

1.2.2. Hydrology

Guyana is a water-rich country. It has two wet seasons, and two dry seasons:

- First Dry Season: February to April.
- First Wet Season: April to July.
- Second Dry Season: July to November.
- Second Wet Season: November to January.

Numerous rivers flow into the Atlantic Ocean, generally in a northward direction. A number of rivers in the western part of the country, however, flow eastward into the draining the Kaieteur Plateau. The Essequibo, the country's major river (see figure 3 below), runs from the Brazilian border in the south to a wide delta west of Georgetown. The rivers of eastern Guyana cut across the coastal zone, making east-west travel difficult, but they also provide limited water access to the interior. Waterfalls generally limit water transport to the lower reaches of each river.

Figure 3. Map of the Essequibo River Drainage Basin[12]

Drainage throughout most of Guyana is poor and river flow sluggish because the average gradient of the main rivers is only one metre every five km. Swamps and areas of periodic flooding are found in all but mountainous regions, and all new land projects require extensive drainage networks before they are suitable for agricultural use. The average km^2 on a sugar plantation, for example, has six km of irrigation canals, 18 km of large drains, and 18 km of small drains. These canals occupy nearly one-eighth of the surface area of the average sugarcane field. Some of the larger estates have more than 550 km of canals, while Guyana itself has a total of more than 8,000 km.

Conservancy dams are an essential part of the hydraulic system of Guyana. The largest conservancy dam in Guyana is the East Demerara Water Conservancy (EDWC), which was developed in 1880 and lies between the Demerara and Mahaica rivers. Its primary function is

[12] Civil Defence Commission of Guyana (CDC). (2012). *National Multi-Hazard Preparedness & Response Plan*.

the storage of water for irrigation, but the northern side of the EDWC dam also protects the coastal zone against flooding by water from rainfall. Most of human settlement and infrastructure are concentrated in the coastal zone, and even Georgetown is below sea level and must depend on dikes for protection from the Demerara River and the Atlantic Ocean. Similarly to the EDWC dam, the West Demerara Water Conservancy (WDWC) dam serves as a flood control mechanism as well as a water supply for agricultural irrigation during dry seasons, while the Tapakuma Water Conservancy (TWC) dam only functions as a water storage system for agricultural irrigation, as well as a drinking water supply for the city of Anna Regina.

1.2.3. Population and Demography

Guyana's population is of mixed heritage and composed mainly of six peoples – East Indians, Africans, Portuguese, Native/Indigenous, Europeans and Chinese. These groups of diverse national backgrounds have been fused together by a common language, English. Yet, although the official language is English, several other languages are spoken throughout the country: Amerindian dialects, Creole, Caribbean Hindustani (a dialect of Hindi), Urdu.

The population of Guyana is estimated at 739,903, including 368,737 males and 371,166 females. While the gender ratio is evenly balanced between males and females, there are variations within age groups. The life expectancy at birth is 67.68 years (males: 63.83 years; females: 71.72 years) and the total fertility rate was 2.21 children born per woman (2013 estimates).[13]

The largest national sub-group is that of East Indians, comprising 43.5% of the population. They are followed by persons of African heritage (30.2%). The third in rank are those of Mixed Heritage (16.7%), while the Native/Indigenous population are fourth with 9.1%. The smallest groups are the Whites (0.06% or 476 persons), the Portuguese (0.20% or 1497 persons) and the Chinese (0.19% or 1396 persons). A small group (0.01% or 112 persons) did not identify their race/ethnic background.[14]

Guyana's population is small in relation to its land space with an average population density of approximately four persons per km^2, but population density differs significantly between rural and urban areas. Only 10% of the population lives in the interior and the majority (90%) lives on the country's narrow coastal plain that occupies a mere 7.5% of the country's total land area.[15]

The country is divided into 10 administrative regions as presented in figure 4 below.

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[13] Central Intelligence Agency. (2013). *CIA The World Factbook. Country Profile : Guyana*. [online].
[14] Government of Guyana (GoG). Bureau of Statistics. (2007). *Population and Housing Census 2002. National Census Report*.
[15] United Nations Development Programme (UNDP). (2010). *Assessment of Development Results. Evaluation of UNDP Contribution Guyana*.

Figure 4. Guyana Administrative Regions[16]

1.2.4. Economy

Guyana's real GDP in 2012 was 341,905 million GYD[17] and the GDP per capita in 2012 was US$ 3,148.00.[18] Annual growth was determined to be 2.3% and inflation 3.5%. Guyana's major industries include sugar, bauxite, rice, timber, fishing (shrimp), gold mining and diamonds. The main trading partners include the United States, Canada, the United Kingdom, the Caribbean (especially Trinidad and Tobago), Brazil, China and India.[19]

1.3. Disaster Trends – Global, Regional and National

1.3.1. Global Disaster Trends

At the global level, the number of disasters is increasing. The UNISDR reported in its *Global Assessment Report on Disaster Risk Reduction* that the number of natural disasters increased from less than 150 per year in the 1970s to more than 400 per year after the year 2000. Consequently, the number of people affected by disasters has increased as well. Regarding disasters caused by natural hazards, particularly by floods and tropical cyclones, the UNISDR affirms that exposure to floods and tropical cyclones are increasing rapidly, especially in low

[16] CaribbeanElections. (2013). *Guyana*. [online].
[17] 1 GYD = 0.00489120 US$ as per 2013-06-25. This data is extracted from Guyana's Bureau of Statistics and therefore the movement between currencies follows how this most recent data is presented.
[18] Government of Guyana (GoG). Bureau of Statistics. (2013). *National Account Department.* [online].
[19] Government of Guyana (GoG). Bureau of Statistics. (2013). *National Account Department.* [online].

income countries.[20] This is due mostly to the increase of the number of people living in flood-prone areas, for whom the advantages of living in those areas outweigh the perceived risks of flooding. Please see table 1 below:

Table 1. Flood Exposure by World Bank Region (million people per year)[21]

Region	1970	1980	1990	2000	2010
East Asia and the Pacific	9.4	11.4	13.9	16.2	18.0
Europe and Central Asia	1.0	1.1	1.2	1.2	1.2
Latin America & the Caribbean	**0.6**	**0.8**	**1.0**	**1.2**	**1.3**
Middle East and North Africa	0.2	0.3	0.4	0.5	0.5
Organisation for Economic Co-operation and Development (OECD) countries	1.4	1.5	1.6	1.8	1.9
South Asia	19.3	24.8	31.4	38.2	44.7
Sub-Saharan Africa	0.5	0.7	1.0	1.4	1.8
World	**32.4**	**40.6**	**50.5**	**60.5**	**69.4**

The UNISDR *Global Assessment Report on Disaster Risk Reduction* also shows that economic loss risk is increasing globally due to the increase of vulnerability in risk areas.[22] Please see table 2 below:

Table 2. Average Annual Global GDP Exposed to Floods (in US$ billion 2000)

Region	1970-1979	1980-1989	1990-1999	2000-2009
East Asia and the Pacific	2.8	5.1	10.2	21.5
Europe and Central Asia	2.2	2.7	2.7	3.1
Latin America & the Caribbean	**2.5**	**3.2**	**3.9**	**5.4**
Middle East and North Africa	0.3	0.4	0.6	0.9
OECD countries	24.1	32.8	43.5	52.9
South Asia	3.9	5.4	8.7	15.4
Sub-Saharan Africa	0.4	0.5	0.6	0.9
World	**36.2**	**50.0**	**70.2**	**100.1**

1.3.2. Disaster Trends in the Caribbean

In the Caribbean region, disaster trends are similar. The number of disasters, the number of people affected by them and the economic loss caused are increasing. The reasons include the increase of vulnerability due to human settlements in risk areas, deficient land use and the failure to incorporate risk reduction measures into urban planning, among others.

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[20] United Nations International Strategy for Disaster Reduction (UNISDR). (2011). *Global Assessment Report on Disaster Risk Reduction. Revealing Risk, Redefining Development.*

[21] Table 1 and 2 have been taken from the UN International Strategy for Disaster Reduction (UNISDR). (2011). *Global Assessment Report on Disaster Risk Reduction. Revealing Risk, Redefining Development.*

[22] *idem.*

In 2011, UNDP's Caribbean Risk Management Initiative (CRMI) jointly with the Disaster Risk Reduction Centre (DRRC) conducted a mid-term review titled *Caribbean Implementation of the Hyogo Framework for Action.* The review showed that in the Caribbean, the number of disasters was on the rise, as was the population affected and the damage costs. This is shown in figures 5, 6 and 7 below.

Figure 5. Frequency of Disasters in the Caribbean (1980-2009)[23]

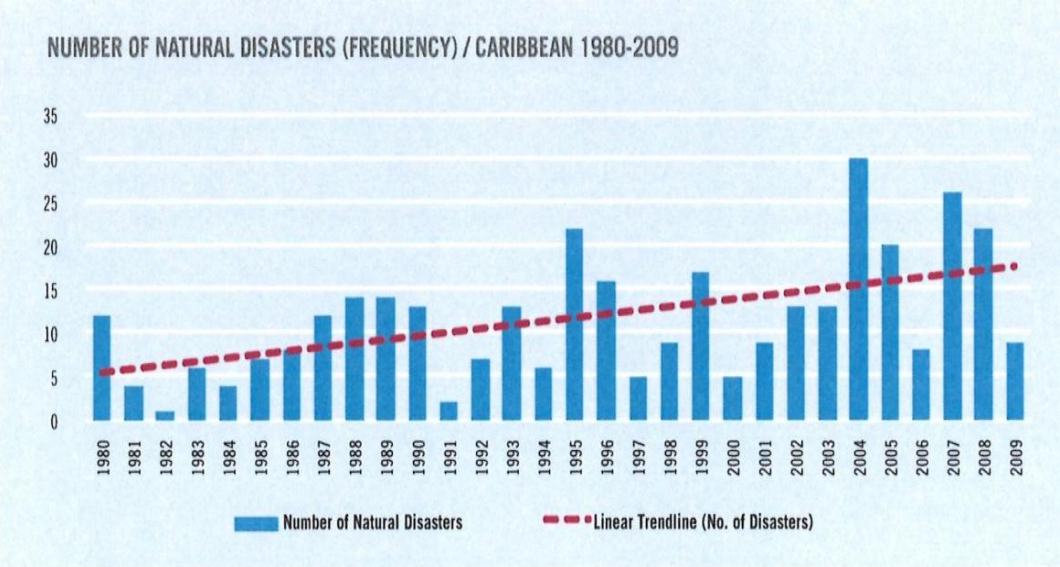
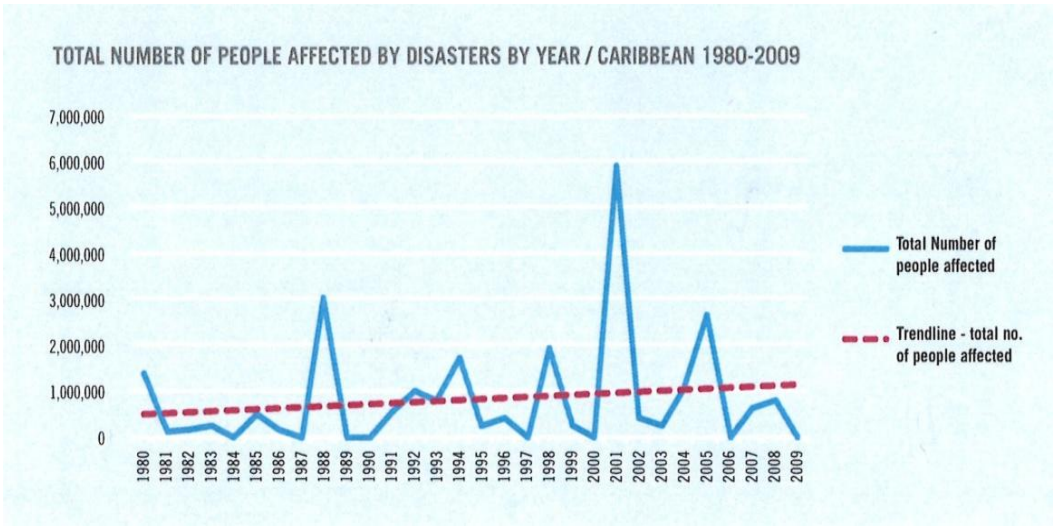
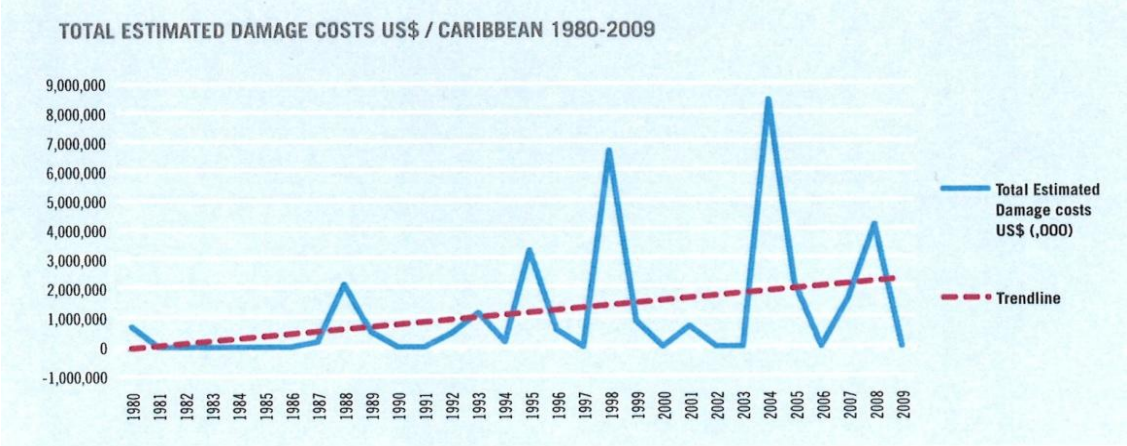


Figure 6. Total Number of People Affected by Disasters in the Caribbean (1980-2009)



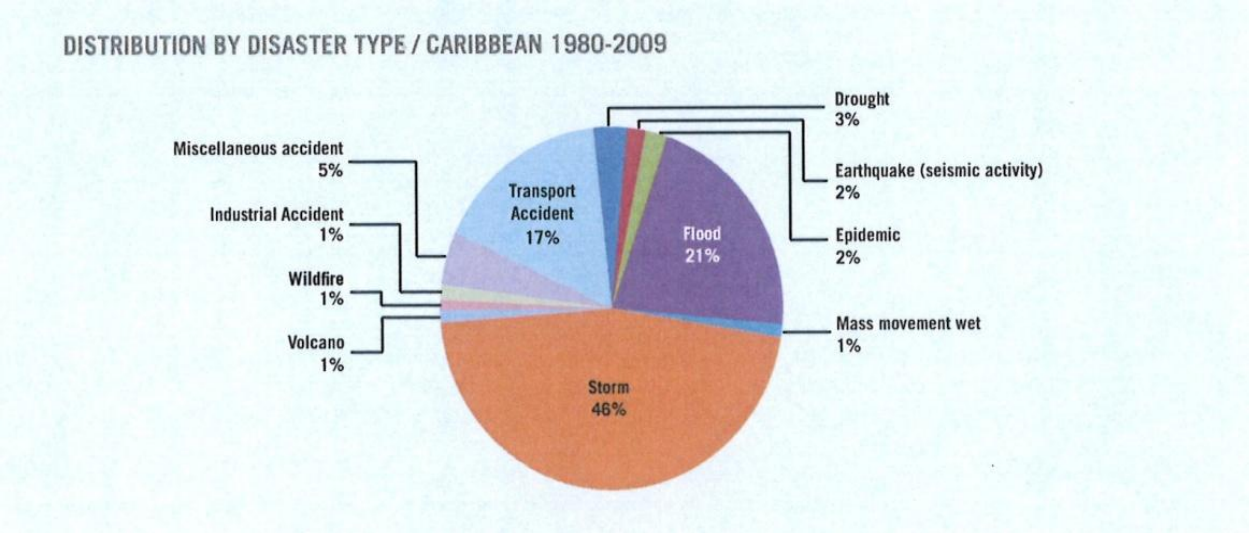
[23] Figures 5, 6, 7 and 8 have been taken from United Nations Development Programme (UNDP) & Disaster Risk Reduction Center (DRRC). (2011). *Caribbean Implementation of the Hyogo Framework for Action. HFA Mid-term Review*.

Figure 7. Total Estimated Disaster Damage Costs (US$) in the Caribbean (1980-2009)



Of all disasters that occurred from 1980-2010, the majority of disasters were due to floods and the impact of hydro-meteorological phenomena: tropical cyclones followed by floods. Please see figure 8 below.

Figure 8. Distribution by Disaster Type in the Caribbean: 1980-2009



The figure above highlights the importance of flood hazards in the Caribbean and thus the importance of flood risk reduction. The vulnerability of Caribbean community (CARICOM) states to climate events is evidenced by the impact of hurricanes, tropical storms and flooding in the region. Between 1995 and 2000, the region experienced its highest recorded level of hurricane activity. Over the last three decades, the Caribbean region has suffered direct and indirect losses estimated at between US$ 700 million and US$ 3.3 billion owing to natural disasters associated with extreme weather events.[24]

[24] Inter American Development Bank (IDB). (2000). *Natural Disasters in Latin America and Caribbean: An Overview of Risk*.

1.3.3. Disasters and Disaster Impacts in Guyana

The situation in Guyana is congruent with global and regional trends but also encompasses national contextual specificities. In the period from 1900 to 2013, the main disasters in the country were due to floods and these affected the coastal areas in particular. In Guyana specifically, the flood risk is exacerbated by vulnerability. As a result of the dynamic interplay between high tides, high rainfall and a network of drainage and irrigation canals, conservancy dams and sluices designed to support agriculture, the coastal zone is susceptible to high risk of flooding. This risk is also increased by the quality of sea defences along the coastal zone[25]. Table 3 below depicts among the most significant disasters in the country.

Table 3. Top Disasters in Guyana from 1900-2013, and Number of People Affected[26]

Disaster	Date	Total no. affected
Drought	July 1997	607,200
Flood	January 15, 2005	274,774
Flood	December 8, 2008	100,000
Flood	July 1996	38,000
Flood	January 8, 2006	35,000
Flood	July 1971	21,000

Economic costs have been increasing over the last four decades. The worst disasters in Guyana were caused by the floods of January 2005 and January 2006. Please see table 4 below:

Table 4. Top Disasters in Guyana and According Economic Costs[27]

Disaster	Date	Damage (US$, 000)
Flood	January 15, 2005	465,100
Flood	January 8, 2006	169,000
Drought	July 1997	29,000
Drought	January 2010	14,700
Flood	July 1971	200

Guyana is highly vulnerable to flooding, particularly in the coastal areas which are below sea level, and in Region 9 (see figure 4 above), which is prone to floods as a result of heavy and continuous rainfall and the run-off from neighbouring Brazil. In addition, flooding occurs due to a number of factors such as: high precipitation, river overflowing, sea swell and overflowing or breach of sea defences and conservancy dams. Furthermore, most human settlements and agriculture activities are in the coastal area which is below sea level.

[25] Government of Guyana (GoG). (2012). *Disaster Risk Management Policy*.
[26] US Office of Foreign Disaster Assistance (OFDA) & the Centre for Research on the Epidemiology of Disasters (CRED). (n.d.). *EM-DAT. Result Country Profile. Guyana.* [online].
[27] *idem*.

Moreover, the vulnerability of settlements in flood-prone areas is high with regards to their populations, infrastructures, housing and agricultural activities.

In January 2005, Guyana had the highest rainfall on record since 1888. A combination of this heavy rainfall, malfunctioning drainage structures and high tides caused an accumulation between one to one and a half metre of water affecting coastal Regions 3, 4 and 5 (presented in figure 4 above). This situation affected approximately 62% of the population of the country with an estimate of 70,000 dwellings severely impacted and 34 deaths caused by the floods and by water-borne diseases.[28] Damages and losses were extensive as depicted in table 5, which is taken from the *Macro-Socio Economic Assessment of the Damage and Losses Caused by the January –February 2005 Flooding* report produced by the Economic Commission for Latin America and the Caribbean (ECLAC).

Table 5. Summary of Damage and Losses Caused by the January 2005 Floods[29]

Summary of Damage and Losses			
Millions GYD			
Sector and Subsector	Damage and Losses		
	Total	Direct	Indirect
Total	**93,022.9**	**83,659.5**	**9,363.4**
Social Sectors	**55,665.9**	**55,247.2**	**418.7**
Housing	55,120.8	54,842.6	278.2
Education and culture	371.7	352.1	19.6
Health	**173.4**	**52.5**	**120.9**
Productive sectors	27,458.6	20,945.0	6,513.7
Agriculture	10,894.3	10,018.8	875.5
Commerce	14,476.1	10,213.1	4,263.0
Tourism	1,126.8	47.0	1,079.8
Manufacturing	961.5	666.1	295.4
Infrastructure	**9,143.3**	**7,452.2**	**1,691.1**
Drainage and irrigation	1,311.1	194.8	1,116.4
Water supply and water disposal	3,943.7	3,763.7	180.0
Road transport	3,529.0	3,349.0	180.0
Telecommunications	152.7	91.3	61.4
Electricity	206.7	53.4	153.4
Environment	**15.1**	**15.1**	
Total Emergency Relief	**740.0**		**740.0**

The loss of 93,022.9 billion GYD (as reported in table 5 above as the total amount of losses and damages for all sectors and subsectors) represented 59.49% of the gross national product (GNP) for 2004. The economic damage was furthermore exacerbated in that funding previously allocated to continue economic development had to be diverted to reconstruction instead. Table 6 below shows the economic damage related to selected macroeconomic variables.

[28] Economic Commission for Latin America and the Caribbean (ECLAC). (2005). *Macro-Socio Economic Assessment of the Damage and Losses Caused by the January –February 2005 Flooding*.

[29] Economic Commission for Latin America and the Caribbean (ECLAC). (2005). *Macro-Socio Economic Assessment of the Damage and Losses Caused by the January –February 2005 Flooding*. The consultant cannot explain any calculation errors in the table made by ECLAC.

Table 6. Summary of Damage in Relation to Selected Macroeconomic Variables as a Result of the January 2005 Floods[30]

Summary of Damage			
	Total	**Direct**	**Indirect**
Damage as percentage of GDP	59.49	53.51	5.99
Damage as percentage of export of goods	90.70	81.57	9.13
Damage as percentage of exports and services	64.22	57.75	6.46
Damage as percentage of gross domestic investment	185.88	167.17	18.71
Damage as percentage of consumption	75.73	68.11	7.62
Damage as percentage of the public external debt stock	43.11	38.77	4.34

Between December 2005 and January 2006, heavy rainfall again caused flooding in Guyana. Regions 1, 2, 3, 4, 5 and 6 (presented in figure 4 above) were the most affected, with floods being most severe in Regions 2 (Pomeroon/Supernaam) and 5 (Mahaica/Berbice). Both regions were declared disaster areas by the GoG on January 28th.[31] Damages and losses are listed in table 7 below.

Table 7. Summary of Damages and Losses, Floods December 2005-January 2006[32]

Summary of Damage and Losses				
Sector	**Damages and losses**			
	Million US$	***Million GYD***		
	Total Impact	**Total Impact**	**Damages (Direct cost)**	**Losses (Indirect cost)**
Total	**30.1**	**6,011.4**	**4,441.9**	**1,559.7**
Productive Sectors				
Agriculture	**22.1**	**4,415.4**	**3,923.8**	**491.7**
Rice	9.2	1,829.0	1,614.9	214.7
Other	8.3	1,662.2	1,593.2	69.0
Sugar	0.1	24.0	20.0	4.0
Livestock	4.5	900.2	695.7	204.5
Social Sectors	**0.8**	**158.0**	**91.6**	**66.4**
Housing	0.4	86.2	80.3	5.9
Education and culture	0.0	1.1	0.2	0.8
Health	0.4	70.7	11.0	59.7
Infrastructure	**4.7**	**940.2**	**426.5**	**503.8**
Drainage and irrigation	2.5	495.2		495.2
Water supply and water disposal	0.0	8.6	0.0	8.6
Road transport	2.2	436.4	426.5	…
Emergency expenditures	**2.5**	**497.8**		**497.8**
Cash grants to affected population	2.4	477.8		477.9
Supplement to the CDC	0.1	20.0		20.0

[30] Economic Commission for Latin America and the Caribbean (ECLAC). (2005). *Macro-Socio Economic Assessment of the Damage and Losses Caused by the January –February 2005 Flooding*.
[31] Economic Commission for Latin America and the Caribbean (ECLAC). (2006). *Guyana. The Impact on sustainable livelihoods caused by the December 2005- February 2006 Flooding*. The consultant cannot explain any calculation errors in the table made by ECLAC.
[32] *Idem.*

As can be seen, damages and losses for both floods were higher for the agriculture and housing sectors and, in the case of the 2006 floods, also in terms of impact on drainage and irrigation systems. As the result, the GoG provided cash grants to a population that had damage and loss in housing, crops and livestock. The GoG then had to provide these grants, as, in general, neither housing nor crops are insured in Guyana.

1.3.4. Potential Disaster Losses

According to data presented in the third draft of Guyana's *Low Carbon Development Strategy* (2010) "By 2030, the annual loss due to flooding in Guyana is projected to be US$ 150 million. This at-risk value has been estimated by using flood maps that combine an assessment of flood risk, population density and economic activity. Additionally, an extreme event similar to the serious flooding in 2005, which resulted in losses equivalent to 62% of GDP, could result in some US$ 0.8 billion in damages and losses to more than 320,000 people. Given these potential losses, investing in the most beneficial adaptation measures would significantly increase estimated national income in Guyana, and would likely be essential to attracting investors."[33]

1.3.4.1. Findings from the CDC Guyana Flood Risk Modelling Report[34]

In July 2012, the CDC produced a comprehensive and detailed *Guyana Flood Risk Modelling Report*[35] that speaks to flood hazards, vulnerability and risk mapping. It produced data and maps for:

- Dam-breach scenarios at three different water conservancy dams – the EDWC, the WDWC, and the TWC.
- Intense rainfall scenarios. (Combinations of 1, 2, 3, 4 and 5 day rainfall with return periods of 50, 100, 500 and 1,000 years)
- Flood hazard modelling considering run-off factors and detailed topography. (Combinations of 1, 2, 3, 4 and 5 day rainfall with return periods of 50, 100, 500 and 1,000 years)
- Vulnerability of exposed assets considering structural type, materials and height (number of stories).
- Risk assessment considering hazard assessment, inventory of elements exposed (Physical valuable cost of replacement; human value, or number of occupants estimated and structural class to which the assets belong to) and vulnerability of constructions.

Results were presented in maps showing the estimated relative loss in specific areas and in tables showing the estimated cost of crops such as rice and total loss in Georgetown, Ana Regina and New Amsterdam for the different scenarios for dam breach and rainfall. In addition, the report presents maps showing the main areas that would be flooded as a result

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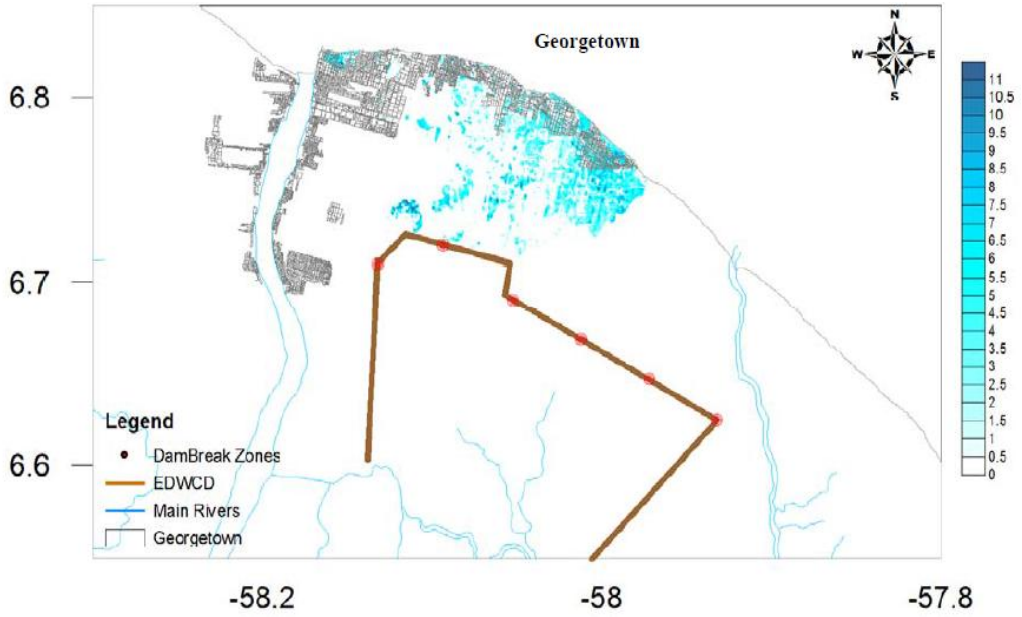
[33] Government of Guyana (GoG). Office of the President. (2010). *A Low Carbon Development Strategy. Transforming Guyana's Economy while Combating Climate Change*.

[34] Information and maps in this section have been taken from Civil Defence Commission of Guyana (CDC), Inter-American Development Bank (IDB) & Evaluación de Riesgos Naturales – América Latina (ERN). (2012). *Flood Risk Modelling Report*.

[35] Under the technical cooperation project ATN/OC-11718-GY financed by the IDB.

of a dam breach of one of the three water conservancy dams or of precipitation. For an example, see figure 9 below.

Figure 9. Dam Break Flood Hazard Result, Map for Zone 2 - EDWC



Fu

Furthermore, the report presented results of a probabilistic risk assessment analysis of the probability distribution which exposed assets may be subjected to over a given period of time as a consequence of floods caused by dam breach and precipitation. For example, see figure 10 and 11 below, which present respectively the relative loss that could occur as a result of a dam breach and for precipitation in Region 3.

Figure 10. Relative Loss for Dam Breach – Region 3

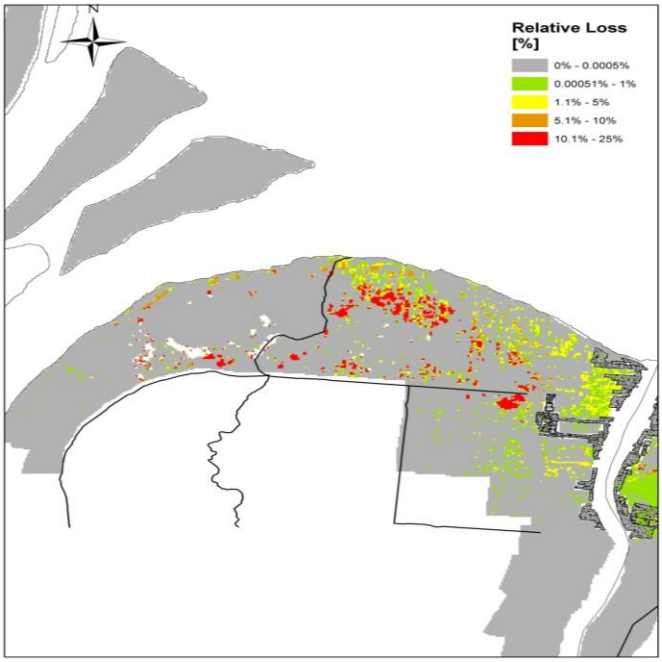
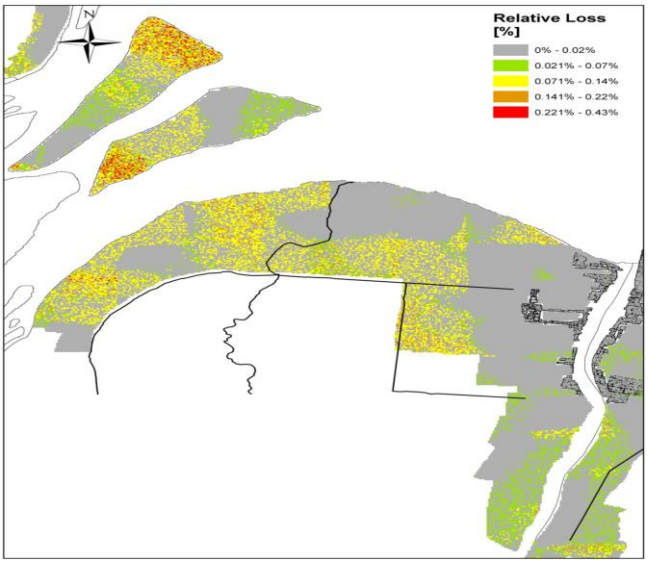


Figure 11. Relative Loss for Precipitation – Region 3



In addition, by combining the hazard (dam breach temporality and precipitation temporality), its frequency and spatial distribution with the exposed elements and their vulnerability to those hazards in specific scenarios and applying probabilistic equations, the report estimated the probable maximum loss (PML) and the average annual loss (AAL) per hazard as well as for both the city and main towns portfolio (Georgetown, New Amsterdam, Ana Regina) and for the main crops portfolio (sugar and rice). The overall results are presented in table 8 below, which summarizes the results for the entire portfolio of exposed assets in Guyana, including the AAL and the PMLs for the different return periods.

Table 8. Flood Modelling Report Results Summary[36]

Results		
Exposed value	**US$ x10^6**	7,619.35
Annual Average Loss[37]	**US$ x10^6**	15.300
	‰[38]	2.008
PML		

[36] Civil Defence Commission of Guyana (CDC), Inter-American Development Bank (IDB) & Evaluación de Riesgos Naturales – América Latina (ERN). (2012). *Flood Risk Modelling Report*. The table is taken directly from this report. The consultant cannot explain any potential variance or error.

[37] "The AAL value represents the amount of economic loss that, on average, is expected to occur each year to Guyana's principal human settlements and crops due to the action, in this case, of both dam breach events as well as direct precipitation. This result is presented both in monetary units and as relative values (relative loss with respect to the total exposed value)" Civil Defence Commission of Guyana (CDC), Inter-American Development Bank (IDB) & Evaluación de Riesgos Naturales – América Latina (ERN). (2012). *Flood Risk Modelling Report*.

[38] This column determines the relative value of the AAL by attributing a corresponding per mil (‰) of the total exposed value.

Return period[39]	Loss	
years	US$ x10^6	%
100	222.65	2.92
250	273.92	3.60
500	283.29	3.72
1000	300.08	3.94

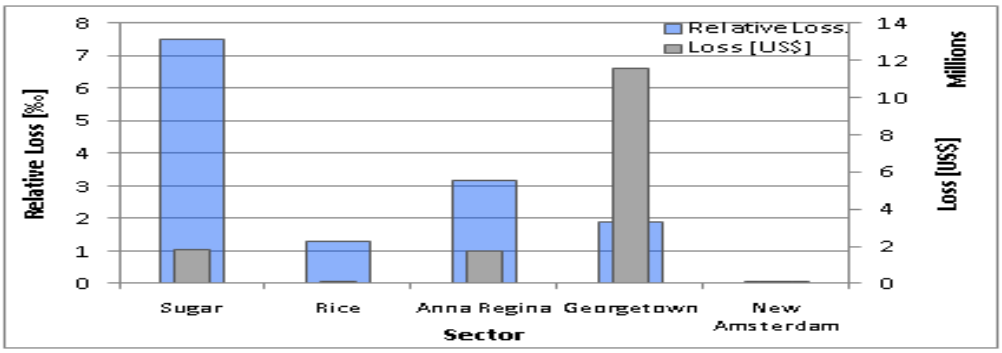
The report mentions that the AAL value represents the amount of economic loss that, on average, is expected to occur each year to Guyana's principal human settlements and crops due to the action, in this case, of both dam breach events as well as direct precipitation. This result is presented both in monetary units and as relative values (relative loss with respect to the total exposed value), in order to have a better understanding of the magnitude of that figure. Table 9 and figure 12 below present a summary of results for each component of the complete portfolio of analysis.

Table 9. Results by Component. Average Annual Loss[40]

Component	Exposed Value		Average Annual Loss		
	[US$]	[%]	[US$]	[‰]	Rel. part [%]
Sugar	245,515,208	3.22	1,844,056	7.5	12.05
Rice	105,240,584	1.38	135,356	1.3	0.88
Anna Regina	549,518,000	7.21	1,738,504	3.2	11.36
Georgetown	6,178,896,000	81.09	11,556,832	1.9	75.54
New Amsterdam	540,176,000	7.09	24,872	0.05	0.16
TOTAL	**7,619,345,792**	**100**	**15,299,620**	**2.008**	**100**

This table shows the AAL corresponding to each individual component.

Figure 12. Results by Component. Average Annual Loss.[41]



[39] A return period is an estimate of the likelihood of an event, such as an earthquake, flood or a river discharge flow to occur.

[40] Civil Defence Commission of Guyana (CDC), Inter-American Development Bank (IDB) & Evaluación de Riesgos Naturales – América Latina (ERN). (2012). *Flood Risk Modelling Report*. The table is taken directly from this report. The consultant cannot explain any potential variance or error.

[41] Civil Defence Commission of Guyana (CDC), Inter-American Development Bank (IDB) & Evaluación de Riesgos Naturales – América Latina (ERN). (2012). *Flood Risk Modelling Report*.

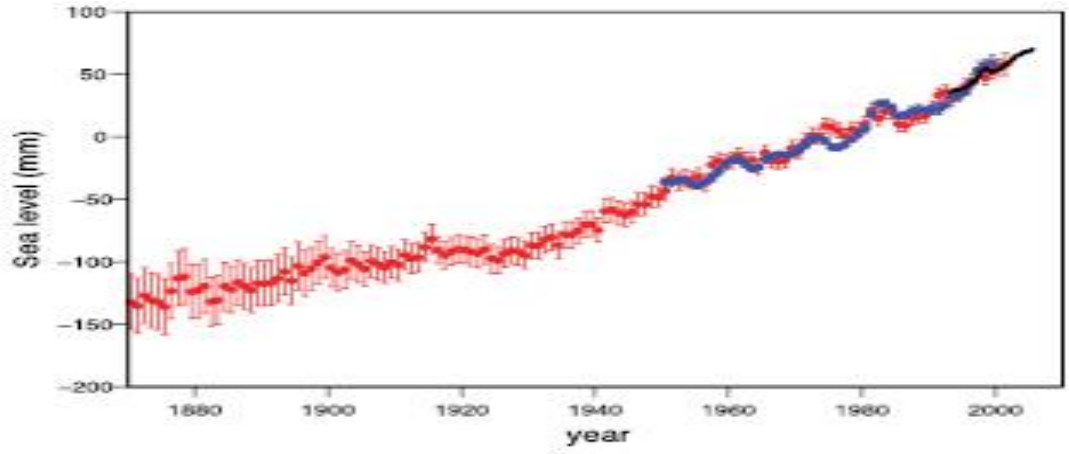
As shown in the previous table and figure, when analyzing absolute losses, the most exposed value and absolute loss are concentrated in Georgetown, which would bear 75.54% of total losses. The sugar crops would account for 12.05% of total losses, followed by Anna Regina with 11.36%, rice crops with 0.8% and New Amsterdam with 0.16%. However, when analyzing losses relative to exposed value, the sugar crops are in the most vulnerable condition with 7.5‰, of the value followed by the town of Anna Regina with 3.2‰, Georgetown with 1.9‰, rice crops with 1.3‰, and New Amsterdam with the lowest relative loss of 0.05‰.

Finally, the report concludes that "Both direct and indirect impacts on the global economy of Guyana, due to the high risk on both agricultural activities and human settlements, are of major concern. About 90% of the population and most of the economic activity and exposed infrastructure are located within potential flooding zones. (…) probabilistic risk analysis indicates that maximum probable losses on the order of US$ 300 million could be expected in extreme events, when considering only direct impact on infrastructure and main crops. This figure could increase two- or threefold once direct and indirect economic impact is considered."[42]

1.3.4.2. The Potential Impacts of Climate Change

The potential negative impacts that climate change can have on Guyana are also noteworthy. Climate change and DRM are in fact closely linked. Scientific research suggests that in the coming years, more extreme weather events will increase in frequency and magnitude due to climate change. Therefore, DM organizations need to take provisions to adapt to climate change by improving DM measures such as hazard and vulnerability mapping as well as mitigation and disaster response actions.

Figure 13.1. Annual Averages of the Global Mean Sea Level (in millimetres)[43]



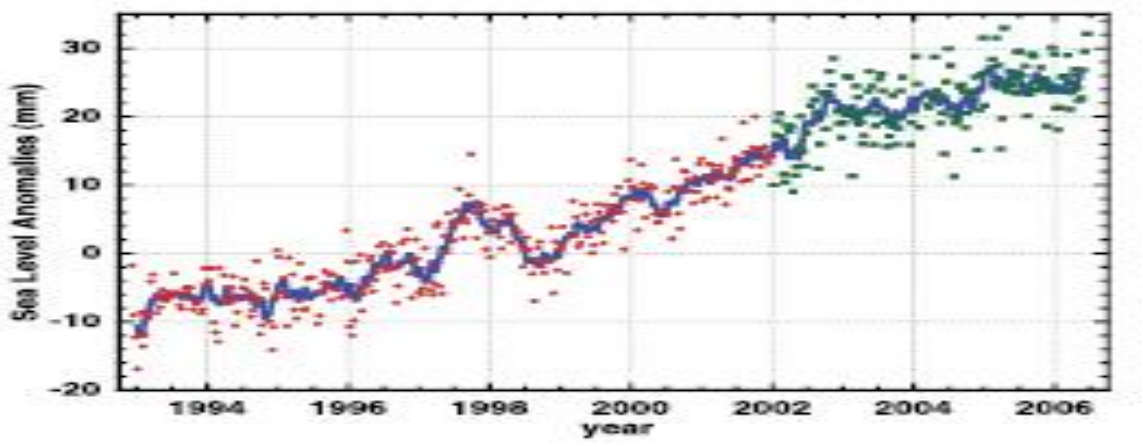
The red curve shows reconstructed sea level fields since 1870 (updated from Church and White, 2006); the blue curve shows coastal tide gauge measurements since 1950 (from Holgate and Woodworth, 2004) and the black curve is based on satellite altimetry (Leuliette et al., 2004). The red and blue curves are

[42] Civil Defence Commission of Guyana (CDC), Inter-American Development Bank (IDB) & Evaluación de Riesgos Naturales – América Latina (ERN). (2012). *Flood Risk Modelling Report*.
[43] Figure 13.1 and 13.2 are taken from Solomon, S., *et. al.* (eds.)(IPCC). (2007). *Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*.

deviations from their averages for 1961 to 1990, and the black curve is the deviation from the average of the red curve for the period 1993 to 2001. Error bars show 90% confidence intervals. IPCC[44]

In addition to more frequent and higher magnitude natural hazards due to climate change, the IPCC in its *Fourth Assessment Report* (2007) indicates that one of the climate change effects will be changes in sea level. Analyses of tide gauges are displayed in figure 13.1. above. The same report also presents data from analyses from 1993 to 2005 also showing the increase in sea level. Please see figure 13.2. below:

Figure 13.2. Variations in Global Mean Sea Level (in millimetres)



(Difference to the mean 1993 to mid-2001) computed from satellite altimetry from January 1993 to October 2005, averaged over 65°S to 65°N. Dots are 10-day estimates (from the TOPEX/Poseidon satellite in red and from the Jason satellite in green). The blue solid curve corresponds to 60-day smoothing. Updated from Cazenave and Nerem (2004) and Leuliette et al. (2004).[45]

As noted in the Caribbean *Regional Framework for Achieving Development Resilient to Climate Change* (2009-2015), global climate change is the most serious threat to sustainable development facing CARICOM states.[46] While the contribution of CARICOM states to greenhouse gas emissions (GHG) is quite negligible, according to a recent report of the IPCC[47] the projected impacts of global climate change on the Caribbean region are expected to be devastating. These impacts would be reinforced due to the limited adaptive capacity of the CARICOM small-island and low-lying coastal states. Specifically, global climate change is expected to result in more hostile regional climate change and rising sea levels. Rising sea levels, together with the associated coastal erosion and salt water intrusion, an escalation in the frequency and intensity of tropical storms and hurricanes, and disruptions in rainfall and fresh-water supply threaten the very existence of the CARICOM states. CARICOM states have

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[44] Solomon, S., *et. al*. (eds.)(IPCC). (2007). *Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*.

[45] Solomon, S., *et. al*. (eds.)(IPCC). (2007). *Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*.

[46] Caribbean Community Climate Change Centre (CCCCC). (2009). *Climate Change and the Caribbean: A Regional Framework for Achieving Development Resilient to Climate Change (2009-2015)*.

[47] Pachauri, R.K. and Reisinger, A. (Eds.)(IPCC). (2007). *Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*.

considerable cause for concern as the threats posed to the region's development prospects are severe and adaptation will require a sizeable and sustained investment of resources that governments will find very difficult to provide on their own.

In its *Second National Communication to the UNFCCC*, Guyana reported that according to the results of projections derived from different scenarios, the country is likely to be affected by climate change by temperature change, rainfall change and evaporation and water deficits, all of which could have critical effects on the country. Projections for mean annual air temperature for Guyana presented in the report show that temperature might be rising from 2°C to 4°C by the end of this century. The projections also show that by 2031, the increase in sea-level could reach 26 centimetre (cm) and in addition, storm surges could result in a 2.94 cm sea-level rise considering a moderate scenario, and up to 5.94 cm in a catastrophic scenario.[48] As demonstrated, Guyana could be affected by sea level rise, which can increase flooding particularly in coastal areas, and by the reduction of rainfall, causing more frequent and severe droughts. Planning is therefore essential for addressing adaptation options. The capacity to identify options must be in place as is the capacity to respond to the adverse impacts of climate change. DM organizations in Guyana must be prepared to respond effectively to abrupt and prolonged adverse conditions. As already discussed, the region's vulnerability to extreme weather events was demonstrated by floods in Guyana in 2005 and 2006. The flooding in Guyana affected 463,300 persons, or 62% of the population, and inflicted damage estimated at 93 billion GYD or 59.49% of the GDP for 2004[49].

Guyana is responding to climate change through a number of adaptation and mitigation measures that are detailed in several documents such as its *Climate Change Action Plan* (2001), the *National Development Strategy* (2001-2010), the *Low Carbon Development Strategy* (2010), and its *Second National Communication to the United Nations Framework Convention on Climate Change* (2012). Documents related to the "Guyana Mangrove Restoration" project also speak to measures being implemented to address climate change.

1.3.5. Disaster Risk Management and Sustainable Development

Disasters caused by different natural hazards can impact development in many ways. Disasters can cause direct damage to human life, settlements, infrastructure, environment, etc. This situation, of course, causes damage to the economy in that development funds have to be diverted to reconstruction. Thus, disasters have an impact in development by delaying its projects and programmes, thereby increasing poverty. Some facts have already been presented demonstrating that this is the case for Guyana.

Disasters and disaster loss have increased in the last decades, globally and in the Caribbean, a phenomenon that is attributed to the increase of population living in areas at risk as well as to unregulated urban development. As is the case specifically in Guyana, in all instances where more population are living in areas at risk, coupled with more human settlements, buildings and infrastructure, these together serve to increase vulnerability and risk. For example, urban growth without risk reduction measures such as the enactment and enforcement of adequate

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[48] Government of Guyana (GoG). (2012). *Guyana. Second National Communication to the United Nations Framework Convention on Climate Change.*

[49] Economic Commission for Latin America and the Caribbean (ECLAC). (2006). *Guyana. The Impact on Sustainable Livelihoods Caused by the December 2005 – February 2006 Flooding*.

building codes and without adequate land use regulations causes vulnerability to natural hazards to increase. These factors are at play as well in Guyana. The World Bank states that "Unplanned and ill-planned urbanization has been the cause of environmental degradation (e.g., deforestation), overexploitation of natural resources (e.g., water), ecological disturbances (e.g., pollution), and social destitution (e.g., increase in poverty). These factors turn hazards into disasters. Increased population concentrations and substandard construction increase the vulnerability of the built environment and the fragility of socioeconomic systems. Land use and urban development practices often do not take into account susceptibility to natural hazards. United Nations statistics indicate that in the 1990s, close to 70% of construction in developing countries was built illegally. Hence, year after year, exposure to natural hazards increases as a result of unsustainable development. In sum, the following factors correlate disasters and development:

- Poor land management
- Increased population concentrations in hazard areas
- Environmental mismanagement, resulting in environmental degradation
- Lack of regulation and a lack of enforcement of regulation
- Social destitution and social injustice
- Unprepared populations and unprepared institutions
- Inappropriate use of resources."[50]

All these factors tend to increase vulnerability, reduce resilience, increase the number of disasters and, consequently, make development unsustainable. This highlights the utmost importance of planning and implementing DRM activities and projects that would ensure vulnerability reduction and lead to sustainable development. As noted, many of these factors are significant and bear consideration in the Guyanese context. Notwithstanding slow growth of the country's population due to the high rate of emigration of the Guyanese population,[51] the main areas of population concentration have not changed over the decades, and some of the sparsely populated regions have begun to grow. These areas of growth (i.e. Region 8) and high population concentration (especially Region 4 where the capital city, Georgetown is located – as presented in figure 4) represent those of higher risk to floods due to its low sea level. Additionally, bearing in mind the results of the *Guyana Flood Risk Modelling Report* and the possible future effects of climate change in terms of sea level rise as well as the aging and vulnerability of sea walls, conservancy dams and drainage system, the risk to flooding is increasing and the risk of unsustainable development remains. This is increased further if the challenges in structural vulnerability are considered in tandem with the challenges in non-structural areas such as land-use planning. Risk is therefore augmented by the fact that Guyana has no enacted Building Code. Thus, risk increases in terms of population and infrastructure exposed, combined with the higher risk of flooding and higher vulnerability due to the vulnerability of both old and new structures. Moreover, the situation of vulnerability is further exacerbated by the low rate of insurance use in Guyana. Since disasters are likely to continue if DRM measures are not taken to reduce vulnerability and risk, it is imperative to take immediate short-, medium- and long-term measures to ensure sustainable development in Guyana.

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[50] Fouad Bendimerad. (World Bank). (n.d.). *Disaster Risk Reduction and Sustainable Development*.
[51] Central Intelligence Agency (CIA). *The World Factbook.* [online].

2. PART II – OVERVIEW OF DISASTER RISK MANAGEMENT IN GUYANA

2.1. Disaster Risk Management and Integrated Disaster Risk Management vs. Disaster Management

The concept of DM was developed more than two decades ago. It comprises several components such as hazard information (hazard identification, vulnerability and risk assessment), prevention/mitigation (including both structural and non-structural measures), preparedness, response and recovery. This concept arose in order for DM organizations to cover all components instead of focusing on only one of the components, as it happened in the past; namely, disaster organizations were much more focused on response or relief only.

The concept of DM has evolved slowly to DRM. Whereas traditional preparedness and response mechanisms often focused on individual hazard events, risk management viewed hazard exposure as an ongoing process and aimed at reducing vulnerability to hazards across all sectors of society and the economy.[52] DRM then, was developed to ensure a comprehensive framework for coordinating multi-hazard and multi-sectoral risk management activities. The IDB has developed an IDRM approach that emphasizes actions that are taken before a hazard results in a disaster, and incorporates climate change adaptation as well. The concept of IDRM refers to taking a multi-hazard, all-phases, all-sectors and all-level (national, district, local) comprehensive and integrated approach to DRM. In this manner, disaster risks can be addressed and reduced in a comprehensive way, i.e. not just by considering one component (e.g. preparedness and response) but all of them; and not just at the national/central level but by considering all levels and all sectors of society (e.g. national and regional governments, ministries and sectors of health, education and tourism, the private sector, and communities).

DRM and IDRM encompass the following five components: risk identification, prevention and mitigation, financial protection and risk transfer, preparedness and response, and recovery (rehabilitation and reconstruction). DRM and IDRM integrate risk identification, risk mitigation, and financial protection and risk transfer with disaster preparedness, emergency response and rehabilitation/reconstruction to lessen the impacts of hazards. The move to DRM/IDRM encompasses transformational change, with a shift from reactive and responsive DM to a more holistic and comprehensive approach that focuses on risk reduction and management and sustainable development. Table 10 below depicts the five components of DRM/IDRM and its main sub-components/activities.

Table 10. Examples of Activities Comprised by Each DRM Component

DRM Components	Examples of Activities (Sub-Components)
Risk identification	1. Hazard identification and mapping 2. Vulnerability assessment and mapping 3. Risk assessment and mapping 4. Disaster scenario design 5. Baseline data collection on population considering gender issues 6. Baseline data collection on housing, infrastructure and environmental assets including their estimate value

[52] The World Bank. Caribbean Group for Cooperation in Economic Development (CGCED). (2002). *Natural Hazard Risk Management in the Caribbean: Revisiting the Challenge*.

DRM Components	Examples of Activities (Sub-Components)
	7. Research
Prevention/mitigation	1. Structural vulnerability assessment 2. Retrofitting 3. Structural strengthening 4. Re-location of infrastructure and human settlements (i.e., land-use planning) 5. Enacting and enforcement of Building Code 6. Best construction practices 7. Adequate land use 8. Maintenance for infrastructure 9. DRM integrated in development
Financial Protection and Risk Transfer	1. Prevention/mitigation funds 2. Promotion of insurance 3. Establish dialogue with insurance companies to design and implement insurance strategies 4. Accessing insurance through regional and international insurance companies and facilities
Preparedness/ Response	1. Legislation and policies[53] 2. DRM organizational capacity building 3. Emergency operations centres (EOCs) 4. Emergency response plans 5. Training 6. Simulation exercises 7. Public education and awareness
Recovery	1. Establishment of mechanisms for adequate early recovery and reconstruction after disasters 2. National capacity for damage and needs assessment (DANA) 3. Design of business continuity plans (BCP) for the private sector 4. Design of continuity of operations plans (COOPs) for governmental organizations 5. Design of guidelines for national recovery and reconstruction after disasters considering risk reduction 6. Contingency funds

The NIDRMP has been designed to include and address the five DRM/IDRM components and their specific sub-components. The NIDRMP has been developed with a view to alignment with IDB's DRM components, as developed in IDB's IDRM approach and articulated in its *Disaster Risk Management Policy* (2007), as well as in the enhanced regional *CDM Strategy and Programme Framework 2007-2012* and the *Hyogo Framework of Action* (2005-2015).

2.1.1. Comprehensive Disaster Management

In the Caribbean region in 2001, the CDEMA, with the involvement of regional and national DM organizations, the private sector, regional technical institutions and multi- and bilateral donors and leading institutions developed a Strategy and Results Framework for CDM in the Caribbean. This Strategy was developed with the objective of integrating CDM into the development process within the region. CDM also speaks to and comprises four phases for managing disasters: mitigation, preparedness, response and recovery. IDRM and CDM are therefore consistent. In addition, CDM adopts an approach to DRM that addresses all sectors and all institutions and organizations at all levels in a country and the region.

[53] Certainly, some of these aspects can rightly be understood as elements of 'governance; and not of preparedness or response or any DRM component per se. However, in the CDM and DRM paradigm, these elements are included in thse components. The NIDRMP treats these areas of 'governance' under these DRM components for consistency.

In 2006, CDEMA developed the enhanced regional *CDM Strategy and Programme Framework 2007-2012*. The enhanced regional CDM Strategy's vision, goal, outcomes and outputs can be seen in figure 14 below. All countries, including Guyana, have agreed to and adopted this regional framework.

Figure 14. The Enhanced Regional CDM Strategy's Results[54]

GOAL **Regional sustainable development enhanced through CDM**			
PURPOSE ***To strengthen regional, national and community level capacity for mitigation, management and coordinated response to natural and technological hazards and the effects of climate change.***			
OUTCOME 1: **Enhanced institutional support for CDM programme implementation at national and regional levels.**	**OUTCOME 2:** **An effective mechanism and programme for management of CDM knowledge has been established.**	**OUTCOME 3:** **DRM has been mainstreamed at national levels and incorporated into key sectors of national economies.**	**OUTCOME 4:** **Enhanced community resilience in Caribbean CDEMA states/ territories to mitigate and respond to the adverse effects of climate change and disasters.**
OUTPUTS *1.1 National disaster organizations are strengthened for supporting CDM implementation and a CDM programme is developed for implementation at the national level.* *1.2 CDEMA coordinating unit is strengthened and restructured for effectively supporting the adoption of CDM in member countries.* *1.3 Governments of participating states/ territories support CDM and have integrated CDM into national policies and strategies.* *1.4 Donor programming integrates CDM into related environmental, climate change and DM programming in the region.* *1.5 Improved coordination at national and regional levels for DM.* *1.6 System for CDM monitoring, evaluation and reporting being built.*	**OUTPUTS** *2.1 Establishment of a Regional DRR Network to include a DRR Centre and other centres of excellence for knowledge acquisition sharing and management in the region.* *2.2 Infrastructure for fact-based policy and decision-making is established /strengthened.* *2.3 Improved understanding and local/community-based knowledge sharing on priority hazards.* *2.4 Existing educational and training materials for CDM are standardized in the region.* *2.5 A strategy and curriculum for building a culture of safety is established in the region.*	**OUTPUTS** *3.1 CDM is recognized as the roadmap for building resilience and decision-makers in the public and private sectors understand and take action on DRM.* *3.2 DRM capacity enhanced for lead sector agencies, national and regional insurance entities, and financial institutions.* *3.3 Hazard information and DRM is integrated into sectoral policies, laws, development planning and operations, and decision-making in tourism, health, agriculture and nutrition, planning and infrastructure.* *3.4 Prevention, Mitigation, Preparedness, Response, Recovery and Rehabilitation procedures developed and implemented in tourism, health, agriculture and nutrition, planning and infrastructure.*	**OUTPUTS** *4.1 Preparedness, Response and Mitigation capacity (technical and managerial) is enhanced among public, private and civil sector entities for local level management and response.* *4.2 Improved coordination and collaboration between community disaster organizations and other research/data partners including climate change entities for undertaking CDM.* *4.3 Communities more aware and knowledgeable on DM and related procedures including safer building techniques.* *4.4 Standardized holistic and gender-sensitive community methodologies for natural and anthropogenic hazard identification and mapping, vulnerability and risk assessments, and recovery and rehabilitation procedures developed and applied in selected communities.* *4.5 EWS for DRR enhanced at the community and national levels.*

[54] Caribbean Disaster Emergency Management Agency (CDEMA). (2007). *Comprehensive Disaster Management Strategy and Programme Framework 2007-2012.*

The move from DM to DRM, CDM and IDRM is beyond semantic. The move to DRM/IDRM is representative of a paradigm shift that encompasses transformational change. Since endorsing CDM, Guyana has taken several advances towards CDM, as discussed throughout this section.

2.2. The National Disaster Risk Management System in Guyana

2.2.1. Introduction

This section focuses on the national DRM system and the institutional structure and enabling environment for DRM in Guyana as well as presenting the existing organizations and their main functions. The organizations and their functions are described. Finally, this section will provide a look at key projects and activities currently ongoing or recently undertaken in the context of presenting how the country has advanced with regards to DRM. As the section clearly shows, **many of the key elements of a national DRM system have increasingly come into place in recent years in Guyana, though neither a full national DRM system nor a comprehensive programme for DRM yet exist.**

2.2.2. Evolution of the Enabling Environment

Over the years, the GoG, with the support of the international donor community, has designed and implemented several policy instruments and plans aimed at improving DRM and addressing climate change. Table 11 below presents a summary of key developed, demonstrating a commitment to DRM and an evolving enabling environment for DRM and for addressing climate change with view to reducing vulnerability and managing risk.

Table 11. Overview of the Evolution of the Legal Environment in Guyana

Date	Key Policies, Strategies and Plans related to DRM in Guyana[55]	Description linked to DM and DRM
1982	National Prevention, Preparedness and Relief Plan	Guyana's efforts to manage emergencies and disasters date back from 1982 when the CDC developed the *National Prevention, Preparedness and Relief Plan* to cope with all types of disasters.
1985	National Disaster Preparedness and Response Plan	Outlines stakeholders involved in DM and their roles.
1992	United Nations Framework Convention on Climate Change	Guyana signed the UNFCCC in 1992. The UNFCCC entered into force for Guyana in 1994.
2000	Integrated Coastal Zone Management Action Plan	Provides overarching planning framework for the sustainable use of coastal resources as well as strengthening of institutions. This Plan is further reinforced by the Environmental Protection (Hazardous Wastes Management) Regulations, 2000
2001	Climate Change Action Plan	Provides reference point for national programmes to help mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and measures to facilitate

[55] A Ministry of Education (MOE) *Disaster Preparedness Policy*, and a *Health Sector Emergency and Management Plan* were mentioned in documents reviewed. However, these documents have not been provided to the consultant; therefore, the dates of publication and the content are not known.

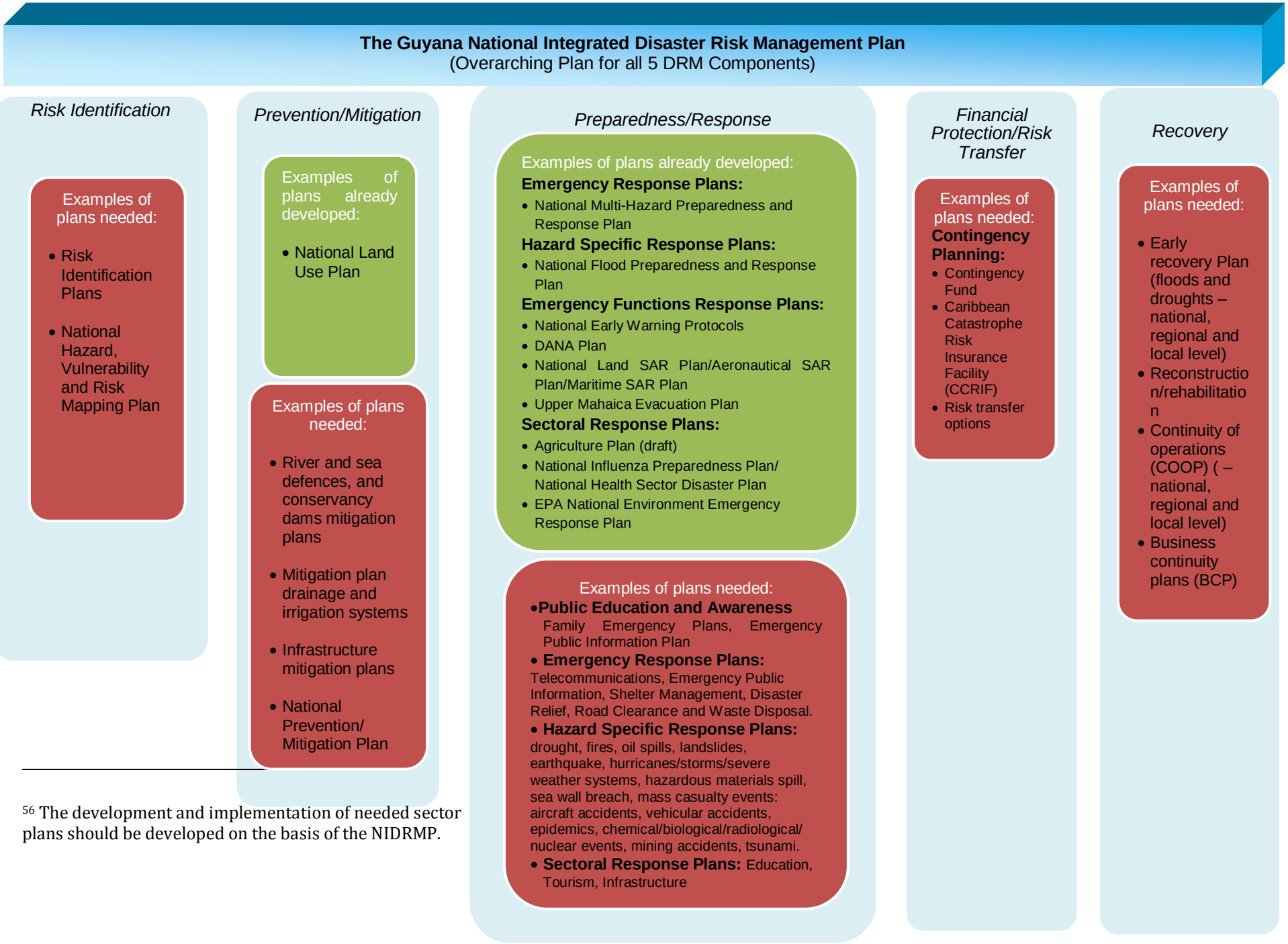
		adequate adaptation to climate change.
2001	National Development Strategy (2001-2010)	Provides a framework for national planning and captures a number of cross-sectoral issues such as environment, forestry, agriculture, mining, tourism and fisheries, among others. Makes some clear statements on measures to be taken to build capacity in the areas of water management and flood control, sea defence management, and to promote the use of renewable energy.
2002	Poverty Reduction Strategy Paper (2001-2005)	Provides planning framework for initiatives taken to reduce the socio-economic vulnerabilities of communities (particularly those of rural and interior areas) through improved social infrastructure and increase livelihood opportunities will build national resilience to climate change and other environmental hazards. The *Poverty Reduction Strategy Paper* highlights the vulnerability of Guyana to disaster risks, particularly natural disasters due to the geo-topography of Guyana.
2002	Climate Change Adaptation Policy and Implementation Strategy for Coastal and Low Lying Areas	Provides a point of reference in the process of identifying key issues of coastal plain of Guyana with regards to potential climate change impacts, capacity building, and the institutional and legislative framework. Further, it informs the types of interventions that are necessary at the sectoral level to ensure that Guyana's response to the threat of climate change is planned.
2005	Hyogo Framework for Action 2005-2015	Promotes a strategic and systematic approach to reducing vulnerabilities and risks to hazards. It underscores the need for, and identified ways of, building the resilience of nations and communities to disasters. Guyana however did not fully implement the Hyogo Framework for Action at the national level yet.
2006	EPA National Environment Emergency Response Plan	Was prepared with the purpose of protecting the environment and the sustainable use of natural resources and to facilitate recovery from the detrimental effects of incidents.
2006	CDEMA Enhanced Regional CDM Strategy and Programme Framework (2007-2012)	Represents the Strategy and Results Framework for CDM in the Caribbean. CDM speaks to and comprises four phases for managing disasters: mitigation, preparedness, response and recovery. Guyana has not implemented fully this framework yet.
2007	Declaration of Turkeyen	Highlights Guyana's commitment to disaster prevention and response. The Declaration in Clause 11 furthermore emphasizes Guyana's commitment to the *Hyogo Declaration* and the Framework for Action.
2009	National Agricultural Sector Adaptation Strategy to Address Climate Change (2009-2018)	The goal of this Strategy is to more effectively reduce the risks posed by climate change and position the agricultural sector to adapt through technical innovation and diversification to increase its competitiveness and sustainability by 2018. Among its objectives is to build resilience and adaptive capacity within the sector.
2010	Guyana Low Carbon Development Strategy	Provides overarching national framework for the transformation of Guyana's current economy to that of a "low carbon economy" while addressing issues related to climate change. The Guyana *Low Carbon Development Strategy* emphasizes the linkage between climate change and induced flooding. The LCDS identifies floods as one of the main adaptation challenges for Guyana and as a consequence one of its priority areas for action.
2010	Damage Assessment and Needs Analysis Plan, Policy and Framework	Outlines the framework within which damage assessment is carried out. The Plan outlines the authority, purpose and objectives along with the institutional framework for planning and executing DANA in addition to the Standard Operating Procedures (SOPs) to be followed in the event of a major response operation.

2010 (rev. in 2012)	National Flood Preparedness and Response Plan	Provides strategic guidance in a systematic and sequential manner for preparing and responding to floods.
2012	National Multi-hazard Preparedness and Response Plan	Shows GoG commitment towards instituting adequate preparedness and response mechanisms to ensure that the country is well prepared and able to respond in an efficient manner to disasters.
2012	National Early Warning Systems in Guyana Report	The main purpose of having an EWS is usually to protect lives and livelihoods from known hazards, while minimising negative impacts on economy and environment. An effective EWS constitutes one of the key elements of any disaster reduction approach.
2012	Draft Disaster Risk Management Policy	Designed to establish the guiding principles and architecture for DRM in Guyana by presenting the institutional structures, roles, responsibilities, authorities and key processes required to achieve a coordinated, coherent and consistent approach. The *DRM Policy* also seeks to provide an overarching framework for decision-making and coordination across DRM sectors and multiple stakeholders inclusive of government, civil society, private sector, and the international community.
2013	National Land Use Plan	Provides the framework for coordination among the land uses, as well as, facilitates integration of land use. It is aimed at providing support to decision making, through looking at development options and constraints throughout the country. Addresses the question of climate change and sea-level rise.
2013	Draft Disaster Risk Management Bill	Represents the GoG commitment to develop a national strategy for DRR and management. The *DRM Bill* provides the legal basis for the development of policies and plans for the implementation of actions and measures pertaining to all aspects of DRM.

In terms of national planning, as shown in table 11, in 2012 a *National Multi-hazard Preparedness and Response Plan* was developed and approved. This is a preparedness and response plan, and its critical and central function as the primary response plan for Guyana remains, even as this NIDRMP exists and is implemented. It is noted that the *National Multi-hazard Preparedness and Response Plan* is not a DRM plan per se. It covers all hazards thematically, yet addresses only preparedness and response and not the other DRM components. Other plans already developed include the *Flood Response and Preparedness Plan*, *Damage Needs and Assessment Plan, Early Warning Protocols,* NEOC SOPs, *National Land Search and Rescue Plan, Aeronautical Search and Rescue Plan, Maritime Search and Rescue Plan*, the *National Influenza Preparedness Plan, National Health Sector Disaster Plan* and the *Upper Mahaica Evacuation Plan*. This collective of more recently developed plans demonstrates some progress towards DRM in the country and the NIDRMP takes this a step forward. The NIDRMP is designed to take account of and integrate key aspects of existing plans, and not to replace them. The development and implementation of needed sector plans should be developed on the basis of the NIDRMP.

Germane to a discussion on the enabling environment, figure 15 below depicts some of the linkages between the *National Multi-hazard Preparedness and Response Plan* and the NIDRMP, as well as some of the types of plans that need to be designed within the context of the NIDRMP, such as risk identification plans, prevention/mitigation plans, emergency response plans and recovery plans and a number of hazard-specific plans and emergency function response plans. A discussion of gaps to be addressed in DRM planning is presented below in section 4.2.

Figure 15. Links between the NIDRMP and Other Plans[56]



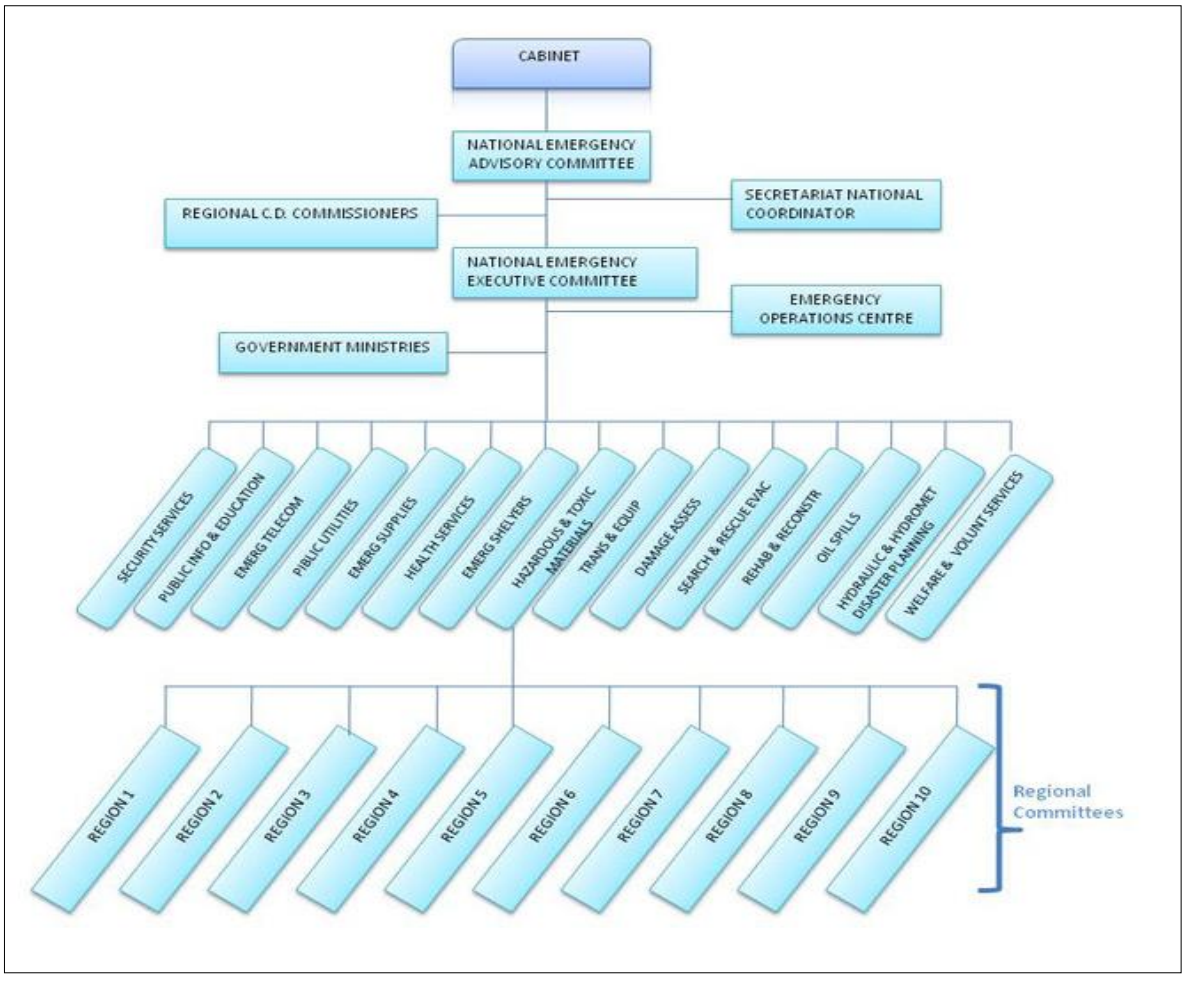
[56] The development and implementation of needed sector plans should be developed on the basis of the NIDRMP.

2.2.3. The National Disaster Risk Management System

2.2.3.1. Evolution of Guyana's National Disaster Management System

In 1982, under Guyana first 'disaster' plan – the *National Prevention, Preparedness and Relief Plan* – the CDC was created as the lead organization in Guyana in charge of conducting operations to deal with all types of disasters in the country and was placed under the Office of the Prime Minister (OPM). In 1985, the *National Disaster Preparedness and Response Plan* was designed, and in 1992, the responsibility for the CDC was moved to the Office of the President (OP), where it still remains. *The National Disaster Preparedness and Response Plan* from 1985, prior to the regional move to CDM and DRM, defined the DM structure in Guyana as follows:

Figure 16. Disaster Management Structure (1985)[57]



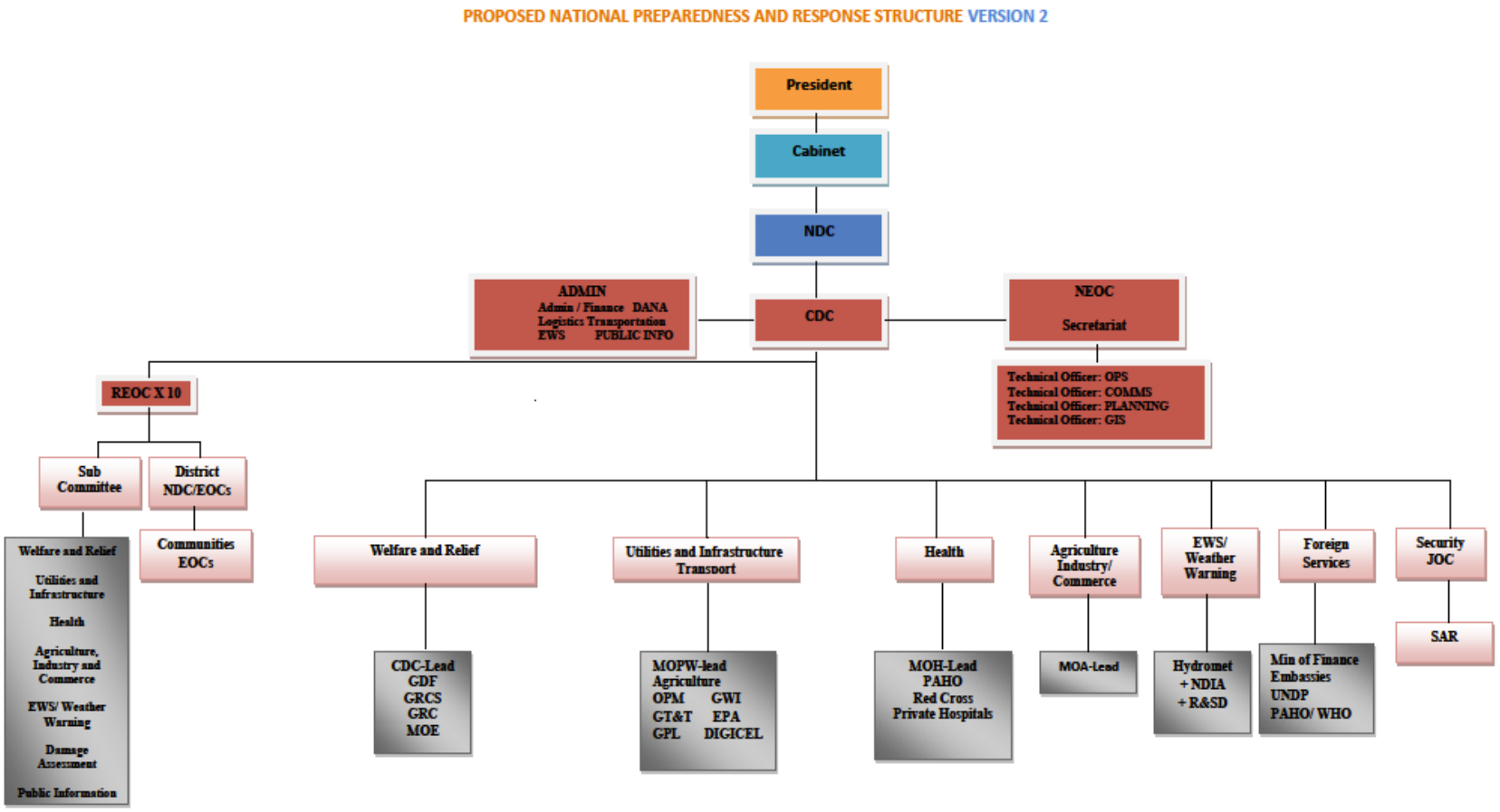
In recent years, Guyana has taken important steps towards CDM and IDRM. Though the move is not complete, key documents suggest that Guyana has more recently been shifting to a

[57] Civil Defence Commission (CDC). (n.d.). *CDC Website. About us.* [online]. Unfortunately, no clarification was provided to the consultant as to where the CDC fits into this defined structure.

proposed National Preparedness and Response Structure, as presented in the *National Multi-Hazard Preparedness and Response Plan.* This proposed National Disaster Preparedness and Response Structure (as shown in figure 17 below) shows the suggested new chain of command for the CDC under the National Disaster Coordinator, Cabinet and the President. At the same time, it shows the new suggested national disaster sub-committees which have been reduced from 15 to 7.

Though this revised structure presents improvements from an IDRM perspective, a structure that fully reflects all aspects of IDRM still needs to be put in place. The proposed national disaster structure has a preparedness and response approach that does not reflect the other phases of IDRM, namely: risk identification, prevention and mitigation, financial protection and risk transfer, and recovery. These other key components of IDRM could be better reflected in a new revised structure indicating organizations or sub-committees responsible for these DRM components. The National Preparedness and Response Structure is further assessed from a DRM perspective below in section 4.3.

Figure 17. Proposed National Disaster Preparedness and Response Structure



2.2.4. Key DRM Organizations

This section identifies the key organizations that are part of the Guyana DRM system. These actors have important roles and responsibilities for different DRM aspects, whether before, during or after events.

2.2.4.1. DRM Roles and Responsibilities by Organization

The draft *DRM Policy* (2011) discusses several GoG ministries, institutions, agencies, non-governmental organizations (NGOs), private sector and international and regional organizations involved in DRM along with their areas of involvement, including the CDC. These are presented in summary fashion in table 12 below.

Table 12. Organizations Involved in DRM in Guyana and their Areas of Involvement – as Proposed in the Draft DRM Policy (2011)[58]

Components	Roles and Responsibilities	Institution
DRM	Planning, coordination and conducting operations related to disaster preparedness.	CDC
Constitution, Political System	Definition of rules and boundaries of responsibilities within the system.	President, National Assembly
Executive and legislature	Policy direction	OP Head, Presidential Secretariat National Disaster Coordinator
Ministries and Public Service departments	*Activities in all aspects of the Disaster Management Cycle*	Ministry of Agriculture (MoA)
	Human capacity development.	Ministry of Amerindian Affairs
	Public Awareness and Education	Ministry of Education (MoE)
	Finance and Budgetary allocations	Ministry of Finance
	Regional and International commitments.	Ministry of Foreign Affairs
	Addressing Health Hazards	Ministry of Health (MOH)
	National Security	Ministry of Home Affairs
	Human capacity development	Ministry of Human Services and Social Security
	Human capacity development	Ministry of Labour
	Promulgation of laws, and other aspects of the legal and regulatory framework.	Ministry of Legal Affairs
	Disaster Preparedness	Ministry of Local Government
Statutory authorities and other semi-autonomous public agencies	National Environmental Emergency Response Plan	Environmental Protection Agency (EPA)
	Disaster Prevention Disaster Mitigation	Guyana Lands and Surveys Commission (GL&SC)

[58] This table was extracted from Government of Guyana. (GoG). (2011). *Disaster Risk Management Policy*. Draft. Revised in 2012.

	Disaster Prevention Disaster Mitigation	Guyana Geology and Mines Commission (GG&MC)
	Disaster Prevention Disaster Mitigation	Central Housing and Planning Authority (CHPA)
	Disaster Prevention Disaster Mitigation	Rice Development Board
	Disaster Prevention EWS Disaster Mitigation	Sea and River Defence Board
	Disaster Prevention EWS Disaster Mitigation	National Drainage and Irrigation Authority (NDIA)
Judicial bodies	Interpretation of laws Recommend changes in the law and procedures	Courts of Law – Magistrates Court, High Court, Court of Appeal and the Caribbean Court of Justice.
Enforcement and regulatory agencies	Monitoring and enforcement of laws and regulations. Disaster Response.	Guyana Defence Force
		Guyana Fire Service
		Guyana Police Force
Local Government	Disaster Preparedness	Mayor and Councilors of the City Georgetown
	Disaster Preparedness	Municipalities
	Disaster Preparedness	National Democratic Councils
	Disaster Preparedness	Regional Democratic Organs
International organizations, institutions and agreements	All activities	UNDP
	Public Awareness and Education	UNICEF
	Disaster preparedness and response activities.	Guyana Red Cross Society
Public Corporations	EWS	Guyana Power and Light Incorporated (GPL)
	EWS	Guyana Water Incorporated (GWI)
	EWS	Guyana Sugar Corporation
Private businesses	EWS Information and Communications Technology	Guyana Telephone and Telegraph Company (GT&T)
	EWS Information and Communications Technology	Digicel
Industry associations	Disaster Preparedness	Private Sector Commission
	Disaster Preparedness	Chamber of Commerce of Georgetown
	Disaster Preparedness	Guyana Tourism and Hospitality Association
	Disaster Preparedness	Air-Craft Owners Association
	Disaster Preparedness	Religious Organizations
Media	EWS	OP

	Public Awareness, Education and EWS	National Communications Network
	EWS	Guyana Information News Agency (GINA)
Epistemic Communities (groups defined by expertise)	Climate Smart Disaster Risk Management.	Climate Change Committee
	Public Awareness, Education and Research	University of Guyana
Informal and community-based institutions and organizations	Human capacity	Amerindian Village Councils

As presented above in table 12, a wide variety of DRM duties, roles and responsibilities have been proposed in the draft *DRM Policy* (2011), and are associated with a variety of institutions, ministries, agencies, and sectoral stakeholders. Duties and responsibilities are currently articulated in several contexts and in several instruments, all of which comprise part of the national DRM system. Institutional roles, duties and responsibilities are presently articulated in the context of a *National Early Warning System for Guyana*, the National DRR Platform, the draft *DRM Bill* (2013), and the *DANA Framework and Plan*. It is unclear at this stage to what extent there is currently awareness of these established roles and responsibilities among the key entities and to what extent these are being implemented at present. With the wide range of institutions involved in various aspects of DRM, there is, among other elements, a need to clarify and for coordination of the responsibilities and roles of each institution with respect to DRM and for all stakeholders to play their key role. A more in depth assessment of the current DRM system in Guyana as it relates to the roles and responsibilities of key organizations is presented in section 4.3.

2.2.4.2. The National Disaster Coordinator

The agreement establishing CDEMA requires that the participating state establish and maintain a National Disaster Office, directed by a National Disaster Coordinator, which is responsible for the daily management of this organization in charge of the coordinated response to disaster in each countries and responsible for carrying out the countries' National Disaster Management Programs. Based on this agreement, participating states, through their National Disaster Offices, are required to:

- Establish emergency disaster planning groups and define national policies and priorities in the event of disasters;
- Provide national relief organizations with adequate human resources support;
- Define the role and functions of the main agencies such as Health, Public Works and Security Services in disaster emergency response management and establish a system for regular review of their procedures;
- Establish and equip a suitable EOC capable of handling emergency telecommunications and coordinating emergency responses involving many services;
- Review and rationalize legal arrangements for disaster mitigation and emergency action;
- Develop and implement a comprehensive disaster public awareness, information and education program;

- Develop and implement appropriate training programs for persons involved in the disaster management system.[59]

The draft *DRM Bill* (2013) proposes that a National Disaster Coordinator be responsible for coordinating the general policy of the GoG relating to the prevention and mitigation of, preparedness for, response to, and recovery from emergencies and disasters and generally, to advise on matters relating to DRM. The draft *DRM Bill* (2013) also suggests that the National Disaster Coordinator be responsible to:

- review and assess the various programmes and activities of the GoG which have an impact on DRM, and recommend activities and programmes on disaster preparedness and coordination;
- in collaboration with Ministries and Departments of the GoG or other relevant entities, define procedures and formats for data sharing and gather timely and authoritative information concerning the conditions and trends in the quality of the natural and socio-economical environment, both current and prospective, as these relate to the likelihood of disasters in Guyana;
- analyse and interpret information for the purpose of determining whether identified conditions and trends are interfering, or are likely to interfere, with the achievement of the prevention and mitigation of, preparedness for, response to, and recovery from, emergencies and disasters;
- liaise with persons and organizations within and outside Guyana for the purpose of exchanging information and facilitating the harmonisation of the policies of such persons and organizations with those of the GoG relating to DRM;
- provide technical advice on draft regulations;
- consult with such entities, governmental or non-governmental as deemed appropriate in the preparation of the NIDRMP and Strategy;
- require any governmental entity or other relevant body to make available to the CDC such data or information, publicly owned vehicles, plant and equipment or personnel as are available to it for the purposes of response, rescue and relief;
- establish mechanisms for the exchange of information among public and private sector entities to inform policy formulation, plan development and decision making within other sectors.[60]

2.2.4.3. The CDC

Mission and Functions of the CDC

Currently, the CDC is the most critical institution in the DRM system and is the main coordinating entity for DRM in the country. The CDC's role is illustrated by the various actions taken by the organization in response to the Region 9 (defined in figure 4 above) floods of June, 2011 which involved the establishment of an EOC, holding coordination and briefing meetings with stakeholders, deploying personnel to the affected region, delivering relief supplies to the affected region and preparing and making available situation updates[61]. In

[59] Mark Kirton. (2013). *Caribbean Regional Disaster Response and Management Mechanisms: Prospects and Challenges*.
[60] Government of Guyana. (GoG). (2013). *Disaster Risk Management Bill*. Draft.
[61] Government of Guyana. (GoG). (2011). *Disaster Risk Management Policy*. Draft. Revised in 2012.

brief, the CDC's mission is to reduce loss of life and property and improve the quality of life in Guyana by leading, coordinating and supporting the nation in the development and enhancement of a CDM (DRM) system involving prevention, mitigation, preparedness and response.

In June 1997, the CDC was reconstituted by the GoG Cabinet with the following terms of reference:

- To identify disasters according to established criteria and classification;
- To produce plans for the management of national disasters;
- To identify and implement mechanisms for disaster response and mitigation;
- To maintain a permanent body, to enhance the national capacity for disaster management and response;
- To train human resources involved in disaster response mechanisms;
- To educate at all levels in the tenets of disaster responses.

The functions of the CDC are:[62]

- Service Provider: Promoting its role of providing services to local authorities/ communities and, for that purpose, to develop programmes designed to enhance those services.
- Planning and Implementation: Ensuring the promotion and development at the national level of disaster planning and management and, in cooperation with local authorities, facilitating the implementation of DM measures for the purpose of emergency relief and support;
- Loss Reduction and Mitigation: Promoting the adoption of disaster loss reduction and mitigation policies and practices at the national and local authority level;
- Voluntary Service: Promoting and developing voluntary service as an integral aspect of DM;
- Training and Education: Establishing and promoting the development, maintenance and improvement of the tenants of DM training and education; and
- Permanent Staffing: Maintaining a permanent body to enhance the national capacity for DM services.

The draft *DRM Policy* (2011), proposes that the Director General of the CDC (or his/her alternate) serves as the chair of the DANA Committee, as well as the National DRR Platform. Though not designated as the chairman, the CDC is also a member of the National EWS Sub-Committee. The CDC also is responsible for the NEOC. This is a critical institution which is activated in times of disasters in Guyana, and which role will be further defined in section 2.2.4.6. below.

As is evident, though the mission of the CDC speaks to CDM (and therefore DRM), the terms of reference and the functions of the CDC do not reflect the various components of IDRM. In fact, the functions and structure of the CDC have limitations from an IDRM perspective in terms of adequate coverage of all phases and components.

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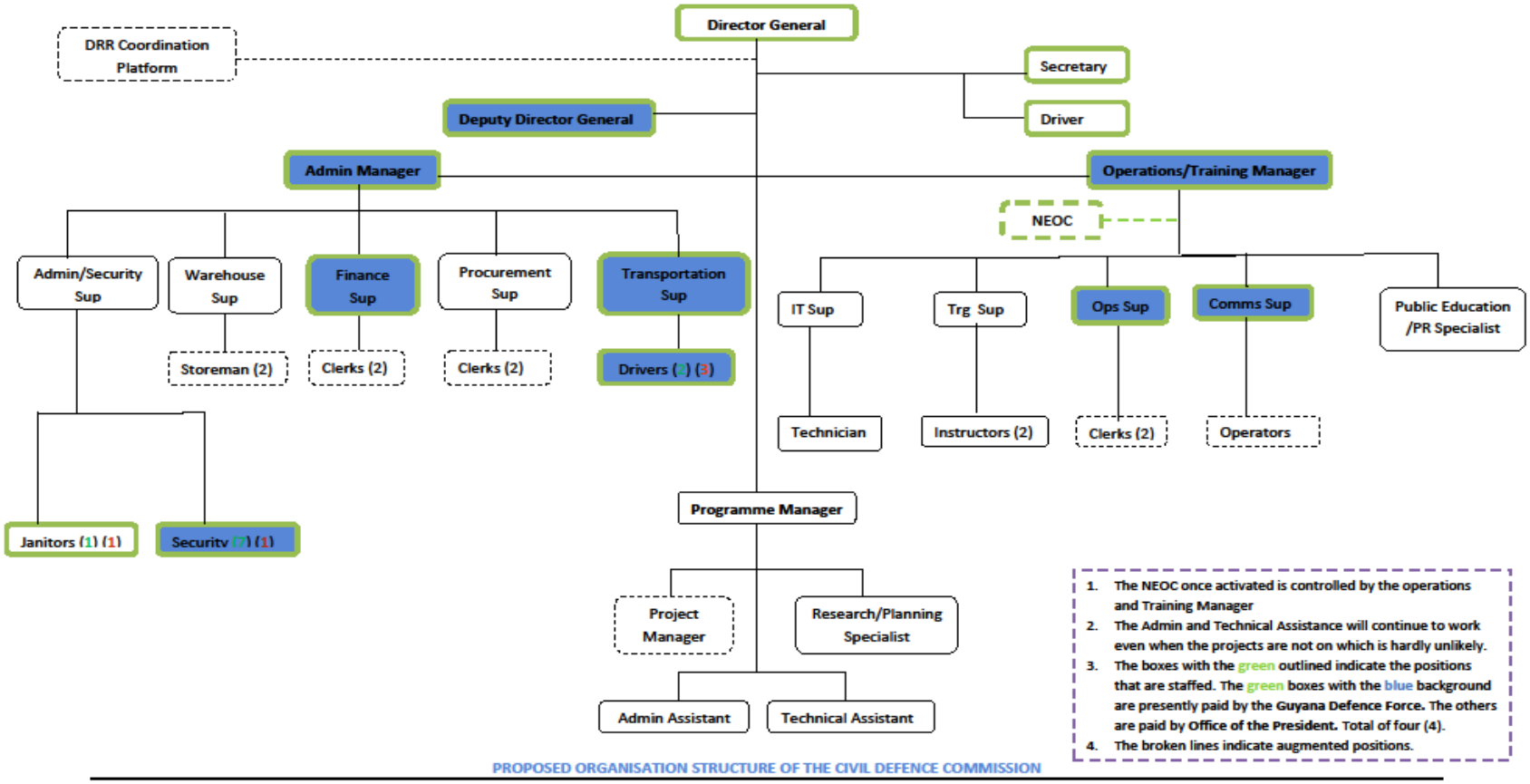
[62] Civil Defence Commission. (CDC). (n.d.). *Civil Defense Commission Website*. [online].

Structure of the CDC The structure of the CDC is presented in figure 18 below. It shows both the current and the ideal organizational structure for the CDC, indicating what positions are already staffed and which are not.

Figure 18. Organizational Structure of the CDC[63]



[63] Source unknown. Provided by the CDC.

2.2.4.4. Disaster Sub-Committees

More recently (and post CDM), seven disaster sub-committees are presented in the *National Multi-Hazard Preparedness and Response Plan*. The seven national sub-committees are depicted in table 13 below:

Table 13. Disaster Sub-Committees Presented in the National Multi-Hazard Preparedness and Response Plan

Disaster sub-committees	Composition
Welfare and Relief	CDC (Lead) Guyana Defence Force Guyana Red Cross Society, Guyana Relief Council MOE
Utilities, Infrastructure and Transport	Ministry of Public Works and Communications (Lead) MOA OP GT&T GPL GWI EPA DIGICEL
Health	MOH (Lead) Pan American Health Organization (PAHO), Guyana Red Cross Society Private Hospitals
Agriculture, Industry/Commerce	MOA (Lead)
EWS	Guyana Hydro-meteorological Service (HydroMet), NDIA Sea and River Defences
Foreign Services	Ministry of Finance Embassies UNDP PAHO
Security Joint Operation Centre	Search and Rescue Teams

In addition to these, the proposed National Disaster Preparedness and Response Structure, recently proposed in the *National Multi-Hazard Preparedness and Response Plan,* attributes further responsibilities to Regional Disaster Committees. These units are supposed to be established in all ten region of Guyana. They shall be responsible for "region level planning, coordinating and implementation for disaster management and take all measures for the purpose of disaster management in the region in accordance with the guidelines laid down by the national management authorities"[64]. Furthermore, these Regional Disaster Committees are expected to establish Neighbourhood Disaster Committees under the management of

[64] Civil Defense Commision (CDC). (2012). *National Multi-Hazard Preparedness & Response Plan*.

Neighbourhood Democratic Councils, as well as Community Disaster Committees under the Community Democratic Councils.

Though all these sub-committees/regional committees cover key areas that pertain to DRM, they do not comprehensively cover all the components on DRM as described above such as all aspects of risk identification, prevention and mitigation, financial protection and risk transfer and recovery. In addition, there is no information regarding the specific roles and responsibilities of these sub-committees and it is not clear to what extent these sub-committees perform their functions and at what frequency.

2.2.4.5. The National Disaster Risk Reduction Platform

As presented in the *National Multi-Hazard Preparedness and Response Plan*, the National DRR Platform is a "national mechanism for coordination and policy guidance on disaster risk reduction that are multi-sectoral and inter-disciplinary in nature, with public, private and civil society participation involving all concerned entities within the country."[65] Thus, the National DRR Platform, chaired by the CDC, is mandated to provide guidance and assistance to the CDC in terms of programming. The membership of the National DRR Platform according to the *National Multi-Hazard Preparedness and Response Plan* is: NDIA, Guyana Red Cross, UNDP, GL&SC, Ministry of Local Government and Regional Development (MLG&RD), MoH, UNICEF, Ministry of Finance, Sea and River Defence, HydroMet Department , Guyana Fire Service, Guyana Police Force, EPA, Guyana Defence Force, Private Sector Commission and the IDB.

The National DRR Platform meets quarterly and members can be co-opted. Vast roles and responsibilities – beyond coordination and advice – are posited for the National DRR Platform in the draft *DRM Bill* (2013). Nevertheless, the Platform's role, responsibilities and functions need to be clarified and then further aligned with IDRM components and an IDRM approach. Insofar as the national disaster sub-committees are concerned, their number and functions could also be revised in order to ensure that all risk identification, prevention and mitigation, emergency support, financial protection and risk transfer, and recovery functions are covered and that all aspects of IDRM are adequately addressed.

[65] Civil Defense Commision (CDC). (2012). *National Multi-Hazard Preparedness & Response Plan*.

2.2.4.6. The National Emergency Operations Centre Model

The organization that coordinates the national response to emergencies and disaster due to the threat and/or impact of hazards in a country is the NEOC. The NEOC is divided into three basic functional areas, with three sub-areas.

Functional Areas:

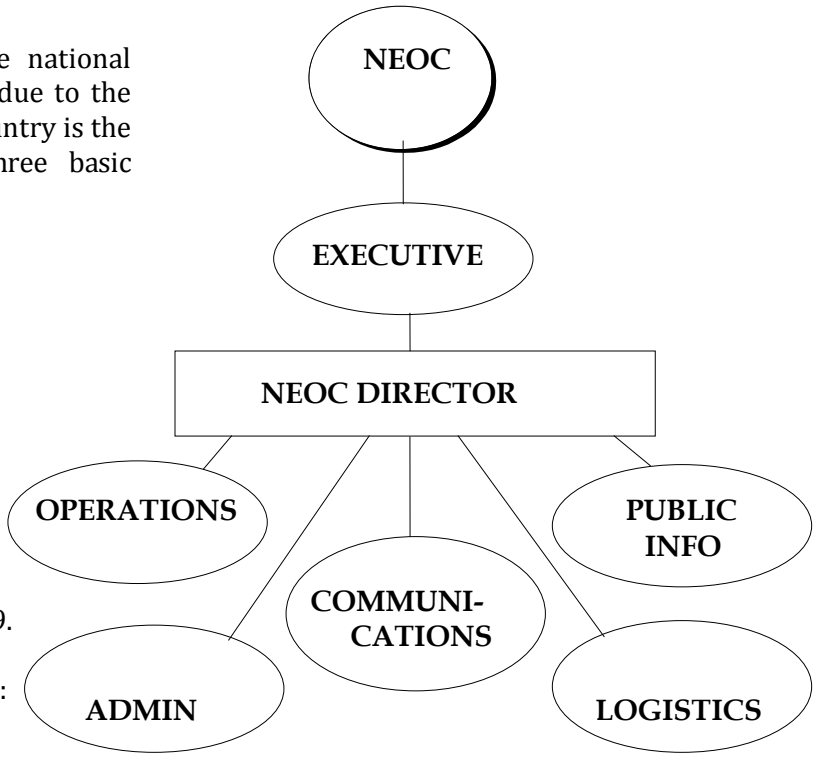
- Executive
- Operations
- Public Information and Education

Sub Areas:

- Communications
- Administration
- Logistics

A model of the NEOC is shown at figure 19.

Figure 19. NEOC



The primary functions of the NEOC[66] are:

- Coordination
- Analytical decision making
- Policy-making
- Operations management
- Information gathering and record keeping
- Public information
- Resource management

2.2.5. Conclusion

It is evident that there have been significant advances made in Guyana in terms of an evolving national DRM system with an increasing reflection of the DRM approach. The advances made in the enabling environment are significant as legislation, policies and plans continue to increasingly reflect the IDRM (and CDM) approach. Some key gaps remain nonetheless, as briefly pointed to above, but which are the subject of section 4 below. The case is similar with regards to the overarching evolving DRM structure in Guyana, also discussed further below in the same section. In brief, if the national IDRM structure is to be comprehensive, it will need to further consider the five DRM components and provide for an enhanced and clarified definition as well as harmonization of roles and responsibilities between the different actors involved in DRM in Guyana.

[66] Civil Defense Commision (CDC). (n.d.). *National Emergency Operations Center. Standard Operating Procedure*.

2.3. Key Projects and DRM Activities

In addressing hazards and risks, considerable investments have been made and will continue to be made to address drainage, irrigation, and sea and river defences issues, thereby reducing vulnerability to floods. The significant evolution of both the enabling environment and the national DRM system and structure has been brought forth in sections above. In addition, Guyana has experienced an increase in programming addressing key areas of DRM and strengthening areas requiring attention. However, while there are a number of key and important DRM projects underway (or completed) in Guyana, these do not form part of, or are the result of, any comprehensive IDRM programme in the country.

2.3.1. Brief Description of Key Projects

There are many DRM projects in Guyana that are either ongoing or recently completed and they are discussed briefly below.[67] Projects are presented in chronological order.

- *Building National and Local Capacity for Disaster Response and Risk Reduction (2008-2012, US$ 540,000)*

This UNDP project aimed to support the country to reduce the risks of disasters in a sustainable manner and to be better prepared for disasters at the national and community levels. In particular, the project seeks to develop capacities of the national emergency management agencies (CDC and line ministries) to coordinate disaster response effectively. Furthermore, it aimed to strengthen communities' capacities in disaster risk assessment and response planning. Activities are conducted in the following areas: awareness raising, institutional and legislative systems and small-scale disaster risk mitigation.

Key achievements: Capacity assessment of the national DRM system completed and used as a baseline for programming in the main phase of the project; NEOC, located at the CDC office, refurbished and equipped to strengthen emergency response capacity; baseline study on EWS in Guyana produced jointly with the UNDP-Global Environment Facility (GEF)–funded "Sustainable Land Management" project; virtual platform for emergency information management and coordination developed and located at the official website of the CDC. The Draft DRM Policy (2011) was developed under this project as were some key Emergency Response plans such as the National Multi-Hazard Preparedness and Response Plan.

- *Design and Implementation of an Integrated Disaster Risk Management Plan (2009-2013)*

The general objective of this IDB Technical Cooperation is to provide support to the GoG to address several important challenges in order for Guyana to be able to systematically manage and reduce flood risk in the face of a changing climate. The project has three main components: 1) Country Risk Indicators and Flood Risk Evaluation; 2) Strengthening National and Local Capacity for IDRM; and 3) Design of an Investment Programme in Flood Prevention and Mitigation. It is under Component 2 that the IDB is providing support to Guyana for the design and implementation of an NIDRMP.

[67] For more details, see Annex IV.

Key achievements: The project has resulted in the development of critical national plans and studies including the *Flood Risk Modelling Report* and the IDB *Indicators of Disaster Risk and Risk Management* report. As noted, development of this NIDRMP and the corresponding Strategy have also been funded through this project.

- *The Caribbean Disaster Management Project. Phase 2 (2009-2012).*

Regionally coordinated by CDEMA and funded by the Japan International Development Agency (JICA), the "Caribbean Disaster Management" project is to develop and test a community-based flood risk reduction model through the integration of community–based DM planning, flood EWS and flood hazard mapping. The pilot communities in Guyana selected to participate in this project were Little and Big Baiboo in Upper Mahaica, which is an area vulnerable to flooding during heavy rainfall and when water is released from the EDWC.

- *Rehabilitation of Sea Defence and Coastal Management. (2009-2013 14.8 million euros)*

This project of the European Development Fund is focused on the protection of economic and social assets in low-lying coastal areas and aims at improved infrastructure in targeted areas; enhanced institutional capacity of the administration to prioritize, rehabilitate and maintain the said infrastructure. Some 6 to 12 km of sea defences were to be rehabilitated and an integrated maintenance strategy of infrastructure developed.

- *Hope Canal Project (2010-2013)*[68]

The GoG funded a US$ 15 million project aimed at increasing the discharge capacity of East Demerara Northern Relief Channel, known as Hope Canal, East Coast Demerara. The project has four components:

1) the excavation of a 10.3 km channel from the EDWC to the coastal spill off at the other end of the canal;
2) a bridge across the East Coast Public Road;
3) a conservancy head regulator with three gates; and
4) a sluice at the canal's Atlantic Ocean end, which will have eight gates.

- *Guyana Mangrove Restoration Project (2010-2015)*

The GoG has budgeted 100 million GYD for this project managed by the Mangrove Action Committee within the Climate Change and Agricultural Adaptation Unit of Guyana's National Agriculture Research Institute (NARI) of the MOA. The project aims to promote sustainable management of mangrove forests; develop effective protection of mangrove ecosystem and rehabilitation; increase public awareness and education on the benefits of the mangrove forests; establish and complete a legal framework for mangrove ecosystem management and encourage community-based mangrove management; and establish the administrative capacity for the management of mangroves in Guyana.

[68] Unfortunately, no detailed information was provided to the consultant regarding this project and its current status.

- *Conservancy Adaptation Project (2011-2013)*

A two-year project, from June 30, 2011 to March 31, 2013. With the support of the World Bank and with grant support (US$ 3.8 million) from the Special Climate Change Fund of the GEF, the GoG has been implementing the Conservancy Adaptation Project, designed to reduce vulnerability in the low-lying coast that is currently threatened by sea level resulting from climate change. The Conservancy Adaptation Project is aimed at improving infrastructure and increasing storage capacity of the EDWC. In addition to developing the technical baseline for adaptation measures, the project will include some small infrastructure improvements to help cope with the immediate threats to the drainage system. The tools developed under the analytical component of the Conservancy Adaptation Project will be used by the GoG and donor agencies to guide future investments.

- *Purchase of Equipment, Construction, Rehabilitation and Operational Works of the National Drainage and Irrigation System.*[69] *(Started in 2011)*

In 2011, the GoG budgeted 3 billion GYD for the continued construction, reconstruction, rehabilitation, restoration and maintenance of sea and river defence structures throughout the country. The GoG also invested 6.6 billion GYD towards the purchase of equipment and the construction, rehabilitation and operational works of the national drainage and irrigation system.

2.3.2. Conclusion

The scope, breadth and scale of DRM-related activities being implemented in Guyana is noteworthy. The commitment of the GoG to DRM is evidenced further by implementation of these initiatives. As is evident and further discussed below in section 4[70], there is a preponderance of activities in certain IDRM areas, such as in preparedness and response, but much less in areas such as financial protection and risk transfer, and recovery, which shows the need for a more comprehensive IDRM programming in the country. Notwithstanding the increasing attention more recently being given to more IDRM aspects such as risk identification and prevention/mitigation, there are further areas to be covered more comprehensively. Overall, activities are not part of a holistic IDRM programme.

[69] Government of Guyana (GoG). (2011). *Disaster Risk Management Policy*. Draft.

[70] Section 4 discusses the terms of a detailed assessment of what areas are being more or less addressed in terms of the five DRM areas (and overlaid with previous assessments already undertaken in the country.

3. PART III. INTRODUCTION TO AND RATIONALE FOR THE NIDRMP

3.1. Rationale

The rationale for the NIDRMP includes the following:

- The overarching exposure to hazards and the vulnerability of the Caribbean region in general and Guyana in particular to hazards and disasters and to the adverse effects of the climate change were described in section 1.3. Data presented demonstrates that the trend is that the number of disasters is increasing globally and that exposure to floods and tropical cyclones is increasing rapidly in low income countries. Data also suggests that the number of disasters, the number of people affected by them and the economic losses attributed to them are also increasing, and Guyana could be considered to be in this category as well. Moreover, scientific research suggested that in coming years, more extreme weather event will increase in frequency and magnitude due to climate change. Thus, this situation places Guyana squarely within a context wherein the hazards, vulnerabilities and risks require solid strategic planning to ensure that specific actions are taken to mitigate, prepare for, respond to and recover from the effects of these occurrences;

- The unique vulnerability of Guyana was discussed in section 1.3.3. It was shown that Guyana is highly vulnerable to flooding, particularly in the coastal areas which are below sea level, and because of the climate in particular areas which brings heavy and continuous rainfall during certain periods. The significant impacts of and losses from flooding were also shown. Guyana has suffered greatly from the impact of floods in recent years, financially as well as in terms of human and social development. Floods and droughts represent important economic losses both for the state and for the people affected by disasters; therefore, the need for an NIDRMP that addresses Guyana's capacity to confront this and address the resilience of the country is evident;

- Moreover, the gaps of the current national DRM system from an IDRM perspective – as briefly noted above in section 2.2 and discussed in further detail in section 4 below in the context of examining the findings of the IDB's *Indicators of Disaster Risk and Risk Management* report (2012), UNDP's *Institutional Capacity Assessment of Guyana* (2009) and the *CDM Country Baseline Report for Guyana* (2010) – further strengthen the rationale for an overarching NIDRMP that would address Guyana's national DRM system. The main shortcomings from an IDRM perspective are in terms of adequate coverage of all phases and components and a structure that properly reinforces the IDRM approach, thereby affecting capacity. Addressing these gaps is vital to ensuring that prevention and mitigation, preparedness and response, financial protection and risk transfer, and recovery capacity are enhanced. The gaps and challenges highlighted help to provide a strong rationale for the need for an NIDRMP in general as well as solid foundation for the specific activities and expected results of the NIDRMP that are posited, as the NIDRMP activities have been developed specifically to address the key gaps and challenges;

- All of the above are reinforced further by the identified gaps in terms of existing programming in the country from an IDRM perspective, which were briefly noted above in section 2.3. and are discussed and assessed in detail in section 4.4 below.

While there exist a number of DRM projects underway in Guyana, it is evident that no overarching DRM programme yet exists in the country. An NIDRMP that speaks to and suggests a comprehensive DRM programme is necessary to ensure all aspects are covered and that the country's capacity to mitigate, prepare for, respond to and recovery from disasters is continuing to improve.

- The NIDRMP is consistent with and responds to objectives of the LCDS, which speaks to the reduction of floods.

Moreover, notwithstanding key progress made, the GoG does not appear to have fully implemented all of the actions recommended by the World Bank[71] and UNISDR[72] to reduce vulnerability in the pursuit of sustainable development. These actions are:

- Capacity building and strengthening of institutional arrangements;
- Advocacy for the integration of DRR in national development plans;
- Design of development projects taking risk assessment into account in the appraisal stage;
- Development of public awareness programmes;
- Creating and implementing comprehensive urban development strategies and land use plans;
- Development and implementation of strengthened EWS and preparedness schemes;
- Continued research regarding the relationship of climate, natural hazards and related socio-cultural and environmental vulnerability;
- Vulnerability reduction through:
    - Community participation;
    - Public policy action;
    - Safer construction and urban planning, and;
    - Culture of prevention.

The NIDRMP for Guyana should therefore consider activities to reduce vulnerability and ensure sustainable development in the long term, as listed above. Great priority needs to be given to reduce structural vulnerability to sea defences, conservancy dams, infrastructure (housing, health, agriculture, tourism, etc.) by assessing vulnerability, retrofitting, enacting and enforcing a Building Code and by regulated development that considers risk reduction. The NIDRMP also directly addresses these aspects. In the context of providing a rationale for the NIDRMP, section 4.4 below also briefly presents the key gaps for each of DRM area, clearly demonstrating how the specific activities of the NIDRMP address these.

Based on all the above, it is evident that an NIDRMP for Guyana should:

- Address the specific vulnerabilities of Guyana and consider the impacts, losses and hazards the country is prone to (in particular, flood and drought);

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[71] Fouad Bendimerad. (World Bank). (n.d.). *Disaster Risk Reduction and Sustainable Development*.
[72] United Nations International Strategy for Disaster Reduction (UNISDR). (2003). *Disaster Reduction and Sustainable Development.. Understanding the links between vulnerability and risk to disasters related to development and environment*.

- Address the identified gaps and challenges as brought forth by thorough hazard vulnerability and risk analyses as well as institutional capacity assessments, including:
  - The UNDP's *Capacity Assessment Report – Disaster Risk Management in Guyana* (2009);
  - The CDEMA *CDM Country Baseline Report for Guyana* (2010);
  - The IDB *Indicators of Disaster Risk and Risk Management* report (2012);
  - The CDC *Flood Risk Modelling Report* (2012);
  - The assessment of the DRM system;
  - The assessment of existing project, activities and initiatives in Guyana.
- Consider risk reduction and sustainable development within the context of climate change;
- Adequately speak to and address all components of DRM;
- Adequately speak to all sectors and institutions that have a role in DRM in the country;
- Take account of other existing DRM-related plans in Guyana such as: *National Disaster Preparedness and Response Plan*; *National Multi-Hazard Preparedness and Response Plan*; *Flood Response and Preparedness Plan*; *Damage Needs and Assessment Plan*; *Early Warning Protocols*; NEOC SOPs; *National Land, Aeronautical, and Maritime Search and Rescue Plans*; *National Influenza Preparedness Plan*; *National Health Sector Disaster Plan; Upper Mahaica Evacuation Plan*.
- Be consistent with and integrate the enhanced regional *CDM Strategy and Programme Results Framework* and the *Hyogo Declaration* and its *Plan of Action*[73];
- Be consistent with and respond to the objectives of third draft of the Guyana's *Low Carbon Development Strategy* (2010), which speaks to the reduction of flood risks.

3.2. Scope of the NIDRMP

The NIDRMP has a wide IDRM-based scope and identifies expected results and activities addressing all five DRM components, considers activities at the national, the regional and the neighbourhood/local levels, and assigns responsibilities not just to the central government or to the national DM organization, but to all relevant institutions and organizations in all sectors of society. The NIDRMP covers a period of ten years, from 2013 to 2023.

3.2.1. Hazards

While the draft *DRM Policy* (2011) speaks to all-hazards, the NIDRMP specifically speaks to the hazards the country is particularly prone to. The hazards Guyana is most prone to are floods and droughts. In addition, the country is also prone to fires; health-related disaster such as pandemics and epidemics; landslides; earthquake; hurricanes/storms/severe weather systems; hazardous materials spill; sea wall breach; conservancy breach; oil spill; mass casualty events: such as aircraft and vehicle accidents; mining accidents, riverine accidents, and tsunamis.[74] However, at this stage, the scope for the Guyana NIDRMP is to address floods

[73] The linkages between the NIDRMP and the international, regional and national programming context are discussed in section 5.

[74] List of hazards from: Civil Defence Commision (CDC). (2012). *National Multi-Hazard Preparedness & Response Plan*.

and droughts primarily, as these are agreed by all stakeholders as comprising the major hazards for the country.[75]

3.2.2. Sectors

The NIDRMP addresses all sectors involved in DRM in the country, as it relates to floods and droughts such as transportation, infrastructure, health, education, tourism, environment, security and the private sector. Regarding the agricultural sector in particular, at present (2013), an *Agriculture Disaster Risk Management Plan and Strategy* is being designed and will form part of the NIDRMP once finalized.

3.2.3. Levels

The NIDRMP covers the three institutional/governmental levels in Guyana: national, regional, and neighbourhood/local levels, including the community/municipality level. Activities are considered, then, not only for the governmental organizations at the national level (CDC, governmental ministries), but also for organizations at the regional and neighbourhood levels such as the regional and neighbourhood democratic councils as well as municipalities.

3.3. Approach

The main approach in the design of this NIDRMP has been to involve all stakeholders in its design in a participatory and consultative fashion. The NIDRMP is the result of the input and perspectives of disaster managers, sectoral and technical experts and a variety of stakeholders in Guyana as well as the IDB. This is complemented by an extensive and in-depth assessment and integration of the previous assessments completed in the country and reports produced as well as a further assessment of the current state of the national DRM structure and current DRM-related activities, with a view to identifying gaps and challenges to be addressed in the NIDRMP. The overall approach has been proactive and comprehensive from the IDRM and CDM perspective, bearing in mind the all-phases, all sectors and all levels approach and needed coverage.

The following steps were followed as part of the in-depth analytical and participatory approach:

- *Analysis of documentation*: All existing documentation regarding DRM, climate change and other issues in the country was provided by the CDC and reviewed to design the NIDRMP.[76]

- *Analysis of previous events*: Situation reports from the drought of 1998 and from the floods from 1996, 2005, 2006 and 2008 in order to investigate and consider causes, effects (damages and needs, based on DANA).

[75] Regarding others hazards relevant for Guyana, they could be addressed in further depth in future versions of the NIDRMP.
[76] For a full list of documents reviewed, see Annex I. Bibliography.

- *Interviews with key stakeholders*: In October 2012, several meetings were held with key government officials to find out about their experiences in past disasters and about ongoing DM activities implemented, with a view to identifying successes, gaps and challenges. Interviews were held with representatives of the CDC, Government ministries; the private sector and social organizations.[77]

- *First Participatory Workshop:* In November 2012, a workshop was held with the participation of key stakeholders to identify and discuss specific needs in terms of DRM activities and priorities. The NIDRMP is therefore the result of the participation and contribution of all stakeholders. During the workshop it was ensured that:
  - All stakeholders were exposed to DRM concepts;
  - All stakeholders were presented a draft vision, goal, objectives for the NIDRMP for discussion;
  - All stakeholders contributed with their experience in the identification of DRM needs, activities and priorities in each of the five components of DRM and prioritized their needs.

- *Draft Plan and Strategy.* Preparation of a draft NIDRMP and Strategy for the review of CDC and IDB: Drafts of the NIDRMP and its Strategy were prepared and submitted to CDC and IDB for comments and input. The drafts were also circulated among key stakeholders before a second workshop;

- *Second Participatory Workshop*: In June 2013, a second workshop was held in Guyana with key stakeholders in order to review the draft NIDRMP and Strategy, so that all input and comments could be integrated into a final set of documents;

- *Final NIDRMP and Strategy*: The final documents were prepared with the inputs from the second workshop and from CDC and IDB.

The NIDRMP and its strategically suggested activities are the result of this process. In this manner, it was ensured that both the NIDRMP and the Strategy (i) were developed with the needed and valuable contribution of all stakeholders; (ii) were designed based on information from past disasters and the national context, and; (iii) considered and addressed all gaps and challenges from a DRM perspective.

3.4. Implementation of the NIDRMP

3.4.1. Plan Adoption

The methodology used ensured the participation of all stakeholders in its design and implementation and should therefore further ownership. The NIDRMP, its specific projects and activities need to be adopted by all stakeholders in the country, particularly by those with responsibility for their implementation in the future.

[77] For a full list of persons consulted in the development of the NIDRMP, see Annex II.

The NIDRMP is to be adopted primarily by the CDC and the key government ministries, but buy-in by the private sector and social actors and by the population as a whole is preferable. The NIDRMP does not belong to an organization in particular but to the country of Guyana. Implementation is also a joint initiative, as detailed in the Strategy.

3.4.2. Plan Implementation

The detailed Strategy is discussed in detail in a separate document. Suggested projects are presented that group together the many activities that address all gaps and challenges identified. The Strategy suggests the key agencies to be involved or responsible for each suggested project, thus outlining a more specific way forward for implementation.

The Strategy also suggests sources of funding for implementation of the Strategy – existing and upcoming projects and programmes in the region – thus outlining a more realistic way forward for implementation. Among the sources of funding are, among others, the UNDP, IDB, World Bank, European Union, United States Agency for International Development (USAID), Canadian International Development Agency (CIDA), United Kingdom Department for International Development (DFID), Caribbean Development Bank (CDB), CDEMA, PAHO, Organization of American States (OAS), and the Australian International Development Agency (AusAID).

3.4.3. Plan Update

Like all plans and strategies, the NIDRMP needs to be reviewed regularly in order to update it with the results of activities implemented and the lessons learned from both successes and challenges. It needs to continually incorporate new changes in organizations and also may include new DRM activities, strategies and methodologies as they arise in the regional context (DANA methodologies, evaluation methodologies, new programming, etc.) The NIDRMP needs to be updated and include new lessons learned after the impact of hazards are experienced and analyzed. The NIDRMP, then, is not a rigid and unchangeable one. Updating the NIDRMP regularly will avoid a situation in which it would become obsolete and thereby ensure that it remains a "living" document.

Figure 20. NIDRMP and Strategy Lifecycle

4. PART IV. ASSESSMENT AND GAP ANALYSIS

4.1. Introduction

In the last few years, some relevant assessments related to DRM have been conducted in Guyana:

1. UNDP's *Capacity Assessment Report - Disaster Risk Management in Guyana* – 2009
2. CDEMA's *CDM Country Baseline Report for Guyana* – 2010
3. IDB's *Indicators of Disaster Risk and Risk Management* – 2012
4. CDC *Flood Risk Modelling Report* – 2012
5. UNEP & OCHA *Geotechnical and Hydraulic Assessment of the East Demerara Water Conservancy Dam* - 2005

Thus, section 4.2 will provide a brief introduction to each of these assessment reports as well as an overview of the main findings and results with special consideration to hazard, vulnerability and risk assessment and Guyana's institutional capacity for DRM. Key gaps and challenges are presented and discussed[78].

Section 4.3. then presents a brief assessment of the current system for DRM in Guyana. Key gaps and challenges are discussed and a tentative DRM structure for Guyana is suggested.

Section 4.4. then follows with a summary of the gap analysis, building on the aforementioned assessments completed and then complemented and validated further by the findings of review undertaken as part of the development of the NIDRMP. Key areas to be addressed are also presented, each broken down into the five DRM components, as are corresponding specific suggested activities developed to directly address each area.

In all sub-sections below, further data, depth and nuances are interwoven into the discussions of the previously completed assessments. This section therefore provides the analytical and assessment basis – and thus a more in-depth rationale – for the content of the NIDRMP and the Strategy. It will help to explain why each NIDRMP activity (as presented in section 5) was selected as it will clarify that the selected activities of the NIDRMP address all the highlighted gaps and challenges that emerged through all the various assessments made in the recent past and in the process of developing the NIDRMP.

[78] It was agreed at the outset of this consultancy that consultants were not responsible for undertaking any hazard vulnerability and risk assessments in Guyana for the mandate. Rather, it was agreed that the consultants should draw extensively on recent assessments (2009-2012) that had this explicit focus.

4.2 Review of Recent Assessments

4.2.1 UNDP's Capacity Assessment Report

4.2.1.1 Introduction to the Report

The first draft of the UNDP *Capacity Assessment Report - Disaster Risk Management in Guyana* was finalized in March-April 2009. This assessment was conducted under the "Building National and Local Capacity for Disaster Response and Risk Reduction" project. As put forth by the UNDP, a capacity assessment is "an analysis of current capacities against desired future capacities, which generates an understanding of capacity assets and needs, which in turn leads to the formulation of capacity development strategies."[79] The assessment presents the findings of Guyana's capacity assessment for DRM in two sections: a) Capacity for disaster response and emergency response, and b) Capacity for DRR, mitigation, and early recovery.

Capacity assessment for preparedness and response includes consideration of the following:

- National Disaster Management Committee;
- Emergency Response Agency;
- Disaster Response Plan;
- Multi-stakeholder Dialogue;
- NEOC;
- DANA;
- Situation Reporting;
- EWS;
- Relief Supplies Management;
- Shelter Management and Evacuation Planning;
- Accident Response;
- Emergency Communication Strategy and Plan.

Capacity assessment for DRR, mitigation and early recovery is considered in the report as follows:

- National Disaster Management Committee;
- Hazard, Risk and Vulnerability Analysis (HRVA) and Mapping;
- Risk Reduction and Disaster Mitigation – Enabling Environment;
- Risk Reduction and Disaster Mitigation – Organizational systems;
- Risk Reduction and Disaster Mitigation- Individual and Community;
- Flood-Related Risk in Key Sectors;
- South-South cooperation.

For each theme identified above, various capacity statements/indicators were defined. Then for each capacity statement/indicator, a rating was attributed on the basis of answers provided from structured interviews with key stakeholders in the relevant sectors/agencies.

[79] United Nations Development Program (UNDP). (2008). *Practice Note*. in United Nations Development Program (UNDP). (2009). *Capacity Assessment Report - Disaster Risk Management in Guyana.*

The rating was based on the UNDP methodology for capacity assessment presented below in table 14.

Table 14. Rating Table for the UNDP Capability Assessment Report

1	Very Low	No evidence or only anecdotal evidence of capacity/strategy/approach.
2	Low	Capacity/strategy/approach has been initiated but needs further development.
3	Medium	Capacity/approach is planned and implemented.
4	High	Capacity/strategy/approach is planned, implemented and reviewed on the basis of benchmarking data and adjusted accordingly.
5	Very High	Capacity/strategy/approach is planned, implemented and reviewed on the basis of benchmarking data, adjusted and fully integrated into the organization.

It is worth noting that intermediate values have sometimes been assigned (e.g. 1.5). Finally, the final score for each theme represent the average for each capacity statement/indicator (which serves to explain the decimals in the final scores in table 15 and 16 below). Lastly, the total derived was compared with the desired capacity by 2012 and, where possible, areas of strength and needed improvement were identified.

4.2.1.2 Main Findings from the Report

Based on UNDP's assessment, Guyana scored very poorly in most aspects under evaluation, which demonstrate the vulnerability of the country in face of hazards and disasters at that time. Tables 15 and 16 below show a summary of results[80] for each theme (presented above) assessed in the report.

Table 15. Values for UNDP Capacity Assessment on Preparedness and Response

Component	Average Rating/Score for current capacity (2009)
National Disaster Management Committee	1.4
Emergency Response Agency	1.8
Disaster Response Plan	1.3
Multi-stakeholder Dialogue	1.5
NEOC	1.4
DANA	1.0
Situation Reporting	1.2
EWS	1.3
Relief supplies Management	1.3
Shelter Management and Evacuation Planning	1.0
Accident Response - Boat, Aircraft	1.0
Emergency Communication Strategy and Plan	1.3

[80] The report also included a Strengths, Weaknesses, Opportunities and Threats (SWOT) assessment (pp.30-33), the specifics of which could also be brought here.

Table 16. Values for UNDP Capacity Assessment DRR, Mitigation, and Early Recovery

Component	Average Rating/Score for current capacity (2009)
National Disaster Management Committee	1.4
HRVA and Mapping	1.5
Risk Reduction and Disaster Mitigation - Enabling environment	1.0
Risk Reduction and Disaster Mitigation - Organizational Systems	1.3
Risk Reduction and Disaster Mitigation - Individual and Community	1.6
Reduction of Flood–related Risk in Key Sectors	1.3
South-South Cooperation	1.0
Early Recovery	1.0

Some of these aspects that scored poorly in 2009 remain to be addressed, while others have been addressed and Guyana has advanced well.

The low scores related to the DRM system in Guyana (i.e. *National Disaster Management Committee, emergency response agency, NEOC, multi-stakeholder dialogue, risk reduction and disaster mitigation – organizational systems*) rightly pointed to shortcomings in the institutional structure and mandated roles and responsibilities among key agencies with responsibilities in preparedness and response and also for mitigation. This is discussed in particular in section 4.3. below, which demonstrates that while significant advances were witnessed in moving the national DRM system and institutional structure in an IDRM direction, this has yet to be completed. This section also presents further analysis of key gaps and makes suggestions for the way forward. In brief, a robust national DRM system and structure for both prevention and mitigation as well as for preparedness and response is a critical component to the IDRM approach and this was also lacking at the time of the assessment.

With regards to planning (i.e. *disaster response plan, shelter management and evacuation planning, risk reduction and disaster mitigation – enabling environment, emergency communication - strategy and plan*), the lower scores on the disaster plan likely reflect that, at the time of the assessment (2009), Guyana's *National Disaster Preparedness and Response Plan* dated back to 1985, and this plan had neither been significantly updated nor implemented. In addition, at the time of the assessment, no comprehensive evacuation plan, shelter management plan or emergency communication plan existed. Guyana has since addressed some of these stated gaps above, as is evident from the fact that many response plans have been developed since 2009-2010. For example, this NIDRMP which was developed under the IDB project "Design and Implementation of an Integrated Disaster Risk Management Plan" (GY-T1050) represents a key response to the challenge raised by the assessment and a significant advance of Guyana in DRM. In addition, a wealth of other emergency response plans have since been developed (some of these under the technical cooperation between the GoG, the IDB and the UNDP), such as the *Damage and Needs Assessment Plan*, the *National Multi-Hazard Preparedness and Response Plan*, the *Early Warning System Plan*, NEOC SOPs and

the *Flood Preparedness and Response Plan*. However, most of them have focused on floods, since it is the most common and destructive hazard in Guyana. Thus, other plans would have to be designed for other hazards Guyana is prone to. The priority is to design a *National Drought Response Plan*. This plan needs to be designed considering the causes and effects of past events, such as the one from 1998. The experience in the response to this event will be helpful to identify preparedness and response activities as well as resources required. Moreover, as noted in section 2.2.2., there is still need for further improvements since the *National Multi-Hazard Preparedness and Response Plan* only covers emergency response plans and consists of hazard-specific plans, emergency function plans or sectoral plans, which are not yet developed in many cases (as captured in figure 15 in section 2.2.2.). For example, the *National Multi-Hazard Preparedness and Response Plan* makes reference to hazard-specific "sub plans" and many response "sub plans" and SOPs. However, most of these have not yet been developed. The need for new policies and plans has to be identified after the adoption of the NIDRMP and through a contingency planning process that would include updating plans and testing through simulation exercises. In addition, the existing plans could be more harmonized and aligned while also consistently addressing the key organizations, activities and responsibilities assigned.

Table 17 below presents the status of the development of plans related to the five DRM components.

Table 17. Status of DRM Plans in Guyana

Type of plans	Existing plans in Guyana	Plans that still need to be designed for IDRM
Risk identification		
Risk Identification plan	None	National Hazard, Vulnerability and Risk Mapping Plan
Prevention/Mitigation		
Sectoral prevention and mitigation plans	National Land Use Plan	National Prevention/Mitigation Plan River and sea defences, and conservancy dams mitigation plans Mitigation plan drainage and irrigation systems Infrastructure mitigation plans
Preparedness/Response		
Emergency Response Plans	National Multi-Hazard Preparedness and Response Plan	Family Emergency Plans, Emergency Public Information Plan
Hazard-specific plans	National Flood Preparedness and Response and Preparedness Plan	Drought, oil spills, landslides, earthquake, hurricanes/storms/ severe weather systems, fires, hazardous materials spill, sea wall breach, mass casualty events: aircraft accidents, vehicle accidents, epidemics, chemical/ biological/radiological/ nuclear events, mining accidents, tsunami.
Emergency function plans	National Early Warning Protocols NEOC SOPs DANA Plan National Land Search and Rescue Plan/Aeronautical	Tele-communications, emergency public information, evacuation (beyond Mahaica), shelter management, disaster relief, road clearance and waste disposal.

	Search and Rescue Plan/Maritime Search and Rescue Plan Upper Mahaica Evacuation Plan -Community plans developed by Guyana Red Cross Society	
Sectoral plans	Agriculture Plan (draft) National Health Sector Disaster Plan (and Influenza Response Plan) Environmental Protection Agency National Environment Emergency Response Plan	Education, agriculture (currently being developed), tourism, infrastructure, environment.
Recovery		
Early Recovery	None	Early recovery Plan (floods and droughts – national, regional and local level)
Reconstruction rehabilitation	None	Reconstruction rehabilitation Plan (national, regional and local level)
Private sector	None	COOPs (national, regional and local level) BCPs

With regards to early warning, a critical aspect of disaster preparedness, the assessment rightly presented a score that denoted some gaps (i.e. 1.3). Although a Dopplar radar had been installed at the time of the assessment, it was not considered fully functional and not linked to an operational regional mosaic of information exchange allowing for adequate data being collected and therefore for analysis and prediction. In addition, the review undertaken as part of the development of NIDRMP confirmed that it is still the case that warning systems could be improved in terms of more time for warning and widening the coverage for warning. Purchase of the Doppler radar with 4-5 day prediction capabilities still remains. There remains the need to identify all means of communications for warning to cover all the population at risk for floods (e.g. text messaging) and also to consider further integration of early warning for flooding/dam failure. There could also be a review of the *National Early Warning System Plan* and further integration of early warning into the national DRM system (e.g. by the establishment of an EWS Sub-Committee of the National DRR Platform).

In addition, the report highlighted a key ongoing challenge that is well known: "The coastal strip which accommodates a significant proportion of the population and economic infrastructure lies behind the seawall below sea level. It is imperative that mutual accountability be fostered among agencies responsible for management of different aspects of the sustainability of the sea wall".[81] This remains a particular concern for Guyana, notwithstanding increasing evidence of prioritization of the issue in the form of GoG projects/programming in this area, such as the "Rehabilitation of Sea Defence and Coastal Management" project and the Conservancy Adaptation Project (as described in section 2.3.). As not all the vulnerabilities of all sea wall (or the conservancy dams, drainage and irrigation channels) had been or have been fully assessed, there is still a need to both conduct further assessments (perhaps like the one conducted for the EDWC in 2005 which will be looked at in section 4.2.5. below) that will identify specific areas for rehabilitation/repair in conservancy

[81] United Nations Development Program (UNDP). (2009). *Capacity Assessment Report - Disaster Risk Management in Guyana.*

dams and sea walls and then to undertake a revision of water conservancy, drainage and emergency plans. Repairs and rehabilitation will still need to be brought to parts of the sea walls and conservancy dams and the assessment would clarify the specific areas to be addressed. It is also still imperative that there be increased capacity and capacity building for regular inspection and maintenance in sea walls, conservancy dams and drainage structures.

To highlight one last area of the assessment that speaks to another critical remaining gap, the report notes that: "Organisational capacity is weak in most sector agencies as the knowledge and skill base in disaster response and risk reduction have not been developed (…) Leadership is strong in key sector agencies but development and delivery of programs are constrained by limited resources."[82] More current data as collected from various sources throughout the NIDRMP development process suggests that recent training has focused mostly on emergency and response (and more specifically on shelter management and DANA training). Thus, a more comprehensive national DRM training programme still remains to be established in Guyana that adequately address the DRM components. In terms of covering more components and aspects of DRM, the following training areas have been noted by stakeholders as priorities: HRVA and mapping including use of software; Inspection of sea walls and conservancy dams; Search and rescue (land and maritime); Contingency Planning (CDEMA has guidelines for the design of emergency plans); Contingency Planning for the Health Sector (using PAHO guidelines); Mass Casualty Management (with PAHO assistance); Incident Command System (with PAHO assistance); EOCs management (with assistance from USAID), to name a few. It will be crucial to ensure that sustained training programmes are developed and that trainees are well targeted with a view to ensuring that all the needed roles and responsibilities for all needed tasks during the response phase are addressed sufficiently in all sectors and at all levels and that the appropriate persons are targeted for the relevant tasks and responsibilities.

The gaps and challenges noted by the UNDP assessment, especially those that persist to the present, have been integrated into the NIDRMP and the Strategy as priorities that are to be targeted and addressed by key activities and objectives.

4.2.2 CDEMA's CDM Country Baseline Report for Guyana

4.2.2.1 Introduction to the Report

In February 2009, CDEMA engaged an international team of monitoring, evaluation and disaster management experts to collaborate with the CDEMA Coordinating Unit and the CDM Coordination and Harmonization Council in the development of a "Monitoring, Evaluation and Reporting Framework" for the enhanced regional *CDM Strategy and Programme Framework* (2007-2012). As part of this mandate, the design and implementation of a baseline data collection process was conducted. The *CDM Country Baseline Report for Guyana* was part of this regional baseline study conducted in the Caribbean for the 16 CDEMA participating states. It was finalized in October 2010. Baseline data was collected on CDM Strategy's four priority outcomes and concurring outputs[83]. It should be noted that the CDM baseline report does not represent an in-depth analysis of findings and does not qualify as a comprehensive

[82] United Nations Development Program (UNDP). (2009). *Capacity Assessment Report - Disaster Risk Management in Guyana.*

[83] CDM outcomes and outputs are presented in Figure 14 in section 2.

assessment of CDM capacity in the country. Instead, it highlights the situation related to each of the CDM outputs as it was when data collection occurred.

4.2.2.2 Main Findings from the Report

In addition to further confirming and validating findings of the UNDP assessment, data from the *CDM Country Baseline Report for Guyana* served to highlight various gaps in terms of DRM capacity in the country. For example, in the area of risk identification (and linked to prevention/mitigation) the baseline report contains data that spoke to and continues to speak to areas that could be considered gaps in the DRM approach requiring attention. For example, the 2010 baseline data suggested that while Guyana had geographical information system (GIS) software, it was not considered as capable of performing digital mapping and modelling to identify and predict risks. Stakeholders confirmed in 2013 that this critical area of risk identification and assessment allowing for enhanced prevention and mitigation still needs to be addressed. In addition and along these lines, the baseline notes that Guyana did not have a standard procedure for conducting HRVA and found that no national-level HRVAs had been conducted. This aligns well with UNDP assessment scores for these areas (e.g. a score of 1.5 for HVRA and mapping, for example) and underscores a critical DRM aspect related to both components of risk identification and prevention/mitigation: the need to undertake comprehensive mapping of hazards and vulnerabilities and to assess the risks related to these. On this, it should be noted that since these two assessments, progress has been made; this IDB project (GY-T1050) included the undertaking of crucial hazard and vulnerability assessments in the form of the *Flood Risk Modelling Report* (2012) and the *Indicators of Disaster Risk and Risk Management* report (2012). Nonetheless, key gaps remain, such as the need to develop more robust maps that integrate GIS data – in particular flood maps for noted vulnerable areas – to integrate this data into accessible and robust databases, and to use these maps and this data for modelling and for planning and decision making from an IDRM perspective.

The baseline report also pointed to important gaps the country was facing in terms of legislation, policies and plans. These served to validate further some of the UNDP assessment low scoring on aspects related to the "enabling environment". Beyond issues brought forth above (e.g. with regards to both progress made in disaster planning and plans that still need to be developed), the baseline report noted that national disaster planning was not exercised adequately. However, since the CDM baseline was conducted, Guyana has moved forward with a draft *DRM Policy* (2011). Yet, the more recent review of these key DRM documents revealed that it inadequately addressed the five components and lacked a clear outline and in-depth specificity of roles and responsibilities for key ministries and agencies for all DRM components. Although the draft *DRM Policy* mentions DRM in its intent, vision, goals and objectives, it does not fully address all the five DRM components. In particular, risk identification is insufficiently addressed and treatment of financial protection and risk transfer, and recovery is also minimal. Once the NIDRMP is finalized and adopted by Guyana, the draft *DRM Policy* could be revised to ensure congruence and harmonization.

The baseline report noted that DRM could also be better reflected in other policies in Guyana, such as the *Lands and Survey's Commission Act*, the *Housing Development Act*, and the *Sea Defences Act*. Many such laws/acts are relevant from a DRM perspective. In addition, while health and agriculture sectors were found to have CDM/DRM policy statements as part of their plans and strategies; yet no policy for the tourism or education sectors was found by the baseline study. With regards to agriculture in particular, as has been noted already, currently

a new DRM Plan for the agriculture sector is being developed and so progress is being made in this area.

Moreover, in 2010, the baseline report found that Guyana had no enacted or drafted CDM-related legislation. Some progress has since been made: a draft *DRM Bill* is currently being developed (in draft form as of July 2013), though it has not yet been approved. While there is an improved *DRM Policy* (in draft form, 2011), it could better speak to all aspects of DRM. At the same time, it is recommended that the *DRM Bill* also integrate the NIDRMP (and the revised *DRM Policy*). In this way, the *DRM Bill* could cover all aspects of DRM adequately and embed both the NIDRMP and its Strategy (and then the *DRM Policy* as well) properly within Guyana's legislative framework. The fact that neither the *DRM Bill* nor the *DRM Policy* have been approved by Cabinet gives Guyana the opportunity to harmonize the *DRM Bill*, the *DRM Policy* and the NIDRMP and therefore ensure that roles and responsibilities are legislated and that there is overall congruence. In fact, the NIDRMP could be mentioned in the *DRM Bill* and the *DRM Policy* alongside the responsibilities for its design, implementation, monitoring and evaluation.

All the above aspects therefore validate and align with the UNDP assessment that noted that "the most glaring [gaps for DRM in Guyana] is the enabling environment with respect to the legislative and policy framework to guide institutional development as well as national and community strategies, programs and plans in the areas of preparedness and response, and risk reduction."[84]

The baseline report pointed to a number of other issues that still need to be addressed in Guyana to move IDRM forward. For example, challenged were raised related to land-use planning and the need for further non-structural mitigation, which were noted along with the need to finalize, enact and begin enforcement of the Building Code. This challenge remains and there is still a need to move forward with the Building Code and its enforcement.

In addition, the baseline report noted that CDM (DRM) related issues were not integrated into the grade school curriculum. Furthermore, baseline data suggested that Guyana did not conduct annual CDM (DRM) related awareness campaigns.

Lastly, with regards to recovery, in 2010 Guyana did not have a national recovery plan or policy and these remains to be done. Furthermore, this plan or policy should be grounded in a national HVA. In addition, very minimal Business Continuity Planning was found in 2010, while 1 sector (Health) had developed a Model Business Continuity Plan (BCP).

The gaps and challenges that arise from the *CDM Country Baseline Report for Guyana* that may still exist in the present have been integrated into the NIDRMP and the Strategy as priorities that are to be targeted and addressed by key activities and objectives.

[84] United Nations Development Program (UNDP). (2009). *Capacity Assessment Report - Disaster Risk Management in Guyana.*

4.2.3 IDB's Indicators of Disaster Risk and Risk Management

4.2.3.1 Introduction to the Report

In July 2012, the report on the *Indicators of Disaster Risk and Risk Management* was prepared and finalized by the CDC with financing from the IDB and with the collaboration of the consulting firm *Evaluación de Riesgos Naturales en América Latina* (ERN). The objectives of this report were to apply the system of indicators of the IDB to Guyana in order to improve disaster risk understanding and help assist in the management of disaster risks by providing useful and relevant information on the country's vulnerability and risks. Therefore, this report presents the results of a probabilistic flooding risk assessment for Guyana, focused on the coastal zones. As part of this study four indices were analyzed:

1. The Disaster Deficit Index (DDI) measures country risk from a macro-economic and financial perspective when faced with possible catastrophic events. This requires an estimation of the critical impacts during a given exposure time and of the capacity of the country to face up to this situation financially.

2. The Local Disaster Index (LDI) identifies the social and environmental risks that derive from more recurrent lower-level events, which are often chronic at the local and sub-national levels. These events particularly affect the more socially and economically fragile population and generate a highly damaging impact on the country's development.

3. The Prevalent Vulnerability Index (PVI) is made up of a series of indicators that characterize prevailing vulnerability conditions reflected in exposure in prone areas, socioeconomic fragility, and lack of resilience in general.

4. The Risk Management Index (RMI) brings together a group of indicators related to the risk management performance of the country. These reflect the organizational, development, capacity and institutional action taken to reduce vulnerability and losses, to prepare for crisis and to efficiently recover.

4.2.3.2 Main Findings from the Report

Disaster Deficit Index

As mentioned in introduction, the DDI measures the economic loss that a particular country could suffer when a catastrophic event takes place as well as the implications in terms of the resources needed to address the situation. The index captures the relationship between, one, the demand for contingent resources to cover losses caused by the Maximum Considered Event (MCE) that the public sector must assume as result of its fiscal responsibility and, two, this sector's economic resilience (ER). Losses caused by the MCE are calculated with a model that takes into account, on the one hand, different natural hazards – calculated in probabilistic terms according to historical registers of intensities of the phenomena - and, on the other hand, the current physical vulnerability that the exposed elements present towards those phenomena. The ER is obtained from the estimation of the possible internal or external funds that the government, as the entity responsible for recovery or as owner of the affected goods, may access or has available at the time of the evaluation.

A DDI greater than 1.0 indicates the inability of a country to cope with extreme disasters, even if it were to take on considerable debt. The greater the DDI, the greater the gap. Table 18 shows DDI for 2000, 2005 and 2010 for the MCE of 50, 100 and 500 years of return period for Guyana.

Table 18. DDI Values for the MCE by Period

DDI	2000	2005	2010
DDI50	1.47	1.37	0.75
DDI100	2.06	1.92	1.09
DDI500	2.57	2.41	1.40

The numbers show that for extreme events with return periods of 500, 100 and 50 years in all periods the DDI is greater than 1.0. This means that Guyana does not have enough resources to cover losses and/or feasible financial capacity to face losses and to replace the capital stock affected. However, it should be noted that in all scenarios, Guyana has improved in its score between 2000 and 2010 quite significantly. In almost all cases the DDI has been almost halved and in two of the three cases, the DDI has been brought down below or just about 1.0. Notwithstanding the further progress to be made – in particular with regards to insurance coverage in the country – this improvement likely speaks to an enhanced financial capacity of the GoG, through either internal or external funds, to cope with, respond to and recover from disasters[85]. This area still needs to be strengthened and therefore has been integrated into the NIDRMP and the Strategy as a priority to be targeted and addressed by key activities and objectives.

Prevalent Vulnerability Index

The PVI expresses the predominating vulnerability conditions with regard to exposure in prone areas, socio-economic fragility and lack of social resilience—aspects which favour both direct impact and indirect and intangible impact in case of a hazard event. The index is a composite indicator that depicts, comparatively, a situation or pattern in a country, and its causes or factors. The PVI ranges between 0 and 100. A value of 80 means very high vulnerability, from 40 to 80 means high, from 20 to 40 is a medium value, and less than 20 means low. The vulnerability conditions that underlie the notion of risk are considered to be, on the one hand, problems caused by inadequate economic growth and, on the other hand, deficiencies that may be intercepted via adequate development processes. Table 19 shows the total PVI for Guyana and its components related to exposure and susceptibility, socio-economic fragility and lack of resilience.

[85] As has been discussed with the IDB and the CDC, further analysis on these indices cannot be made as the raw data and specific details that support the calculation of these indices are not available in the reports and were not provided to the consultant.

Table 19. PVI Values 1995-2007[86]

PVI Components[87]/Years	1995	2000	2005	2007
PVIES	26.69	19.78	23.98	25.31
PVISF	38.25	32.36	32.35	32.68
PVILR	49.68	45.03	43.61	43.75
PVI	38.21	32.39	33.28	33.92

In general, as can be seen above, there has been some reduction in vulnerability for some of the indices above. This was not the case for the PVIES, which reflects continued susceptibility due to a high degree of physical exposure of goods and people, favouring direct impact in case of hazard events. This score likely reflects the exposure to floods as discussed in key areas such as the ones below sea level and in Region 9 (defined in figure 4), some of which wherein dense human settlements and critical infrastructure are particularly exposed and vulnerable. Furthermore, needed strengthening of both sea walls and drainage capacity linked to conservancy dams is coupled with structural vulnerability in terms of buildings, construction methods and land-use planning, as already discussed. This may help to explain why there were not significant improvements in the PVISF, whose calculation speaks to the conditions of socio-economic fragility, which favour indirect and intangible impact. Once again, issues related to insurance (i.e. lacking insurance for farmers for example) could be contributing to this vulnerability, exacerbated by the elements noted above. The PVILR that measures lack of resilience is the highest, which points to a lack of capacity for Guyana to absorb consequences of disasters and to efficiently respond and recover, some of which was already mentioned when reviewing DDI indicators above (i.e. pertaining to financial capacity to respond and recover from disasters). In addition, this may also speak to some of the gaps in terms of the overall DRM system, the enabling environment in terms of planning and relevant capacities at different levels to respond. The structural/systemic deficiencies in terms of clearly defined and known roles and responsibilities have been noted (and are discussed further below in section 4.3), and gaps in this area would affect the ability to respond efficiently. Notwithstanding advances made in terms of planning in the recent past, still incomplete planning would exacerbate these deficiencies as well. Moreover, capacity weaknesses, as noted above with regards to the many areas of training still required to adequately strength key ministries, and agencies in the national DRM system could also be contributing to this low score[88].

All of these gaps and challenges have been integrated into the NIDRMP and the Strategy as priorities that are to be targeted and addressed by key activities and objectives.

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[86] It is important to point out that in order to include sub-indicators for which there were no recent figures, the option was made by ERN to use the same value in all periods, in order to avoid affecting the relative value of indices. Therefore, although this evaluation was developed in 2011, the most recent available indicators for Guyana were for 2007, so the presented results correspond to the years 1995, 2000, 2005 and 2007.

[87] PVIES = susceptibility due to the level of physical exposure of goods and people; PVISF = social and economic conditions that favour indirect and intangible impact; PVILR = lack of capacity to anticipate, to absorb consequences, to efficiently respond, and to recover. From Evaluación de Riesgos Naturales – América Latina (ERN). (2012). *Indicators of Disaster Risk and Risk Management.* Prepared for the Guyana Civil Defence Commission and IDB.

[88] Again, further detailed and in-depth analysis on these indices cannot be made as the raw data and specific details that support the calculation of these indices are not available in the reports and were not provided to the consultant.

Risk Management Index

The main objective of the RMI is the measurement of the performance of risk management. This index is a qualitative measurement of risk based on pre-established levels (targets) or desirable referents (benchmarking) towards which risk management could be directed, according to its level of advancement. For RMI formulation, four components or public policies are considered: risk identification, risk reduction, DM and governance, and financial protection. Estimation of each public policy takes into account six sub-indicators that characterize the performance of management in the country. Assessment of each sub-indicator is made using five performance levels (*low, incipient, significant, outstanding, and optimal*) that correspond to a scale of 1 to 5, where 1 is the lowest level and 5 the highest. In this methodological focus, each reference level is equivalent to a "performance objective," thereby allowing for the comparison and identification of results or achievements towards which governments could direct the efforts of formulation, implementation and evaluation of policies in risk management. Once performance levels of each sub-indicator have been evaluated, through a non-lineal aggregation model, the value of each component of the RMI is determined. The value of each composed element is between 0 and 100, where 0 is the minimum performance level and 100 is the maximum level. Total RMI is the average of the four composed indicators that represent each public policy. When the value in the RMI is high, performance of risk management in the country is better.

The indicators that represent risk identification are the following:

1. RI1. Systematic disaster and loss inventory
2. RI2. Hazard monitoring and forecasting
3. RI3. Hazard evaluation and mapping
4. RI4. Vulnerability and risk assessment
5. RI5. Public information and community participation
6. RI6. Training and education on risk management

The indicators that represent risk reduction are the following:

1. RR1. Risk consideration in land-use and urban planning
2. RR2. Hydrological basin intervention and environmental protection
3. RR3. Implementation of hazard event control and protection techniques
4. RR4. Housing improvement and human settlement relocation from prone areas
5. RR5. Updating and enforcement of safety standards and construction codes
6. RR6. Reinforcement and retrofitting of public and private assets

The indicators that represent the capacity for DM are the following:

1. DM1. Organization and coordination of emergency operations
2. DM2. Emergency response planning and implementation of warning systems
3. DM3. Endowment of equipment, tools and infrastructure
4. DM4. Simulation, updating and testing of inter-institutional response
5. DM5. Community preparedness and training
6. DM6. Rehabilitation and reconstruction planning

The indicators that represent governance and financial protection are the following:

1. FP1. Inter-institutional, multi-sectoral and decentralizing organization
2. FP2. Reserve funds for institutional strengthening
3. FP3. Budget allocation and mobilization
4. FP4. Implementation of social safety nets and funds response

5. FP5. Insurance coverage and loss transfer strategies of public assets
6. FP6. Housing and private sector insurance and reinsurance coverage

Table 20 below shows the total RMI and its components, for each period for Guyana. They are risk identification (RMIRI), risk reduction (RMIRR), disaster management (RMIDM) and governance and financial protection (RMIFP).

Table 20. Risk Management Index Values 1990-2010

Component/Year	1990	1995	2000	2005	2010
RMIRI	7.39	9.93	14.16	31.37	37.04
RMIRR	8.13	12.93	12.93	17.21	32.41
RMIDM	5.25	9.32	16.3	17.21	39.51
RMIFP	8.26	9.94	13.46	14.77	17.21
RMI	7.26	10.53	14.21	20.14	31.54

Despite some improvements that can be seen in the table above between 1990 and 2010, RMI scores overall remain quite low. This reflects some key gaps as already noted pertaining to incomplete hazard, vulnerability and risk assessments, challenges with regards to mapping and modelling, among other areas of risk management that factor into calculations above. However, notwithstanding the many areas that remains to be addressed, as depicted above, performance in risk management increased notably.

Risk management as it relates to risk identification (RMIRI) shows a notable progress from 1990 to 2010 and this seems to be due primarily to the most significant indicator according to the used weighting in the calculation – vulnerability and risk assessment (RI4) – which had among the most significant changes. This could be to an increase in such assessments, such as of the EDWC in 2005. The country also experienced steady improvement - from low to significant, from 1990 to 2010 - in hazard monitoring and forecasting (RI2), which could have been due to the installations of the Dopplar radar and some increased capacity for hydrometereological prediction and analysis. Systematic disaster and loss inventory (RI1) changed from an incipient to a significant level, which could potentially have been due to an increased capacity for and use of damage assessment approaches such as DANA and better systematic storage of losses. Hazard evaluation and mapping (RI3), public information and community participation (RI5) and training and education in risk management (RI6) however changed only from a low to an incipient level of performance. Overall, based on the RMIRI, it seems the 20 years period included more vulnerability and risk assessments as previously, allowing for further knowledge pertaining to hazards, risks and vulnerabilities, which could then be managed in an improved manner[89]. Nonetheless, this remains an area to be further addressed including detailed risk assessments for priority areas, community level risk assessments, and development of GIS-based flood and drought risk information systems for improved decision making and planning.

[89] Again, further detailed and in-depth analysis on these indices cannot be made as the raw data and specific details that support the calculation of these indices are not available in the reports and were not provided to the consultant.

Scores for risk management as it relates to risk reduction (RMIRR) show that between 2005 and 2010, there was a significant increase in the risk reduction in the country, as seen in the change from the incipient to the significant level in two of the indicators, namely the hydrological basin intervention and environmental protection (RR2) – which again could be linked to work around the EDWC – and the updating and enforcement of safety standards and construction codes (RR5), which may point to the drafting of the Building Code. The other indicators did not change between 2005 and 2010. The implementation of hazard event control and protection techniques (RR3), the housing improvement and human settlement relocation from prone areas (RR4) and the reinforcement and retrofitting of public and private assets (RR6) did not change and remained at the same incipient level from 1995. These elements may again point to the persistent vulnerabilities as they pertain to the challenges in ongoing enhancements and maintenance of the conservancy dams and drainage system, among other aspects. Elements related to these aspects, both the need for strengthened structural and non-structural mitigation, encompassing needed repairs and rehabilitation, construction and retrofitting for the former and land-use planning and human settlements for the latter, have been brought forth as remaining areas to be addressed to strengthen mitigation capacity and thereby reduce vulnerability and risk. However, the increases in scores reflected in the RMIRI above may point to the increased knowledge that now exists of the vulnerabilities to be addressed in these different ways.

Risk management as it relates to DM (RMIDM) also indicates a progressive advance from 1990 to 2010. All the indicators started in 1990 with quite a low level. The incipient level was reached for the endowment of equipment, tools and infrastructure (DM3) and the simulation, updating and testing of inter-institutional response (DM4) in 1995. The other indicators reached this level in 2000, with the exception of rehabilitation and reconstruction planning (DM6), which reached it in 2005. In 2010, organization and coordination of emergency operation (DM1), endowment of equipment, tools and infrastructure (DM3), simulation, updating and testing of inter-institutional response (DM4), and community preparedness and training (DM5) reached the significant level, up from the incipient level. The DM aspects of the RMI noted some improvements that relate to response capacities of DRM organizations, which may be linked to a strengthened CDC over the period. Notwithstanding improvements in testing and simulations of response, it remains clear that there continues to be a need for more testing and exercises of plans at all levels including all sectors and from the regional down to the community levels as well. In addition, though improvement was noted in the organization and coordination throughout the period, there are needs related to enhancing the national DRM system to better address all aspects of DRM. This is discussed further below in section 4.3. These elements would serve to reduce vulnerability through the enhancement of coping capacity. The assessment though rightly indicators that this is among the areas where Guyana has notably progressed the most.

Risk management as it relates to financial protection and governance (RMIFP) indicates that the country has slightly increased its performance. In 1990, all the indicators with the exception of housing and private sector insurance and reinsurance coverage (FP6) were at a low level of performance. In 1995, the reserve funds for institutional strengthening (FP2) passed to the incipient level. Also, in 2000, budget allocation and mobilization (FP3) and implementation of social safety nets and funds response (FP4) reached the incipient level. In 2005, the insurance coverage and loss transfer strategies of public assets (FP5) likewise passed to the incipient level. Finally, in 2010, the performance of inter-institutional, multi-sectoral and decentralizing organization (FP1) reached the incipient level. That these indicators related in particular to insurance and financial management (i.e. related to risk

transfer) remain at a low level and represent the lowest area of scoring for Guyana in the IDB assessment underscore the areas to be addressed from a DRM perspective. Issues related to insurance have already been discussed and remain a critical element to be advanced.

Overall, based on the IDB's *Indicators of Disaster Risk and Risk Management* assessment, a gradual advance in the various areas of DRM can be observed between 1990 and 2010, with the most notable growth being between 2005 and 2010. Indicators which vary more considerably have been the RMIDM (disaster management) and RMIRI (risk identification) denoting particular advances in better identification of hazards, vulnerabilities and risks and improved capacity for managing them. The lesser advances in RMIFP (financial protection) highlight the areas of risk transfer and financial management that need to be addressed. Progressive variation in RMI illustrates Guyana's general advance in risk management. Nevertheless, although the country's RMI average represents a noteworthy improved level of performance, there is much work to be done in order to achieve better performance levels in risk management and to move more fully to an IDRM approach. All of these gaps and challenges as raised by IDB's assessment have been integrated into the NIDRMP and the Strategy as priorities that are to be targeted and addressed by key activities and objectives.

4.2.4 CDC Flood Risk Modelling Report

4.2.4.1 Introduction to the Report

In July 2012, the *Guyana Flood Risk Modelling Report* was produced by the CDC with the collaboration of the IDB and ERN. This comprehensive and detailed study includes flood, vulnerability and risk mapping and produced many maps for: Dam-breach scenarios at three different conservancy dams; intense rainfall scenarios and flood hazard modelling considering run-off factors and detailed topographies. (combinations of 1, 2, 3, 4 and 5-day rainfall with return periods of 50, 100, 500 and 1,000 years); Vulnerability of exposed assets considering structural type, materials and height.

In addition, risk assessment considering hazard assessment, inventory of elements exposed and vulnerability of constructions was undertaken. Results were presented in maps showing the estimated relative loss in specific areas and in tables showing the estimated cost of crops such as rice and total loss in Georgetown, Ana Regina and New Amsterdam for the different scenarios for dam breach and rainfall. For this evaluation of risk, the report considered:

a. Hazard assessment. A set of events defined along with their respective frequencies of occurrence. Each scenario contains a spatial distribution that permits the construction of the distribution of probability of intensities produced by the occurrence of these scenarios.

b. Definition of the inventory of exposed elements. A complete inventory of the exposed elements must be constructed including geographical location of each of the assets, as well as the following parameters:
    i. Physical valuable cost of replacement
    ii. Human value, or number of occupants estimated
    iii. Structural class to which the assets belong to.

c. Vulnerability of the constructions. Each structural class must correspond to an individual function of vulnerability for each type of hazard. This function characterizes the expected structural behaviour of the asset.

Thus, combining the hazard (dam breach temporality and precipitation temporality), its frequency and spatial distribution with the exposed elements, and by then combining their vulnerabilities to those hazards in specific scenarios and applying probabilistic equations, the report estimated the PML and the AAL per hazard as well as for the city and main towns portfolio (Georgetown, New Amsterdam, Ana Regina) and for the main crops portfolio (Sugar and Rice).

4.2.4.2 Main Findings from the Report

The findings of this in-depth comprehensive and detailed report that included flood, vulnerability and risk mapping have been brought forth in section 1.3.4.1. in detail. To recap, key findings of the report included the following:

- About 90% of the population and most of the economic activity and exposed infrastructure are located within potential flooding zones;
- Probabilities show that maximum probable losses on the order of US$ 300 million could be expected in extreme events, when considering only direct impact on infrastructure and main crops. This figure could increase two – or threefold – once direct and indirect economic impact is considered;
- When analyzing absolute losses, the most exposed value and absolute loss are concentrated in Georgetown, with 75.54% of total losses;
- The sugar crops are next with 12.05% of total losses, followed by Anna Regina with 11.36%, rice crops with 0.8% and New Amsterdam with 0.16%.;
- However, when analyzing losses relative to exposed value, the sugar crops are in the most vulnerable condition with 7.5%, followed by the town of Anna Regina with 3.2%, Georgetown with 1.9‰, rice crops with 1.3%, and New Amsterdam with the lowest relative loss of 0.05%;

This flood modelling analysis highlighted the need to reduce vulnerability by:

- Assessing and reducing structural vulnerability in water conservancy dams to avoid structural failure and breaches that could cause scenarios identified in the report;
- Ensuring sustainable development by including DRM measures such as land use regulations;
- Assessing and reducing flood vulnerability in buildings and infrastructure in the city and main towns, mainly through the enactment and enforcement of an adequate Building Code;
- Reducing vulnerability of structures, infrastructure and crops through relocation and risk transfer and financial management measures (insurance);
- Using the results of flood mapping for better land use and future development in low risk areas.

All of these aspects above have already been brought forth previously in this section as areas to be addressed to reduce vulnerability and risk.

The report then makes the following recommendations of specific concern to the NIDRMP:

- Activities in the short term could include the diagnosis of the structural reliability of each one of the critical infrastructure components in order to determine critical components requiring strengthening and reinforcement;
- All operational systems and important complementary activities could be reviewed and revised in order to adapt them to the risk results and scenarios presented. An implementation and calibration process is required in order to guarantee the operability and function of such important instruments;
- Prevention activities could be implemented in the short term, including regulation and land-use planning and control. In particular, building construction and occupation of the first floor of all constructions in potentially flood-prone areas could be regulated and enforced;
- Since the lack of adequate maintenance, especially noticeable in the trash and weed overgrowth accumulation in urban drainage systems, is a major contributing factor to exposure and then to risk, this activity could be given special attention by mayor and city councils, Regional and Neighbourhood Democratic Councils and public works companies of urban settlements. Education and cultural campaigns are required in order to involve the private sectors in such activities;
- Disaster reduction and response activities could be centralized in a national office in coordination with civil society and with the support of agencies such as the Guyana Red Cross and other international assistance agencies.

These recommendations served to validate and underscore activities that were already being posited in the NIDRMP based on other assessments of gaps. All of these recommendations have therefore been integrated into the NIDRMP and the Strategy as priorities that are to be targeted and addressed by key activities and objectives.

4.2.5 UNEP & OCHA Geotechnical and Hydraulic Assessment of the East Demerara Water Conservancy Dam

4.2.5.1 Introduction to the Report

Published in 2005 by the joint UNEP/OCHA Environment Unit, the *Geotechnical and Hydraulic Assessment of the East Demerara Water Conservancy Dam* was realized right after the 2005 extensive floods in Guyana. This report presents findings based on two distinct geographical areas of the EDWC and the East Demerara coastal zone. The team in charge of the report based its assessment on several field observations, interviews with representatives of relevant United Nations agencies, GoG officials and Guyanese experts, especially within the MOA, the Ministry of Public Works and Communications, and the Secretary of the President's Cabinet.

4.2.5.2 Main Findings from the Report

Guyana has a complex system of water conservancy for irrigation alongside a complex drainage system. The EDWC was built, as other conservancy dams, in 1880. During the floods of 2005, water levels of the EDWC as well as the potential collapse of the Demerara Dam were of great concern. The *Geotechnical and Hydraulic Assessment of the East Demerara Water Conservancy Dam* assessment serves to confirm further findings from the other reports

mentioned above and stated that "the EDWC is a fragile construction [...] The Conservancy Dam is a difficult structure to maintain and in its current condition is unsafe [...] The best option would be the reconstruction of the whole dam according to a fit design, but this undertaking would imply a huge project taking hundreds of millions of US dollars and many years, which is probably not a feasible solution[...] The conservancy was constructed over a hundred years ago and is unfit for the present requirements of irrigation, potable water and safety. The agriculture and population of the coastal zone have grown and new requirements are to be considered."[90]

In brief, the authors of the report noted that the EDWC represents a serious risk of flooding to Georgetown, a situation that is compounded by the lack of natural drainage of the coastal band which lies below sea level. The situation is particularly acute because dam breaching would cause significant damage to key urban and agricultural areas – as noted above, where both the majority of the population lives and where economic impacts would be the most significant – located in the narrow coastal band.

Interestingly, the assessment provided an action plan that includes many relevant suggested activities that were of interest in the context of this NIDRMP. Key aspects of the action plan are depicted in table 21 below.

Table 21. Plan of Action for the Eastern Demerara Water Conservancy[91]

Area	Short-term before May 2005	Medium-term Until 2006	Long-term Until 2015
EDWC dam	Prepare simple repairs.	Rehabilitate the dam up to a functional state.	Redesign water conservancy plan.
Outlets of the conservancy dam	Open up the outlets that are currently out of order.	Rehabilitate all structures and channels that contribute to lowering the EDWC	
Drainage outlets in the sea defence	Construct temporary fixtures to facilitate drainage of dysfunctional outlets.	Rehabilitate all outlets.	Redesign the drainage plan for the coastal zone, involving drainage channels, ducts, kokers, outlet etc.
Drainage in the coastal zone	Repair damage by the flood.	Rehabilitate the drainage system.	
Others	Draw up a Disaster Management Plan. Carry out small scale simulation exercises.	Exercise these plans according to a training schedule. Increase the capacity of staff with education and training, both locally and abroad. Extend Disaster Management Plan to other potential threats in Guyana (such as sea defence breaches) as well.	

[90] UN Office of the Coordinator for Humanitarian Affairs (OCHA) & United Nations Environment Programme (UNEP). (2005). *Geotechnical and Hydraulic Assessment of the East Demerara Water Conservancy Dam*.

[91] UN Office of the Coordinator for Humanitarian Affairs (OCHA) & United Nations Environment Programme (UNEP). (2005). *Geotechnical and Hydraulic Assessment of the East Demerara Water Conservancy Dam*.

While some of the actions planned to be achieved by 2005 and 2006 have indeed been implemented such as some needed dam repairs, others have not such as the comprehensive rehabilitation of all dam structures and the drainage system. Any remaining actions to be implemented, including those that were only planned to be undertaken by 2015, have been integrated into the NIDRMP and the Strategy as priorities that are to be targeted and addressed by key activities and objectives.

4.3 Assessment of the DRM System in Guyana

4.3.1 Assessment of the DRM System and Structure in Guyana

As presented in section 2, Guyana has an overarching DRM system. This section will provide a brief assessment of the national DRM system and structure and its key organizations from the perspective of IDRM.

Though the recently proposed National Disaster Preparedness and Response Structure (as shown in figure 17, in section 2) is an improvement on what existed previously (as defined in 1985 and depicted above in section 2.2.3.1), it still leaves much to be desired from the IDRM perspective. As a disaster "preparedness" and "response" structure, it does not speak to the other aspects of DRM, specifically pertaining to risk identification, prevention and mitigation, financial protection and risk transfer, and recovery. One way this could be enhanced is by integrating the DRM approach further at the sub-committee level. This is discussed below.

4.3.1.1. DRM Sub-Committees

Insofar as the national disaster sub-committees are concerned, it is not well known why they were reduced from 15 to 7, why some disappeared (e.g., evacuation, oil spills, public education and information, etc.) and why others were created (e.g., Foreign Affairs, etc.). The functions and roles and responsibilities of the new suggested national disaster sub-committees are not stated in any document explicitly. It is evident that the sub-committees do not adequately cover the components of DRM. It is suggested that a revised structure be considered (as depicted below in figure 21).

At the regional level, similar structures could be replicated: regional DRM committees could be created with similar (as applicable) DRM sub-committees with a view to effectiveness and efficiency. The same applies for the local level where neighbourhood or community district DRM committees could be created.

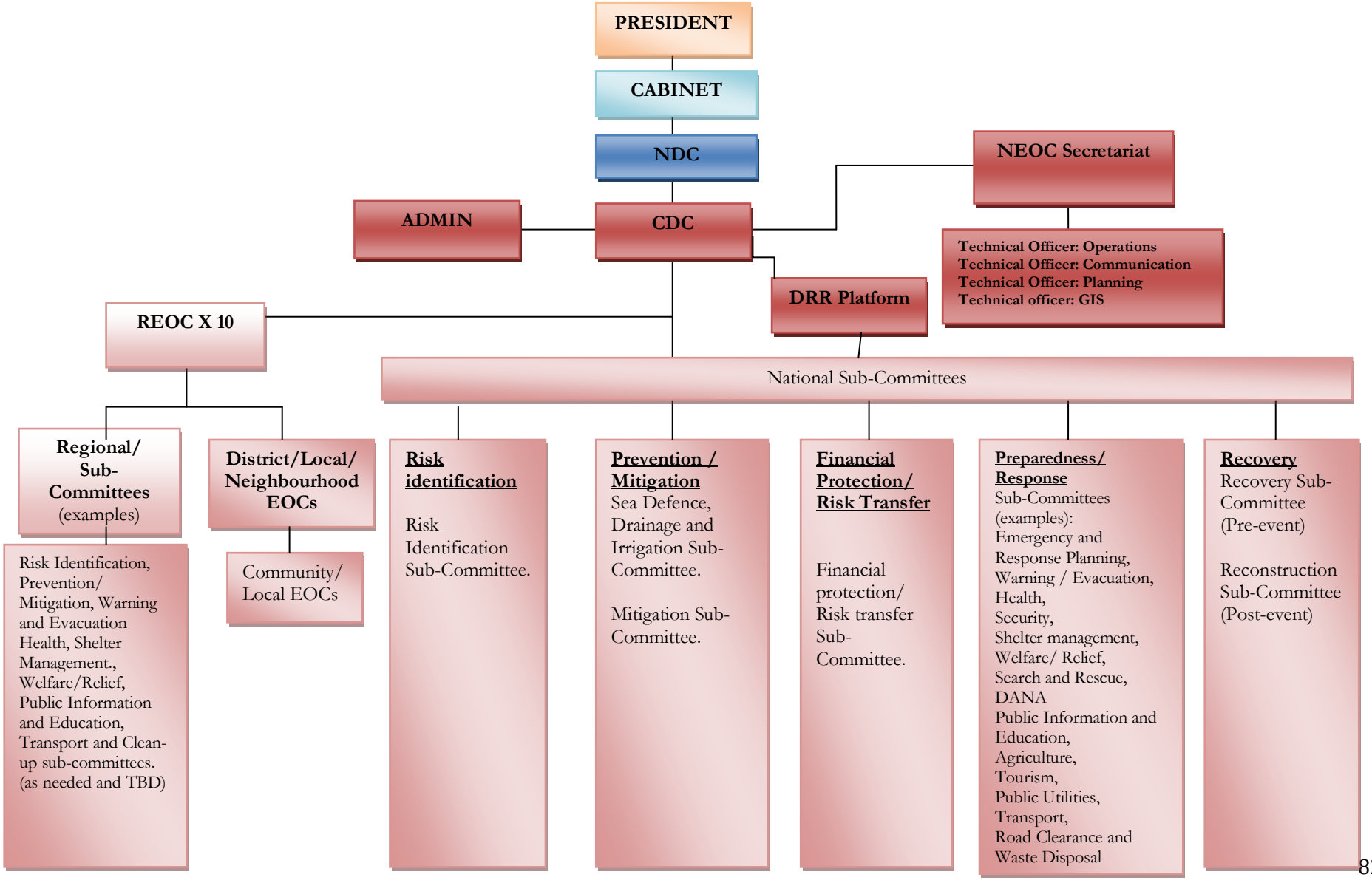
It is interesting to highlight that some documents, such as the NEOC SOPs, mention different sub-committees (called "committees") that are not included in any other document, such as the NMHPRP. This is the case with the "Public Information and Education Sub-Committee", a "DANA Sub-Committee", a "Water Sub-Committee", a "Food Sub-Committee", a "Search and Rescue Sub-Committee", a "Communications Sub-Committee" and a "Shelter Sub-Committee". These suggested sub-committees are excellent and could be included in a revised national DRM structure.

4.3.2 Revised DRM Structure for Guyana

Figure 21 below presents a slightly revised national DRM structure for consideration[92].

[92] This suggested revised structure was posited several times without any feedback received.

Figure 21. Suggested Disaster Risk Management Structure for Guyana



4.3.2.1. Tentative Roles and Responsibilities of the Different Sub-Committees[93]

1. Risk Identification Sub-Committee (suggested lead: GL&SC; suggested members: CDC, MLG&RD, Ministry of Public Works and Communications, MOE, MOH, Ministry of Housing & Water, EPA, CHPA, Ministry of Tourism, GG&MC)

- To plan for and oversee the development of maps, including coordination among key ministries and agencies;
- To ensure that maps are accessible/available for all stakeholders involved in DRM at all levels;
- To ensure that maps are updated as needed;
- To address the needs related to adequate software and capacity for modelling, prediction, analysis and decision-making-planning.

2. Drainage, Irrigation and Sea Defences Sub-Committee (suggested lead: Ministry of Public Works and Communications/NDIA; suggested members: CDC, MOA, MLG&RD, and GWI)

- To assess the vulnerability, risks and operational status of sea walls, sea defences, conservancy dams, irrigation channels, etc.;
- To identify needs and costs for retrofitting, repairing, rehabilitation, rebuilding, of all elements listed above and to plan for and ensure that works are completed;
- To identify needs for maintenance of all elements listed above, including the resources needed to do so: personnel, training, equipment, vehicles, materials, budget, etc. and to plan for and ensure that maintenance is undertaken regularly.

3. Mitigation Sub-Committee (suggested lead: Ministry of Home Affairs; suggested members: CDC, Ministry of Public Works and Communications, MOA, EPA, CHPA, GL&SC, GG&MC, NDIA, GWI)

- To assess vulnerability in schools, hospitals, clinics, government buildings and all critical infrastructure;
- To plan for an ensure that the prioritized actions to reduce vulnerability in all critical infrastructure;
- To ensure that the Guyana Building Code is finalized and enacted;
- To plan for an manage relocation of human settlements and other activities such as agriculture from areas at risk, including development of any needed plans or policies;
- To ensure that a drought plan is developed and implemented;
- To ensure that needed water sources are identified and the issue of storage is addressed;
- To facilitate coordination among all key ministries, agencies and stakeholders for mitigation.

4. Financial Protection/Risk Transfer Sub-Committee (suggested lead: Ministry of Finance; suggested members: CDC, Ministry of Legal Affairs, Ministry of Housing and Water, CHPA, MOA, Private Sector Commission)

- To oversee a comprehensive exploration of options for (mandatory) insurance for drought and flood targeting individuals, crops, livestock, etc.;

[93] These are posited for consideration.

- To ensure that agreed insurance become mandatory and to plan for compliance and enforcement;
- To ensure coordination among the government, private sector and society with regards to access to insurance and options;
- To facilitate an in-depth exploration of having Guyana engage with the CCRIF.

5. Sub-Committees for Preparedness/Response

A number of sub-committees are possible for preparedness/response or a larger committee for preparedness/response overall could be considered. In the latter case, the CDC should lead and in any eventuality should be deeply involved. The elements to be addressed include but are not limited to: Emergency and Response Planning, Warning and Evacuation, Health, Security, Shelter management, Welfare/ Relief, Public information and Education, Agriculture, Tourism, Public Utilities, Transport, Road Clearance and Waste Disposal, among others[94]. As an example of the potential roles and responsibilities of some of these sub-committees, one is posited below:

i. Public Information and Education Sub-Committee (suggested lead: MOE, National Communications Network; suggested members: Ministry of Amerindian Affairs, EPA, GINA, University of Guyana)

This sub-committee could be responsible for, among other aspects:

- To design, implement, monitor, evaluate, update and test an *Education Sector Disaster Plan*;
- To develop an *Emergency Public Information Plan*;
- To develop, implement and update a National DRM Public Awareness and Education Campaign at all levels on a regular basis;
- To develop and introduce DRM curricula in schools at all levels and to monitor its implementation;
- To train teachers and students accordingly.

The other sub-committees could include:

- ***Emergency Response and Planning*** **(suggested lead: CDC; suggested members: all)**
- ***Warning and Evacuation*** **(suggested lead: CDC; suggested members: Hydromet, NDIA, Defence Force, Fire Service, Police Force, GT&T, GINA, National Communications Network)**
- ***Health*** **(suggested lead: MOH; suggested members: Red Cross, PAHO, CDC)**
- ***Security*** **(suggested lead: Ministry of Home Affairs; suggested members: Defence Force, Fire Service, Police Force, CDC)**
- ***Shelter management*** **(suggested lead: CHPA; suggested members: Guyana Red Cross Society, MOE, MOH, CDC)**
- ***Welfare/ Relief*** **(suggested lead: Ministry of Labour, Human Services and Social Security/CDC; suggested members: Defence Force, Guyana Red Cross Society, Guyana Relief Council, MOE)**
- ***Search and Rescue*** **(suggested lead: Guyana Police Force/NEOC; suggested**

[94] The CDC and National DRR Platform should discuss which sub-committees will be selected to be part of the revised structure. This list is a suggestion and also to be considered is the shorter list as presented in the previously proposed structure for the National Disaster Preparedness and Response Structure above in Figure 17 as in the *National Multi-Hazard Preparedness and Response Plan*.

members: Defence Force, Fire Service, Urban Search and Rescue (USAR) teams, Civil Aviation Authority, Air-Craft Owners Association, MOH, EOCs)

- ***DANA*** **(suggested lead: MLG&RD; suggested members: GL&SC, EOCs)**
- ***Agriculture*** **(suggested lead: MOA; suggested members: NDIA, EPA)**
- ***Tourism*** **(suggested lead: Ministry of Tourism, Industry and Commerce; suggested members: Guyana Tourism Authority, EPA, Ministry of Foreign Affairs, Guyana Tourism and Hospitality Association)**
- ***Public Utilities*** **(suggested lead: Ministry of Public Works and Communications; suggested members: MOA, EPA, GWI, GT&T, GPL)**
- ***Transport*** **(suggested lead: Ministry of Public Works and Communications; suggested members: EPA)**
- ***Road Clearance and Waste Disposal*** **(suggested lead: Ministry of Home Affairs; suggested members: MLG&RD, Defence Force, Fire Service, Police Force)**

6. **Recovery Sub-Committees (suggested lead: CDC/ MLG&RD; suggested members: MOA, Ministry of Tourism, Industry and Commerce, Ministry of Public Works and Communications, MOH, MOE, NEOC, Ministry of Finance)**

A separate Recovery Sub-Committee and Reconstruction Sub-Committee are possible for recovery or a larger committee for recovery overall could be considered.

Separately or together, the sub-committee(s) could be responsible, among other aspects:

- To ensure the development and implementation of early recovery plans for floods and drought;
- To oversee the development of BCPs and COOPs as needed for governments and the private sector;
- To ensure that reconstruction is facilitated/coordinated with key mitigation stakeholders to ensure that mitigation is considered in construction;
- To ensure there is adequate resources (human, material, financial) for recovery.

Once the composition, roles, responsibilities of all sub-committees are established as part of a revised and enhanced National DRM structure, a coordination process will also need to be established whereby regular meetings will take place at the committee level. For each one of the national disaster sub-committees there could be a continuous planning process instituted wherein all members of all sub-committee organizations involved in the development and then the management of any plan could be responsible for its ongoing testing and improvement in the context of a continuous contingency planning process.

With regards to emergency response planning, NEOC members, national and regional sub-committees, communities, key sectors such as tourism and health and indeed all organizations involved in emergency plans should meet regularly to ensure that response plans are kept "alive" through testing, exercises and simulations and that any needed resources are available at all times. At the national level, it is important to determine whether this planning process is to be guided by the CDC or by the National DRR Platform[95]. It will be critical to establish a permanent planning process that ensures the development, updating, enhancement and testing of all plans, which will also help to ensure that any emerging needs will be identified

[95] Although it has been noted that a Cabinet Sub-Committee on the Environment, Natural Resources and DRM could also be given this function.

for new and better resources and training, as well as ongoing learning and preparedness enhancement. As crucial will be the need to build capacity and to ensure that trainees are well targeted with a view to the responsibilities and tasks during the response phase and to properly target the right persons for DANA training, shelter management etc. The potentially newly established sub-committees may also include members that would require relevant training, along with other key organizations as part of the national DRM structure. In addition, the need for training at all levels cannot be minimized, including stakeholders and organizations at the local and regional levels.

National Disaster Coordinator

Though there is not extensive explanation about the role of the National Disaster Coordinator and whether or not or how this role is actually being fulfilled and implemented it is worth briefly noting here that the roles and responsibilities as they are discussed in documentation reviewed speak to almost all components of DRM. Among the Coordinators critical roles is to analyse and interpret information for the purpose of determining whether identified conditions and trends are interfering, or are likely to interfere, with the achievement of the prevention and mitigation of, preparedness for, response to, and recovery from, emergencies and disaster. Other than financial protection and risk transfer, it would seem that the Coordinators would look at other components of DRM. Nonetheless, how the Coordinator fits into the National DRM system in practical terms and the actual roles being played in implementation are not well known and clarity would assist.

National Disaster Risk Reduction Platform

It would seem that the National DRR Platform has replaced the 1985 National Emergency Advisory Council. This may need further clarification. In many cases, Caribbean countries have a National Disaster Management Committee/Council presided over by the Prime Minister or the President with ministers or permanent secretaries of the key ministries involved in DRM in the country as members as well as representatives from the private and social sectors. This National Disaster Management Committee/Council meets on an annual basis and is the body that approves DM plans, programmes and activities in the country. This type of National Disaster Committee/Council is proposed in the draft *DRM Bill* (2013). Also, broad roles and responsibilities for the National DRR Platform are posited in the draft *DRM Bill* (2013) but more specific detail and clarification would assist in strengthening the role of the National DRR Platform in the context of an enhanced DRM system.

The CDC

As detailed in section 2.2.4., the CDC has gone through changes and has grown since 1982. As any other national DM office, it has had to grow and change at the same pace as DRM in the Caribbean region. Its name—Civil Defence Commission—evokes the protection/defence of civilians in times of war and comes from the Geneva Conventions from 1949. More recently, national offices in charge of DM and DRM in the region and beyond have changed their names reflecting the change in focus of their activities from emergency relief and emergency response to more comprehensive terms as emergency management and DM offices. This is the case in many Caribbean countries as with the regional disaster organization: CDEMA, which changed its former name of CDERA to CDEMA (changing the word "Response'" to "Management"). In the same way, the CDC could change its name, currently aligned with its functions, to one referring more to recent DRM developments. As the CDC will be in charge of

the overall coordination of DRM (while specific sub-committees and therefore other organizations are in charge of specific DRM components and functions), it is suggested that it changes its name to National Disaster Risk Management Office or Agency. This will make the CDC one of the first national disaster organizations with a name and functions aligned with the current DRM policies and activities in the region and around the world.

In the same way, its organizational structure could follow DRM models and not other previous models that address only relief and/or response. The CDC structure could be revised and redesigned according to IDRM.[96] It could include, then, positions for risk identification, financial protection/risk transfer, prevention/mitigation, preparedness/response and recovery.

It seems evident that the CDC will need more staff to coordinate DRM activities such as risk identification, prevention/mitigation, preparedness (not just training but also emergency planning, etc.), financial protection/risk transfer and recovery.

NEOC and EOCs

The NEOC structure and functions follow the CDEMA manual *National Emergency Operations Centres*. *Standard Operating Procedures* designed in 1995 and used to design NEOCs all over the Caribbean. There are some discrepancies as to who could be in the NEOC, particularly regarding the representatives from the national disaster sub-committees. One and the same NEOC document features two lists showing different representatives from the national sub-committees; this has to be clarified. It should be clearly stated who has to go to the NEOC and for what purposes.

Regarding the NEOC staffing and operations, the sharing of results of an evaluation of the last simulation exercise "Flood Gate 2012" executed in July, 2012 would allow the CDC and the NEOC members to identify gaps and needs for the improvement of the NEOC manual, its SOPs and its operations during emergencies and disasters. In this fashion it would be known if whatever is mentioned in the NEOC manual (staff, equipment, materials, telecommunications equipment, etc.) exists in reality in the NEOC and would be there to ensure adequate operations every time it is activated. It is necessary to know whether the staff, equipment and materials mentioned in the NEOC manual truly exist or whether they refer rather to an ideal state of the NEOC, in which case these resources would need to be hired, purchased, stored, developed, etc.

In the same way that in the Caribbean region CDEMA has designed the NEOC guidelines for CDEMA Participating States to adapt when establishing their own NEOCs, the CDC could develop guidelines for the regions in Guyana to adapt and establish their own regional EOCs. The same could be done by the CDC to design specific guidelines for EOCs at the local level. The CDC could initially develop these guidelines and afterwards promote the establishment, staffing and equipping of regional and local EOC. In this way, all regions and neighbourhoods, councils or communities that need an EOC would have one. The guidelines designed could include: a typical structure for the EOC, its members, lay-out, minimal resources and SOPs. Currently, EOCs are being established at the regional level. Telecommunications between EOCs could be tested at least weekly. This could be stated in the EOCs SOPs. A national

[96] The structure of the CDC is presented in figure 18 in section 2.2.4.

telecommunications plan could be developed. This plan could include all possible means of telecommunications: radios (Very High Frequency, Ultra High Frequency, and HAM), telephones, etc., from government, private telecommunication companies and amateur radio operators. This plan could establish all the mechanisms for telecommunications between NEOC, EOCs, emergency response field task forces, emergency services, shelters, Defence Force, Police Force, Fire Service, and others. Once all national, regional and local EOCs are established, their activation and operations could be tested with simulation exercises planned jointly by the CDC and the regional and local disaster committees.

The key gaps and suggested activities for enhancing the NEOC and EOCs across the country include the following, as depicted in table 22.

Table 22. Emerging Priority Actions Needed for EOCs

Key Gaps	Analysis/Further Needs	Suggested Activities
The NEOC SOPs are not compatible with other emergency response plans.	Revise the NEOC SOPs to ensure they are 100% compatible with all other plans they will be used for. In particular, revise the organizations mentioned and their functions.	New revised NEOC SOPs compatible with all response plans.
The status of equipment and materials mentioned in the NEOC SOPs is not clear.	Review of the results and recommendations from the simulation "Flood Gate" 2012. Review of the NEOC SOPs versus equipment and materials in NEOC.	Revision of NEOC facilities, equipment, materials and telecommunications.
There are no guidelines for the comprehensive establishment of EOCs across the country at all levels.	CDC to design guidelines for the structure and equipment for EOC at regional and local levels. Review of results of simulations exercise.	Guidelines for the establishment and operations of EOCs at the Regional and Neighbourhood levels.
Not all EOCs established in the country.	Establishment of all EOCs.Review of the results and recommendations from the flood simulation exercise conducted in May in Mahaica.	EOCs established and equipped at the regional and local level.

Based on the existing DRM structure, the key limitations and suggested activities for enhancing the DRM structure include the following, as depicted in table 23.

Table 23. Emerging Priority Actions Needed for the IDRM Structure

Key Gaps	Validation by Stakeholders	Analysis/Further Needs	Suggested Activities
CDC structure and functions do not reflect the need to conduct DRM activities in the country.	No specific suggestions.	Revise the CDC structure, functions, etc., to reflect DRM and its five components.	Design of a new CDC structure with functions, positions, structure, job descriptions. etc., reflecting DRM. Rename the CDC.
The National Disaster Preparedness and Response Structure is	No specific suggestions.	Revise the structure versus needs from the NIDRMP and make adjustments in	Design of a new National IDRM Structure reflecting DRM.

not an IDRM structure		the structure as needed to reflect DRM and its five components.	
The national sub-committees' names, composition and functions are not clear.	Committees to be established with various representatives from government among others.	Revise the name, number, composition and functions of all national sub-committees.	Design of new national sub-committees reflecting IDRM, covering its five components and all emergency functions needed.
The structure, role, composition and terms of reference of the National DRR Platform are not clear.	No specific suggestions.	Revise the role, composition, functions and terms of reference of the National DRR Platform. Ensure CDC is a member of it.	New National DRR Platform with a clear role and revised composition and functions.
DRM committees and sub-committees are not yet established in all regions and at the local level.	Need to resuscitate the local emergency committees at all levels. Review current district/local/neighbourhood committees' members and functions. Review new and existing interest of committee members.	Revision of the structure of committees at the regional and district/local/neighbourhood levels to ensure they reflect CDM and its five components. Use and adapt the guidelines produced by the CDC for the regional and district/local/neighbourhood committees	Regional and district/local/neighbourhood DRM committees and sub-committees established according to CDC guidelines.

The gaps and challenges noted above regarding all aspects of the national DRM system and structure are addressed directly through the suggested activities in the NIDRMP in section 5 below and in the Strategy.

4.4. Summary of Key Gaps and Challenges by DRM Component

This section presents some of the key gaps and challenges in Guyana through the lens of the five DRM components identified in the process of developing the NIDRMP. A table highlighting the main gaps and challenges is presented for each component as a summary. Together they complement the assessments and analyses described above and act as a summarizing segue to the NIDRMP itself, the subject of section 5.

4.4.1. Risk Identification

As mentioned above, useful maps have been produced and assessments have taken place in recent years. Nonetheless, hazard maps could be further prioritized based on the history of past events and the probability of future occurrence and possible damage to the country. Overall, it was found that mapping and assessments (and their results) could be better used for the design of disaster scenarios and for DRM planning and national planning and decision-making, from a sustainable development perspective. As other assessments noted, development planning could be more focused on areas that are particularly vulnerable and/or are at risk, while emergency planning could be based on specific disaster scenarios that consider characteristics of the hazard (cause, speed of onset, magnitude, scope of impact, duration, destructive potential, etc.) and vulnerable elements (population, housing,

agriculture, schools, roads, conservancy dams, government buildings, private businesses, communities, etc.) and are based more specifically on in-depth assessments. GIS maps could be made more available (for free) for all those agencies and public involved in DRM. Guyana is neither yet at a point where all hazards are mapped nor where all vulnerable elements are indicated in GIS layers. Digital elevation models (DEM) could also be considered in the development of these maps. This would allow for a view of the interaction of different magnitude hazards over different areas and different vulnerable elements (population, housing, crops, environment), thus being able to assess risk and to design disaster scenarios that would be on a solid foundation for mitigation, development, emergency and recovery planning. Standard procedures for conducting HVRA should be developed since it was noted that none exist at the present.

In order to plan for and oversee the development of maps, and to ensure that these are available for all stakeholders involved in DRM, a National Risk Identification Sub-Committee could be created within the revised national DRM structure.

Based on progress made through recent projects and activities, and integrating the main challenges highlighted by the many recent assessments, the key gaps and suggested activities for risk identification include the following, as depicted in table 24.

Table 24. Emerging Priority Activities Needed for Risk Identification

Summary of Key Gaps[97]	Validation by Stakeholders	Analysis/Further Needs	Suggested Activities
Few recently developed maps identifying floodable areas.	Need for maps showing floodable areas. To acquire satellite images for Guyana coastal area.	Conduct additional flood mapping as needed.	Create flood maps for vulnerable areas such as Georgetown, Anna Regina and New Amsterdam. Use of flood maps for development planning and emergency response planning.
Few maps showing vulnerable elements. Maps with information not updated.	Need to develop flood hazard maps using GIS mapping and to develop a GIS database with location of critical infrastructure and use flood simulation to qualify and quantify the levels of threat to critical infrastructure. Review aging structures (public an private)	Identify the status of maps showing population and infrastructure. Develop/update new ones particularly for flood-prone areas. Diagnosis of the structural reliability of each one of the critical infrastructure components in order to determine critical components requiring strengthening and reinforcement.	Designed/updated GIS maps and databases showing information about population and infrastructure in floodable areas, and for specific priority regions (Georgetown, Anna Regina and New Amsterdam). Small scale risk maps at the community level/community risk assessments. Conduct vulnerability assessments to vulnerable elements (e.g.

[97] No details are provided in these tables. The details for these are provided in sections 4.2 and 4.3 above.

Summary of Key Gaps[97]	Validation by Stakeholders	Analysis/Further Needs	Suggested Activities
			sugar and rice crops) in flood prone areas.
No maps with information about droughts and effects.	Need to map droughts and effects, preferably by region.	Identify information to be mapped in drought maps.	Development of drought maps. Development of a GIS-based flood and drought risk information system
Flood maps just recently developed and might not have been disseminated to all agencies concerned.	Availability of existing maps.	Improve mechanisms to improve access to existing maps and information.	Make maps accessible for government agencies and for the general public. Create a website where maps and updated information is made available.
No standard procedure for conducting HRVA		Need to conduct national-level HRVAs	Design and implementation of a *National Hazard, Vulnerability and Risk Mapping Plan*.
Low capacity to perform digital mapping and modelling to identify and predict risks.	Training of personnel on Information Technology/GIS/Data collection and analysis.	Not enough trained personnel, software and Information Technology equipment to design and use maps.	Deliver training to key government staff in the design and use of mapping software and processes, including analysis.
Not enough coordination among the various stakeholders involved in hazard identification and mapping for identifying types of maps, software and hardware needed, and mechanisms for data gathering and availability.	No specific suggestion.	Bring all stakeholders involved together to identify mapping priorities and information needed to prepare maps and databases. Determine and agree on mechanisms for data collection, storage and availability.	Establishment of a National Risk Identification Sub-Committee and plan to conduct and coordinate all efforts towards hazard, vulnerability and risk mapping in Guyana.

The gaps and challenges noted above are addressed directly through the suggested activities as mentioned above and then detailed as part of the NIDRMP in section 5 below and in the Strategy.

4.4.2. Prevention/Mitigation

Notwithstanding the many initiatives that address the identified gaps and vulnerabilities discussed in section 4.2, and the mitigation activities currently being implemented in Guyana, the sea walls and conservancy dams are complex and old. It is generally recognized that repairs are needed yet also costly and that there is an insufficient capacity and resources for inspection and maintenance of structures in a comprehensive and consistent manner. The creation of a specific committee and/or sub-committee for reducing vulnerability of those structures needs to be considered in order to ensure that all key stakeholders participate in the identification of the problems and implementation of solutions. The 1985 *National Disaster Preparedness and Response Plan* mentions a National Hydraulic and Hydro-Met Disaster Planning Sub-Committee and it is not known whether this sub committee or a similar

one now exists. It was suggested previously (see section 4.3) that sub-committees - Drainage, Irrigation and Sea Defences Sub-Committee, and Mitigation Sub-Committee- could be in charge of these aspects among others.

To reduce vulnerability of its infrastructure, Guyana plans to move forward with the enactment of its Building Code and to enforce it to ensure that buildings and new settlements are built with the view to reducing vulnerability to floods and other hazards. There is a need to identify more specifically what further resources are required in terms of human resources, training, equipment and budget for this aspect. In addition, there is a need to further reduce vulnerability of existing structures through structural mitigation. Once constructions are built to address mitigation and vulnerability, it will be simpler and less expensive to insure them against floods or other hazards.

Along with structures, the assessments presented in section 4.2. noted that both agricultural activities and human settlements present high risk and vulnerability in Guyana. Many actions could be taken with a view to prevent and mitigate impacts of hazards in these areas.

Based on progress made through recent projects and activities, and integrating the main challenges highlighted by the many recent assessments, the key gaps and suggested activities for prevention and mitigation include the following, as depicted in table 25.

Table 25. Emerging Priority Actions Needed for Prevention/Mitigation

Key Gaps[98]	Validation by Stakeholders	Analysis/Further Needs	Suggested Activities
Vulnerability of sea walls, conservancy dams, and drainage and irrigation channels not completely assessed.	No specific suggestion about assessing vulnerability.	Determine the needs for vulnerability assessments of all conservancy dams.	Conduct assessments like the one conducted for the EDWC in 2005 that will identify specific areas for rehabilitation/repair in conservancy dams and sea walls and the revision of water conservancy, drainage and emergency plans.
Insufficient capacity for inspection and maintenance in drainage systems, sea walls and conservancy dams.	Improve maintenance schedule.	Identify needs in terms of personnel, training, equipment, etc.	Capacity building for regular inspection and maintenance in sea walls, conservancy dams and drainage structures.
Repairs to sea walls and conservancy dams.	Enhancement/reinforcement of conservancy dams. Enhancement and repairs of hydraulic structures (sluice gates, flood gates, sea defence). Rehabilitation of sea walls.	Identification of areas needing repairs.	Repair works to sea walls and conservancy dams.
Works towards increasing	Drainage canals at EDWC and WDWC. Upgrade current	Identification of drainage capacity	Construction of canals as needed.

[98] No details are provided in these tables. The details for these are provided in sections 4.2. and 4.3. above.

Key Gaps[98]	Validation by Stakeholders	Analysis/Further Needs	Suggested Activities
drainage capacity in conservancy dams.	manually operated sluice gates with modern mechanized systems.	needs and works needed to increase it.	
Vulnerability of infrastructure in areas at risk not assessed.	Review aging infrastructure (public and private).	Identify vulnerable elements that need vulnerability assessment: schools, hospital, government buildings, infrastructure, etc.	Conduct vulnerability assessment of vulnerable elements in floodable areas. Retrofitting and reinforcement of public and private assets
Human settlements in high risk areas.	Relocation of the residents of the coast line. Relocation of Region 10 community (Berbice river).	Based on flood maps and scenarios and the estimation of risk, determine the need and feasibility of relocating human settlements to less risky areas.	Conduct risk assessment studies to determine the feasibility of relocating specific human settlements in high risk areas.
Lack of a policy of land use and human settlements that considers risk.	Implement strict zoning laws based on specific activity in a given area. Identify and set aside land for appropriate sites for new housing settlements. Formulate criteria for selection and allocation of land. Review development plan with the view to relocate residence to higher grounds.	Use of flood maps to identify specific floodable areas and to assess risk in them in order to determine which specific activities are to be allowed and under what circumstances (types of constructions).	Identify risk areas and establish criteria for settlements in them based on the flood risk. Design and enact a policy for land use and human settlements
Harvesting is done in different times including the rainy season, which increases the risk of loss of crops.	Breed and cultivate crops so that harvest can be done before the rainy season.	Establish criteria and meet with farmers to agree on specific practices.	Identification of agricultural activities to reduce risk during the flooding season.
Building Code not enacted and not enforced.	Enactment and enforcement of Building Code. Prevent the construction of structures without stilts in flood prone areas. Fines.	Design/revise Building Code and identify specific needs for enforcement in Guyana: personnel, training, equipment, vehicles, etc.	Design and enact a Building Code including specific mandatory building measures against floods. Identify enforcement capacity needs. Building capacity for enforcement of the codes.
Water sources not identified for the case of droughts.	Drilling of shallow wells during drought.	Based on past events, determine water needs and sources of water in the case of droughts.	Identification of specific measures to access and store water during droughts.
More coordination needed among all key stakeholders involved in mitigation.	Representatives from EPA, Sea Defence, Guyana Forestry Commission (GFC), Guyana National Bureau of Standards, MLG&RD. Integration and coordination among Ministries, Regional and Neighbourhood Democratic Councils, public works companies of urban settlements.	Identify key stakeholders involved in drainage systems, sea defences and conservancy mitigation and those involved in the mitigation of all other buildings and key infrastructure. Need to involve the private sectors in such activities	Establishment of two national sub-committees: one for sea defences and sea walls and one for assessing vulnerability and mitigation measures for all other buildings/infrastructure.

The gaps and challenges noted above are addressed directly through the suggested activities as mentioned above and then detailed as part of the NIDRMP in section 5 below and in the Strategy.

4.4.3. Financial Protection and Risk Transfer

There are very few relevant actions in Guyana under this component. For example, there is no mandatory insurance in Guyana, particularly regarding flood risk. In addition, the Building Code is not mandatory or enforced at present. The majority of stakeholders met in Guyana agree that insurance should be mandatory. This should thus be reflected in the *DRM Bill* currently being drafted (2013). If the Building Code is enacted and mandatory, and capacity for enforcement is adequate, and if insurance is mandatory, buildings will be built such that they are less vulnerable. Insurance will be rendered more accessible and financial protection and risk transfer could be integrated into the DRM approach.

At the regional level, the CCRIF provides insurance to Caribbean countries for damage due to hurricanes and earthquakes. Recently, the CCRIF is moving to providing insurance to disasters caused by floods; thus, Guyana could take this opportunity to become insured by the CCRIF against floods.

Based on progress made through recent projects and activities, and integrating the main challenges highlighted by the many recent assessments, the key gaps and suggested activities for financial protection and risk transfer include the following, as depicted in table 26.

Table 26. Emerging Priority Actions Needed for Financial Protection/Risk Transfer

Key Gaps[99]	Validation by Stakeholders	Analysis/Further Needs	Suggested Activities
No mandatory insurance in Guyana.	Legislation for compulsory flood and drought insurance. Make flood insurance mandatory by legislation.	Meetings with insurance companies could be held to determine specific conditions and requirements for mandatory insurance and specific economic consequences.	The *DRM Bill* could include mandatory flood and drought insurance. The Building Code could include specific flood and drought counter-measures agreed between government and insurance companies.
Crops and animals not insured in farms.	Flood insurance for crops and livestock	Meetings between government and insurance companies and farmers to determine conditions and analyze implications and consequences of mandatory insurance for crops and livestock.	The *DRM Bill* could consider the specific case of mandatory insurance of crops and livestock.
Need for coordination	No suggestion.	Identification of best	Establish a National Risk

[99] No details are provided in these tables. The details for these are provided in sections 4.2 and 4.3. above.

Key Gaps[99]	Validation by Stakeholders	Analysis/Further Needs	Suggested Activities
between government, private sector and society to design and have access to insurance mechanisms.		insurance practices; development of guidelines, identification of risk transfer options in the country and the region.	Transfer Sub-Committee.
Guyana not insured at the regional level.	No specific suggestions.	Coordination with CCRIF to find out about conditions for flood insurance.	Engage regional insurance with the CCRIF to access insurance for flooding in Guyana Identification of risk transfer financing mechanisms for Guyana in coordination with regional and international organizations

The gaps and challenges noted above are addressed directly through the suggested activities as mentioned above and then detailed as part of the NIDRMP in section 5 below and in the Strategy.

4.4.4. Preparedness and Response

4.4.4.1 Legislation, Policies and Plans

The important gaps in terms of legislation, policies and plans for IDRM in Guyana were a major concern in most of the assessment reports looked at in section 4.2. While the UNDP and CDEMA assessments served to show how much needs to be done to create an enabling environment in Guyana, the *Indicators of Disaster Risk and Risk Management* also mentioned the necessity for more testing and exercise plans in the country.

In fact, as noted above in section 4.2., there is no finalized *DRM Bill* in Guyana, though it is currently being drafted. Guyana has a draft *DRM Policy* that was drafted in June 2011, and revised in March 2012, but that still has not been submitted to Cabinet for approval. Both the draft *DRM Policy* and the draft *DRM Bill* (2013) could be enhanced to better address DRM and its five components and integrate the NIDRMP. As previously mentioned also, it may be useful to consider that DRM concepts could also be included in other relevant legislation. In addition there are other policies and several plans that will need to be designed as identified in figure 15 above in section 2.2.2. and also in tables 17 and 27. Thus, the design of new or missing plans and in some cases the revision of those already existing, is suggested through specific activities of the NIDRMP. In addition, all plans need to be updated and tested regularly. Hence, an emergency planning process needs to be established at the national, regional and local levels, for the case of sectors that have a plan and for those sectors that do not, a sectoral planning process must be established as well, as suggested in section 4.3.2.1.

Emerging summary key gaps and priorities, as well as suggested activities related to legislation, policies and plans are discussed below in table 26 below.

4.4.4.2. DRM Training and Capacity Building

One aspect that emerged from the review of key assessments realized in recent years in Guyana is that there is a need to enhance capacity of the GoG to effectively address problems related to disasters and climate change in a comprehensive manner. In order to address organizational deficiencies, it is important to build capacity of the main actors involved in key sectors. Data and stakeholders suggest that currently training focuses mostly on emergency and response. Thus, a more comprehensive national DRM training programme could be set up in Guyana. DRM training should be based on an identification of training needs through an in-depth assessment to specify the type and number of training courses needed as well as the type and number of trainees to be targeted at all levels, with a view to developing specific training activities that adequately address the DRM components. A number of suggested training areas are posited in the NIDRMP in section 5 below. Moreover, there is a need to address capacity in terms of better functioning of key organizations (e.g. by equipping and establishing the needed facilities for example).

The emerging summary key gaps and priorities as well as suggested activities related to training are discussed below in table 27 below.

4.4.4.3. Public Education and Awareness

Previous assessments (e.g. the 2010 *CDM Country Baseline Report for Guyana*) found that there was no formal public education and awareness programme in Guyana. The low level of awareness of the civilians about the risks was also noted in some reports (UNDP's *Capacity Assessment Report – Disaster Risk Management in Guyana* (2009); IDB *Indicators of Disaster Risk and Risk Management* report (2012)) as a potential vulnerability that would be important to address. The DRM structure, too, does not adequately reflect this aspect. Therefore, it was proposed earlier in section 4.3 that a specific national sub-committee (i.e. Public Information and Education Sub-Committee) could be established within the national DRM structure with this purpose. In addition, at the moment, there is no overarching plan for the sector either. A *National DRM Public Education and Awareness Plan and Strategy* could be designed to improve this aspect. In addition, CDEMA's *Model Public Education/Awareness Strategy and Policy* could be adapted and implemented in Guyana.

Based on progress made through recent projects and activities, and integrating the main challenges highlighted by the many recent assessments, the key gaps and suggested activities for preparedness/response include the following, as depicted in table 27.

Table 27. Emerging Priority Actions Needed for Preparedness/Response

Key Gaps[100]	Validation by Stakeholders	Analysis/Further Needs	Suggested Activities
No *DRM Bill* in Guyana.	Development of a comprehensive DRM Bill.	To design the *DRM Bill* considering a DRM approach and the results of the NIDRMP.	Design of the *DRM Bill* ensuring it covers the five DRM components and considers the NIDRMP. Gender, environmental and climate change issues

[100] No details are provided in these tables. The details for these are provided in sections 4.2. and 4.3. above.

Key Gaps[100]	Validation by Stakeholders	Analysis/Further Needs	Suggested Activities
			should be considered.
Existing legislation presumably without CDM/DRM considerations	Enforcing legislation on squatting on government/drainage services.	Identify other acts that could benefit from including DRM. This will help the implementation of the NIDRMP.	Revise and update all existing legislation to ensure CDM and DRM is considered.
The draft *DRM Policy* (2011) does not fully cover DRM	The *DRM policy* derivative could be the umbrella under which private sector organization policies are developed.	The draft *DRM Policy* (2011) lacks a clear outline of responsibilities.	Revise the draft *DRM Policy* to ensure it covers all five DRM components and supports the design of the *DRM Bill*. Ensure gender, environmental and climate change issues are considered.
Some emergency function plans not designed: tele-communications, emergency public information, evacuation (beyond Mahaica), shelter management, disaster relief, road clearance, and waste disposal,	Mandatory evacuation policy.	The following emergency function plans exist: - NEOC SOPs - EWS Protocol - DANA Plan - Land Search and Rescue Plan - Aeronautical Search and Rescue Plan - Air Maritime Plan - Upper Mahaica Evacuation Plan - Community plans developed by Guyana Red Cross Society Other policies need to be designed.	Establish a national emergency planning process, including the thorough creation, revision and updating of all existing plans. Ensure gender, environmental and climate change issues are considered.
Some hazard-specific plans not designed: drought, oil spills, landslides, earthquake, hurricanes/storms/severe weather systems, fires, hazardous materials spill, sea wall breach, mass casualty events: aircraft accidents, vehicle accidents, epidemics, chemical/biological/radiological/nuclear events, mining accidents, tsunami.		Only the *Flood Response and Preparedness Plan* exists. Other plans and policies need to be designed.	Design and revise emergency response plans for all hazards
Existing response plans are not being updated regularly, particularly after simulation exercises.	The need to resuscitate local emergency committees at all levels.	Plans could be updated by the CDC, the National DRR Platform and the national, regional and local disaster sub-committees/committees	Establish a contingency planning process to revise, update and test all existing plans regularly. Plans to be revised after each simulation exercise.
Some sectoral disaster plans not designed: - Education; - Agriculture; - Tourism;	No specific suggestion.	DRM plans to be designed by sectors: Education, Tourism, Environment, and Infrastructure. The DRM	Design the rest of the sectoral plans considering floods and drought (to include Education, Tourism,

Key Gaps[100]	Validation by Stakeholders	Analysis/Further Needs	Suggested Activities
- Infrastructure; and - Environment		plan for the Agriculture sector is to be finalized in early 2013.	Environment, and Infrastructure, potentially). The Health Sector Disaster Plan could be updated.
Not all plans are compatibles.		Some documents, such as the NEOC SOPs mention different sub-committees (Public Information and Education Committee; DANA Committee; Water Committee; Food Committee; Search and Rescue Committee; Communication Committee; and Shelter Committee) that are not included in any other documents such as the NMHPRP.	Make all plans compatible
Warning systems could be improved in terms of more time for warning and widening the coverage for warning.	Doppler radar with 4-5 days prediction capabilities. Early warning devices for flooding/dam failure. Review /integrate/ harmonize the current EWS with stakeholders (text messaging, etc.). EWS for the entire country, flood warning systems via satellite, radio, etc. Doppler weather radar. Short period (24h.) for hydrological modelling for catchments.	Purchase of the Doppler radar with 4-5 day prediction capabilities. Identify all means of communications for warning to cover all the population at risk for the case of floods. Review the National EWS Plan.	Improve the EWS, including the revision of the EWS Plan. Liaison with neighbouring countries like Brazil, Suriname, and Venezuela, Caribbean Institute for Meteorology and Hydrology (CIMH) and the Caribbean Countries for EWS. Cabinet approval of the EWS protocol and implementation by stakeholders, this should include the establishment of the EWS Sub-Committee.
Need for adequate and enough equipment and vehicles to respond to floods and droughts.	Acquire large buses for evacuation. Provision of equipment such as tents and flashlights. Very High Frequency radios. Boats, four-wheel drive trucks, satellite phones.	Identify specific needs in terms of type and number of equipment, vehicles needed. Identify existing resources. Identify needs for purchasing.	Improve, maintain, acquire equipment and vehicles for response or identify existing resources to be used during emergencies.
Organizational capacity is weak in most sector agencies.	Refresh training of committee members covering theoretical and practical aspects of DRM. Need for shelter administrators to be trained.	To estimate the number of trainees for each training course to be delivered. More resources allocated to development and delivery of DRM training programmes CDC will need more staff	Design and implement a national DRM training programme Revision of the CDC structure, positions, legislative authority, functions and name to ensure it is structured as a DRM organization and enabled to address and

Key Gaps[100]	Validation by Stakeholders	Analysis/Further Needs	Suggested Activities
		to coordinate DRM activities. DRM activities are coordinated at the national level by the CDC. At the regional level, similar structures could be replicated.	coordinate all DRM components Establish regional and local DRM committees and sub-committees
NEOC roles and responsibilities are not clearly defined by legislation		There are some discrepancies in NEOC documents	Revision of the NEOC manual, SOPs and staffing and equipment
Regions and neighbourhoods, councils or communities that need an EOC don't necessarily have one.		EOCs are being established at the regional level.	Design of model regional and local EOC manuals to be adapted at regional and local levels. Design, establish and properly equip all regional and local EOCs.
The functions of the new suggested national disaster sub-committees are not stated in any document explicitly and it is evident that the sub-committees do not adequately cover the components of DRM		A revised structure should be considered	Revision of all national and regional sub-committees to ensure that together they comprehensively cover all DRM components, covering key hazards, all sectors and all levels.
National DRR Platform function, roles and responsibilities are not clear		It has to be clarified whether this type of National Committee/Council is needed in Guyana	Revision of the National DRR Platform, its composition and functions, with a view to DRM
No simulation exercises programme.	Annual simulation exercises for each region.	There is a need for more testing and exercises of plans at all levels. Identify the types and number of simulation exercises needed to test all response plans involved in flood and drought response.	Design and implement a national simulation exercise programme.
DRM not included in school curricula.	No specific suggestion.	Design the curricula and materials to introduce DRM into school curricula in Guyana. Particularly focused on flood and drought prevention and response.	Introduce DRM into school curricula.
Need to increase public awareness about risks/hazards and to enhance their capacity to participate in risk reduction and response planning.	Posters, flyers, TV programmes, radio announcements, workshops.	Identify materials to be designed. Access to technical and financial resources for community to participate in risk reduction and response planning	Finish/ design and implement a National DRM Public Education and Awareness Plan and Strategy.

The gaps and challenges noted above are addressed directly through the suggested activities as mentioned above and then detailed as part of the NIDRMP in section 5 below and in the Strategy.

4.4.5. Recovery

Recovery is normally understood as the rehabilitation of services and public utilities and the reconstruction of those buildings and infrastructure that were damaged or destroyed after a disaster. However, it must also be ensured that response organizations can conduct their emergency operations, that their response is evaluated, and that their organizations and resources are sustained after disasters in order to improve their response capacity for the next event. At the same time, it must be ensured that operations of government, businesses and other organizations are not interrupted by the impact of hazards. This can be achieved with plans for early recovery, COOPs and BCP, which aim to eliminate or minimize interruptions of operations by emergency or disasters and reduce damage and losses due to the hazard impacts. Such plans generally see for the execution of specific activities to avoid the effect of the hazard impact on the operations of the organization.

Consequently, in order to improve the recovery aspect in Guyana, there should be a planning process to develop recovery plans, as they are inexistent at the moment for the most important hazards in Guyana, namely floods and droughts. COOPs and BCPs also need to be developed in a comprehensive manner by government organizations and by the private sector, which are currently absent in the country for the majority. The government could design and promote specific guidelines for the design, enhancement and testing of these plans so that they can be implemented in the case of an emergency and a disaster. Additionally, an overall early recovery plans could be designed for the case of disasters due to floods and droughts. Early recovery "aims to generate self-sustaining, nationally owned, resilient processes for post-crisis recovery. It encompasses the restoration of basic services, livelihoods, shelter, governance, security and rule of law, environment and social dimensions, including the reintegration of displaced populations."[101]

Rehabilitation and reconstruction also should include rebuilding and/or relocating structures in an enhanced manner. This may refer to less vulnerable new buildings, new developments in less risky areas, stronger seawalls or conservancy dams. Infusing reconstruction with principles of mitigation and vulnerability reduction can reduce the need for rehabilitation and reconstruction in the future. This process needs to be more deeply embedded in Guyana and its overall process and mechanisms for both reconstruction and mitigation; there is a further need for more coordination and interaction between these two. Reconstruction of buildings and structures after a disaster do constitute an opportunity to integrate mitigation measures for the next event and this is an area to be strengthened in Guyana, which would serve to further reduce vulnerability and risk.

As noted above in the review of previous assessments, Guyana lacks enough resources to cover losses and/or feasible financial absorptive capacity to handle losses and to replace the capital stock affected by extreme events. Contingency Funds form part of the recovery context and are used to compensate those who suffered a loss due to damage to housing or their crops

[101] From UNDP. *UNDP Policy on Early Recovery.* August 22nd, 2008.

and animals. However, in addition to compensating the people affected after a flood or drought, such funds are also an opportunity to work towards reducing risks in the long term. While a Contingency Fund exists in Guyana, there is the need to enhance it to be more effective. This could be done through proper legislation.

A complete study about the implications of funding based on the effects of previous floods and droughts could be conducted in order to identify ways of optimizing the use of funds and ways in which reconstruction can be done more effectively to reduce risk and avoid similar disasters repeatedly, learning from the country's very significant previous experiences.

Based on progress made through recent projects and activities, and integrating the main challenges highlighted by the many recent assessments, the key gaps and suggested activities for recovery include the following, as depicted in table 28 below.

Table 28. Emerging Priority Actions Needed for Recovery

Key Gaps[102]	Validation by Stakeholders	Analysis/Further Needs	Suggested Activities
No early recovery plan for floods or droughts.	No specific suggestion.	Design the plan considering the experience of past disasters (floods and droughts).	Early Recovery Plans after floods and droughts for the three levels.
Need to design COOPs in Guyana.	No specific suggestion.	Identify what ministries/buildings need COOPs.	COOPs for government organizations at the three levels.
Need to design BCPs in Guyana.	Develop BCPs. Constantly review BCPs. Conduct business impact assessment that adequately informs BCPs.	Identify businesses needing BCPs, conduct training workshops.	BCPs for the private sector.
Equipment needed to conduct recovery activities.	One ferry to transport people and goods along the Demerara river; airplanes and helicopters- reconnaissance and evacuation. Boats, water tanks, trucks, bottled water, detergent, pumps, etc.	Identify equipment and vehicles needed. Consider items already in place in the National Warehouse and others existing elsewhere that could be used during emergencies and disasters.	Equipment and vehicles for recovery activities.
For extreme events, Guyana does not have enough resources to cover losses and/or feasible financial capacity to face losses and to replace the capital stock affected (as shown as a DDI greater than 1.0 for MCE of 50, 100 and	Revolving Disaster Fund at National and Regional Levels. Set aside money in the national budget annually to treat with or deal with the realization/ eventuality of a disaster. Establishment of a National Contingency Fund through	Existing Contingency Fund but there's the need to enhance it to be more effective. Develop/review specific guidelines and criteria (eligibility, amount of assistance provided) to enhance the effectiveness of the Fund.	Revise/update the National Contingency Fund and its mechanisms

[102] No details are provided in these tables. The details for these are provided in sections 4.2. and 4.3. above.

Key Gaps[102]	Validation by Stakeholders	Analysis/Further Needs	Suggested Activities
500 years of return period in 2000, 2005 and 2010)	legislation.		

The gaps and challenges noted above are addressed directly through the suggested activities as mentioned above and then detailed as part of the NIDRMP in section 5 below and in the Strategy.

4.4.6. Conclusion

A review of the key hazards Guyana is prone and exposed to was detailed in section 1, which also looked at some of the potential impacts of disasters and provided a modest assessment of some vulnerabilities. In the previous sub-sections, some other aspects of vulnerability were examined in more depth, bringing forth the findings of relevant assessments conducted in the country recently. The main conclusions that can be drawn from this document review were then summarized and presented broken down by the five IDRM components. In brief, section 4 serves to show the wide-scoping assessment lens used to ensure that all gaps and challenges would; emerge and be accounted for. This has helped to ensure that all priorities were taken into account in the development of the NIDRMP and the Strategy and these are addressed directly through the suggested activities of the NIDRMP in section 5 and in further detail in the Strategy.

5. PART V – THE NATIONAL INTEGRATED DISASTER RISK MANAGEMENT PLAN 2013-2023

5.1. Introduction

This section presents the main portion of the NIDRMP for Guyana. Based on the analyses and assessments, and the subsequent identified gaps and challenges to be addressed, the NIDRMP's objectives, expected outcomes and key activities have been identified and are presented here.

Each one of these elements is the result of an in-depth and detailed analysis process, as evidenced in the sections above. The process followed included:

- The analysis of documentation;
- The results of interviews with key stakeholders in Guyana in 2012;
- The results of the workshops and input from participants;
- Extensive input from the IDB and some from the CDC;
- The identification and analyses of current DRM activities being conducted in Guyana;
- The key gaps and priorities identified related to the national DRM system and structure and key organizations;
- The key gaps and priorities identified related to activities and projects implemented;
- The analysis of previous events and lessons learned;
- A HRVA drawing on the IDB *Indicators of Disaster Risk and Risk Management,* CDC *Flood Risk Modelling Report,* and UNEP & OCHA *Geotechnical and Hydraulic Assessment of the East Demerara Water Conservancy Dam*, and the key gaps and priorities identified;
- The key gaps and priorities identified by the UNDP *Capacity Assessment Report - Disaster Risk Management in Guyana* and the CDEMA *CDM Country Baseline Report for Guyana*; and;
- A thorough work of harmonizing all DRM activities identified as a result of the points above.

As the NIDRMP was also developed within the context of and with specific linkages to key regional and international programmes; these are presented below in order to further explain the context and content of the NIDRMP.

5.2. Regional and International Programming Context

5.2.1. CDM

The NIDRMP should be understood with the context of the enhanced regional *CDM Strategy and Programme Framework* that reflects the CDM paradigm. The NIDRMP was developed to be specifically linked with and to integrate the enhanced regional *CDM Strategy and Programme Framework*, the key expected outputs of which were described above in figure 14 in section 2. Table 29 below presents some of the many regional CDM outputs that the different elements of the NIDRMP are directly linked and contributing to.

Table 29: CDM – NIDRMP Linkages

NIDRMP Scope	CDM Outputs[103]
Risk Identification	2.3 Improved understanding and local/community-based knowledge sharing on priority hazards. 3.3 Hazard information and DRM is integrated into sectoral policies, laws, development planning and operations, as well as decision-making in the areas of tourism, health, agriculture and nutrition, planning and infrastructure. 2.3 Improved understanding and local/community-based knowledge sharing on priority hazards. 4.4 Standardized holistic and gender-sensitive community methodologies for natural and anthropogenic hazard identification and mapping, vulnerability and risk assessments, and recovery and rehabilitation procedures developed and applied in selected communities.
Prevention/Mitigation	2.2 Infrastructure for fact-based policy and decision-making is established/strengthened. 4.2 Improved coordination and collaboration between community disaster organizations and other research/data partners including climate change entities for undertaking CDM. 4.3 Communities more aware and knowledgeable on DM and related procedures including safer building techniques.
Financial Protection and Risk Transfer	3.2 DRM capacity enhanced for lead sector agencies, national and regional insurance entities, and financial institutions.
Preparedness/Response	1.1 National disaster organizations are strengthened for supporting CDM implementation and a CDM programme is developed for implementation at the national level. 1.3 Governments of participating states/territories support CDM and have integrated CDM into national policies and strategies. 1.5 Improved coordination at national and regional levels for DM. 4.1 Preparedness, response and mitigation capacity (technical and managerial) is enhanced among public, private and civil sector entities for local level management and response. 4.5 EWS for DRR enhanced at the community and national levels.
Recovery	3.4 Prevention, mitigation, preparedness, response, recovery and rehabilitation procedures developed and implemented in tourism, health, agriculture and nutrition, planning and infrastructure.
Hazards: Floods and droughts (first stage)	All-hazards
Sectors: infrastructure, health, housing,	All sectors with initial focus on tourism, health, agriculture and infrastructure

[103] CDEMA. *CDM Strategy and Programme Framework 2007-2012*. 2007. Only examples are brought here. For full reference of CDM outputs, see figure 14 in section 2.

education, tourism environment, private sector (agriculture to be incorporated)	
Levels covered: All levels	All levels

5.2.2. Hyogo Framework for Action 2005-2015

The World Conference on Disaster Reduction (2005) in Japan has adopted the *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters.*[104] The Conference provided a unique opportunity to promote a strategic and systematic approach to reducing vulnerabilities and risks to hazards. It underscored the need for, and identified ways of, building the resilience of nations and communities to disasters. The Hyogo Framework for Action adopted specific priorities for action. In the stated approach to DRR, states, regional and international organizations and other actors concerned should take into consideration the key activities listed under each of these five priorities and should implement them, as appropriate, to their own circumstances and capacities.

The NIDRMP was also designed within the context of and with specific linkages to the *Hyogo Framework for Action*. The links between the *Hyogo Framework for Action* priorities and the targeted DRM components of NIDRMP are shown in table 30 below:

Table 30. Links - Hyogo Framework for Action and DRM Components Targeted by the NIDRMP

Hyogo Framework for Action Priorities	Key Activities	Examples of NIDRMP Activities in related DRM Components
1. Ensure that DRR is a national and a local priority with a strong institutional basis for implementation.	a. National Institutional and Legislative Framework b. Resources c. Community participation	a. **Governance (as part of Preparedness/Response)**. Improving the national DRM structure; Strengthening DRM organizations at all levels; Ensuring that there are EOCs at all levels. Clarifying the role of the National DRR Platform; Passing the *DRM Bill*; Improving the national draft *DRM Policy*; Further integrating DRM in legislation and policies. **Prevention/Mitigation.** Building Code enforcement and related capacity strengthening. b. **Preparedness/Response.** Increasing and strengthening human, material and financial resources for prevention/mitigation, financial protection and risk transfer, and preparedness. c. **Risk Identification.** Risk assessments at the community level. **Preparedness/Response.** Improved response plans, planning and exercising at the community level. **Prevention/Mitigation**. Participation in prevention and mitigation activities at the community level. **Recovery.** Development of BCPs; Recovery activities after disasters at the community level.
2. Identify, assess and monitor disaster risks and	a. National and local risk assessments	a. **Risk Identification.** Risk assessment and risk mapping at the national and community levels for key hazards; Improving access to and use/analysis of hazard, vulnerability and risk-related data;

[104] UNISDR. *Hyogo Framework for Action 2005-2015*. World Conference on Disaster Reduction, 18-22 January 2005, Kobe, Hyogo, Japan.

enhance early warning.	b. Early Warning c. Capacity d. Regional and Emerging Risks	b. **Preparedness/Response**. Design or enhancement of EWS for key hazards at all levels. c. **Preparedness/Response**. Database and data sharing mechanisms on hazards, disaster events and related vulnerability, with a focus on areas at risk. d. **Risk Identification.** Information about regional risks compiled and accessible to disaster managers and population at large. **Preparedness/ Response**. Cooperation and coordination with other countries and regional organizations. Design of emergency response plans considering sub regional and regional response.
3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels.	a. Information management and exchange. b. Education and training c. Research d. Public awareness	a. **Risk Identification.** Compilation and exchange of information about disasters and consequences, hazards, vulnerability and risks; Databases accessible to disaster managers, planners, scientific community. b. **Preparedness/Response**. **Prevention/Mitigation. Recovery.** Public education material and outreach within schools; Various forms of training of personnel (all sectors and communities) involved in prevention/mitigation, response and recovery. c. **Risk identification**. Research on hazard and vulnerabilities (including climate change) and vulnerability and risk reduction. d. **Preparedness/Response**. DRM public awareness and education campaigns.
4. Reduce the underlying risk factors.	a. Environmental and natural resources management. b. Social and economic development practices. c. Land-use planning and other technical measures.	a. **Risk identification; Prevention/Mitigation**; **Preparedness/Response; Financial Protection/Risk Transfer.** Identification of environmental assets and critical infrastructure; Integration of DRM into environmental management; Addressing the reduction of environmental vulnerability; Land use planning; Inclusion of climate change and environmental management into DRM plans and programmes. b. **Prevention/Mitigation. Preparedness/Response. Recovery.** Integrate DRM into planning and policies of different sectors of society: health, education, agriculture, planning**,** tourism, private sector, etc**.;** Reduce risks in development projects; Vulnerability reduction in building practices and in post-disaster recovery; **Financial Protection/Risk Transfer**. Insurance and reinsurance against disasters and hazard-specific insurance; Contingency funds. c. **Risk Identification. Prevention/Mitigation**. Land-use plan and Building Code enforcement; Use of the results of hazard, vulnerability and risk assessments and identification and mapping in land use and development; Specific DRM activities in high-risk areas: vulnerability reduction, prevention/mitigation (structural and non-structural) and re-location.
5. Strengthen disaster preparedness for effective response at all levels.		1. **Preparedness/Response. Recovery.** Based on risk identification and EWS, establish and strengthen DRM organizations at all levels and in all sectors, enhancing national DRM capacity; Design and update of emergency response and recovery plans for all hazards; Training response personnel through and simulation exercises; Enhance response capacity through addressing needing resource requirements (human, material, financial).

Implementing the NIDRMP in Guyana will therefore assist the country in monitoring and reporting progress of the implementation of the *Hyogo Framework for Action*, as it will contribute to the objectives of the *Hyogo Framework for Action* in Guyana.

5.3. Vision, Goal and Strategic Objectives

The vision and the goal are:

Vision
A more sustainable and safe Guyana with reduced risk and enhanced resilience to impacts and consequences of the key hazards.
Goal
The establishment and continuous enhancement of Integrated Disaster Risk Management in Guyana mainstreamed across all sectors and at all levels in the country to minimize potential death, injuries, loss of property, livelihoods, socio-economic loss and damage to the environment, and underpinning sustainable development.[105]

The NIDRMP promotes and presents an integrated approach to DRM, addressing the key hazards at all levels and in all sectors and all components of DRM in an integrated manner. The SOs for the NIDRMP are presented below – broken down into the five components of DRM (risk identification, prevention/mitigation, financial protection/risk transfer, preparedness/response and recovery), though they are interlinked.

Table 31. Strategic Objectives[106]

Risk Identification	1. *To be able to identify and quantify the risks and possible consequences of the impacts of floods and droughts in Guyana and their possible interrelationship with the vulnerable elements of society and the environment in order to inform DRM and development activities in the country.*
Prevention/ Mitigation	2. *To reduce the risks of floods and droughts in Guyana through structural and non-structural measures, thereby reducing the vulnerability of society and the environment to the impacts and consequences of floods and droughts in order to better ensure sustainable development in the country.*
Financial Protection/Risk Transfer	3. *To promote the transfer of risk in order to reduce direct losses due to the impacts of floods and droughts affecting the government, private sector and society in general in Guyana.*
Preparedness/	4. *To establish a continuous preparedness process in Guyana, ensuring a*

[105] Various comments were received on the wording of the Goal statement, many inconsistent. This revised version attempts to integrate most. Feedback will be required to arrive at the final wording.
[106] Please note that SOs represent the overarching objective for a particular programmatic area, here broken down by the DRM components. These are not intended to be measurable results, but rather descriptive and the overall "raison d'être" of a particular programmatic area.

Response	*consistent adequate level of preparedness and response capacity for responding to floods and droughts through the ongoing improvement of contingency planning and emergency resources at all levels.*
Recovery	5. *To establish recovery mechanisms from the impacts of floods and drought to ensure the continuity of operations of the government, private sector and communities through early recovery, business continuity, rehabilitation and physical and social reconstruction initiatives.*

5.4. Expected Outcomes

For each one of the SOs there will be a corresponding set of activities, but these are intended to contribute to the achievement of one or more expected outcome(s) in each of the DRM component areas. These expected outcomes represent the measurable results expected from the implementation of the NIDRMP and its Strategy. They are, by nature at a high level, given the nature of the NIDRMP and are expected to come through achievements brought as all activities associated with each are completed.

The expected outcomes are presented in table 32 below.

Table 32. Expected Outcomes

Risk Identification	1. *All hazards, vulnerable elements and risks identified, assessed and mapped in Guyana to be used in the DRM process.*
Prevention/ Mitigation	2. *Vulnerable infrastructure and communities with risks and vulnerability assessed and reduced by strengthening of structures or by relocation.* *3.* *Vulnerability of sea defences, conservancy dams, drainage, and irrigation systems assessed and mitigation measures implemented to reduce risk.*
Financial Protection/Risk Transfer	4. *Mandatory risk transfer financing mechanisms in place for buildings, housing and infrastructure at risk.* 5. *Guyana insured with the CCRIF at the regional level.*
Preparedness/ Response	6. *Organizations at all levels with a high level of preparedness to provide an adequate and timely response to the impacts and consequences of floods and droughts.* 7. *All needed laws and policies completed, and all plans completed, revised and tested for IDRM in Guyana.*
Recovery	8. *Organizations at all levels adequately prepared to start recovering immediately after floods and droughts in Guyana.* 9. *A National Contingency Fund established and operating in the country.*

5.5. Key Activities

This section presents the set of activities proposed under each SO and therefore for each of the five DRM components. It should be noted that each activity was triangulated and cross-referenced from among all sources as listed above in order to ensure that the suggested activities have been confirmed and validated by documentation and previous assessments and that gaps and priorities have been identified through analysis and key stakeholder input. These activities are inextricably linked to the expected outcomes.[107]

5.5.1. Risk Identification

Strategic Objective 1:

To be able to identify and quantify the risks and possible consequences of the impacts of floods and droughts in Guyana and their possible interrelationship with the vulnerable elements of society and the environment in order to inform DRM and development activities in the country.

Effective pre-event activities for DRM are not possible without a solid foundation of knowledge of the potential hazards and of vulnerabilities. An integral and essential element of DRM is the process of risk assessment,[108] which forms the foundation for prevention and mitigation[109] activities. The risk identification and assessment process has as its objective the identification and quantification of risks, namely by analyzing hazards and elements at risk and determining the respective impacts.[110] The process involves five steps:

1. Definition of objectives and scope;
2. Identification and analysis of hazards;
3. Identification and analysis of vulnerable elements;
4. Identification and analysis of risk;
5. Representation of results and planning for action.

Risk identification and assessment is needed at both the macro level (i.e., national or regional) for widespread phenomena and at the micro level for site- or hazard-specific hazards. Both rely on scientific knowledge of the hazards and technological knowledge for vulnerability assessment.

Activities:

Key activities related to SO 1 at the national level are:

- N.1.1. Design and implement a *National Hazard, Vulnerability and Risk Mapping Plan*

[107] Further specificity for some activities can only be provided by national stakeholders, while in others this may only emerge as activities begin to be implemented. Moreover, these activities should not be viewed only here as listed but also in the more detailed contact of the listed projects in the Strategy.
[108] Often referred to in DRM literature as HRVA.
[109] Also for Preparedness
[110] CARICOM Regional Organisation for Standards and Quality (CROSQ). (2009). *Draft Standard for Conducting Hazard Mapping, Vulnerability Assessment and Economic Valuation for Risk Assessment for the Tourism Sector*.

- N.1.2. Establish a mechanism (e.g. a National Risk Identification Sub-Committee) for identification of information needed, data gathering, mapping and addressing the issue of availability.
- N.1.3. Undertake a holistic assessment of national flood and drought management needs, taking into consideration the impacts of increased rainfall, the threat of drought risk and the need to avoid maladaptation.
    - The assessment would also review the various flood protection projects currently underway, address cross-border watershed management issues and examine gaps towards development of a master plan for flood and drought reduction in the country.
- N.1.4. Create and/or update hazard maps for: floods (river overflow), floods on the coastline (storm surge), drought, earthquake, tropical cyclone, landslide and wildfire.
- N.1.5. Create and/or update maps: of floodable/flood prone areas; of droughts and their effects by region; identifying location of critical infrastructure; about the status and location of the population; including small scale risk maps at the community level; and including the acquisition of satellite images of Guyana coastal area.
- N.1.6. Acquire Laser Imaging Detection and Raging (LIDAR) information model for the topography of the main rivers, areas and cities in the country.[111]
- N.1.7. Design of vulnerability maps of prioritized areas (e.g. Georgetown, Anna Regina and New Amsterdam), and elements and assets (population, agriculture, infrastructure[112], floodable areas).
- N.1.8. Conduct vulnerability assessments of all identified (and potential) vulnerable elements (population, agriculture, infrastructure, floodable areas, etc.) to floods and droughts.
- N.1.9. Collect data and conduct analysis on: AAL, Pure Risk Premium (PRP), Loss Excedence Curve, PML
- N.1.10. Develop/update a baseline database of vulnerable and at-risk areas and elements (population, infrastructure, environment, etc.), including prioritization.
- N.1.11. Design of risk maps and disaster scenario maps for development and emergency planning.
- N.1.12. Purchase of hardware and software for the development and analysis of and access to GIS maps developed, as part of national GIS database.
- N.1.13. Develop/improve GIS-based flood and drought risk information system (database).
- N.1.14. Deliver training to key government staff in the design and use of mapping software and processes, including analysis.
- N.1.15. Hold awareness-raising and information sessions with government and decision-makers with a view to integrating hazard, vulnerability and risk mapping and analysis into national planning and decision making (including addressing enforcement).

Key activities related to SO 1 at the regional/local levels are:

- R 1.1 Design of community risk maps[113] and HRVA.

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[111] LIDAR DEM is desirable for the entire country.

[112] For example: dwellings, hospitals, schools, government buildings, industrial buildings, commercial buildings, road and rail network, among others.

- R 1.2 Deliver workshops to key stakeholders at the regional and local level for community risk mapping.
- R 1.3 Incorporation of information from the regional/local level into the national database of vulnerable and at-risk areas and elements and the GIS database.

5.5.2. Prevention/Mitigation

Strategic Objective 2:

To reduce the risks of floods and droughts in Guyana through structural and non structural measures, thereby reducing the vulnerability of society and the environment to the impacts and consequences of floods and droughts in order to better ensure sustainable development in the country.

Prevention and mitigation are key activities for the reduction of vulnerability to hazards with a view to reducing risk. Vulnerability needs to be assessed first in order to determine mitigation, retrofitting and/or relocation needs and activities that would be most relevant for the target elements or areas.

Mitigation measures fall in two general categories: hard and soft. Hard mitigation measures are structural in nature and try to use technological solutions to reduce the impact of the hazard. Therefore, they are based on scientific knowledge of the hazard and on technology. Soft or non-structural measures include such things as legislation, regulations and land-use planning. These are also based on knowledge of the hazard, but rather than relying on technology, they strive to change behaviour and are focused on the enabling environment.

Although mitigation strategies are implemented in the pre-event timeframe (a phase that runs concurrently with preparedness), they can also be implemented as part of the recovery process if applied after a disaster occurs. The difference is that pre-event mitigation is broader in scope as it tries to address a variety of potential hazards, while mitigation implemented as part of recovery tends to be narrower in scope, as it is focused on the hazard experienced. Mitigation measures are hazard-specific, as they may reduce the potential impact from a particular hazard but not necessarily from another.

Activities:

Key activities related to SO 2 at the national level are:

- N.2.1. Design a National Prevention/Mitigation Plan that includes the creation and establishment of two national sub-committees: one for sea defences and sea walls and one for assessing vulnerability and mitigation measures for all other buildings/infrastructure.
- N.2.2. Implementation of mitigation activities according to the National Mitigation Plan (an ongoing activity)[114].

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[113] The key vulnerable communities (i.e. those at risk for floods) in Guyana will be selected by the CDC in coordination with other agencies based on possible risk levels considering previous flooding events or other hazards (such as drought).

[114] Though the NIDRMP identified numerous areas and activities that could comprise the Plan, this could potentially expand the list of activities under this part of the NIDRMP. These need to be identified

- N.2.3. Conduct a diagnosis of structural reliability and a geotechnical and hydraulic assessment of all conservancy dams and drainage and irrigation systems.
- N.2.4. Conduct assessment of the vulnerability of the sea defences.
- N.2.5. Planning and implementation of mitigation/repair works for conservancy dams, drainage and irrigation systems based on vulnerability assessments. Establishment of a mitigation plan for conservancy dams, drainage and irrigation systems.
- N.2.6. Planning and implementation of mitigation/repair works in sea defences based on vulnerability assessments. Establishment of a mitigation plan for sea defences.
- N.2.7. Build capacity for regular inspection and maintenance of conservancy dams, sea defences and drainage systems (personnel, training, equipment, vehicles, materials, pumps, trucks, etc. as an ongoing activity).
- N.2.8. Design of emergency plans for breach or overflow in conservancy dams and sea defences (including allocation of personnel and equipment for response in the case of breaches or overflow in conservancy dams and sea defences).
- N.2.9. Conduct risk assessment studies to determine the feasibility of relocating specific human settlements in high risk areas[115].
- N.2.10. Conduct assessment studies in order to identify agricultural activities that reduce risk during the flooding season.
- N.2.11. Conduct assessment studies for the identification of specific measures to access and store water during droughts.
- N.2.12. Design/revise and enact Building Code for Guyana including specific mandatory building measures against floods[116].
- N.2.13. Identify/assess specific needs and related challenges for enforcement of Building Code in Guyana (personnel, training, equipment, vehicles, etc) and develop a plan of action to address challenges identified.
- N.2.14. Build capacity for enforcement of the Building Code.
- N.2.15. Design/revise and enact a policy and plan for land use and human settlements.
- N.2.16. Identify/assess specific needs and related challenges for enforcement of the land-use plan in Guyana (personnel, training, equipment, vehicles, etc) and develop a plan of action to address challenges identified.
- N.2.17. Ensure that environmental integrated assessment (EIA) is integrated adequately into the land-use planning and construction process in the country.
- N.2.18. Retrofitting and reinforcement of public and private assets and infrastructure as identified through previously completed vulnerability and risk assessments.

Key activities related to SO 2 at the regional/local levels are:

- R.2.1. Allocation of personnel and equipment for regular clean up/maintenance and inspection in conservancy dams, municipal drainage systems, channels, culverts, sluices/kokers, ducts, outlet, etc.
- R.2.2. Training of personnel at the regional and local levels in identified areas for prevention/mitigation.

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and agreed to by the key stakeholders involved. They could include actions such as, for example, the re-introduction of forest rangers to protect the mangroves in the interior locations.

[115] To be identified through the completion of previous.

[116] The Building Code could also include specific flood and drought counter-measures agreed between government and insurance companies.

- R.2.3. Design of maintenance and clean-up plans at the regional and local levels.

5.5.3. Financial Protection and Risk Transfer

Strategic Objective 3:

To promote the transfer of risk in order to reduce direct losses due to the impacts of floods and droughts affecting the government, private sector and society in general in Guyana.

Risk transfer is a strategy undertaken in pre-event phases aimed at reducing the risk of potential losses through mitigation actions and loss financing in recovery.[117] Risk transfer financing mechanisms provide a safety net for financial losses suffered due to consequences of an event, thus providing resources for recovery and rebuilding. In terms of private property, it is a mechanism for transferring the risk of damages to the insurance industry, thereby reinforcing original investment decisions, whether right or wrong. In other words, risk transfer does not reduce the actual vulnerability of the asset insured. Risk transfer financing mechanisms should not be used to replace disaster risk initiatives such as improving land use planning or enforcing building standards and regulations, but are rather additional measures to reduce overall financial impacts.

Activities:

Key activities for SO 3 at the national level are:

- N.3.1. Establish mandatory insurance for housing, agriculture activities and key/critical infrastructure in the *DRM Bill*.
- N.3.2. Develop and disseminate guidelines for the implementation of risk reduction measures for accessing flood insurance.
- N.3.3. Identification of risk transfer financing mechanisms and their requirements for Guyana in coordination with regional and international organizations, insurance companies and farmers.
- N.3.4. Identify requirements to access CCRIF insurance for floods (excess rainfall).
- N.3.5. Acquire CCRIF membership.
- N.3.6. Engage regional insurance with the CCRIF to access insurance for flooding in Guyana.
- N.3.7. Develop a national financial strategy for the management of the impacts of extreme events.

Key activities related to SO 3 at the regional/local levels are:

- R.3.1. Design and deliver workshops to train government officials and communities in risk transfer financial mechanisms.

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[117] Inter-American Development Bank (IDB). (2007). *From Disaster Response to Prevention: Companion Paper to the Disaster Risk Management Policy*. The framework addresses both prevention funding and loss financing.

- R.3.2. Develop and disseminate guidelines for best building practices to facilitate access to insurance.
- R.3.3. Develop and disseminate guidelines for best practices to ensure access to insurance to crops and animals.

5.5.4. Preparedness/Response

Strategic Objective 4

To establish a continuous preparedness process in Guyana, ensuring a consistent adequate level of preparedness and response capacity for responding to floods and droughts through the ongoing improvement of contingency planning and emergency resources at all levels.

In the preparedness phase, DRM organizations undertake initiatives aimed at coping with the consequences of events caused by hazards. Preparedness consists of the enabling environment of laws and policies; Planning, including exercises and simulations; trainings; public awareness and education, and; early warning. The response phase includes the mobilization of the necessary emergency services and first responders to the disaster area. This is likely to include a first wave of core emergency and medical services, such as defence forces, firefighters, police and ambulance crews, etc. They may be supported by a number of secondary emergency services, such as specialist rescue teams. The focus of the response phase is to save lives and provide assistance to victims. A well known and exercised/tested emergency/disaster plan developed as part of the preparedness phase enables efficient coordination of rescue. Where required, search and rescue efforts commence at an early stage.

Activities:

Key activities related to SO 4 at the national level are:

- N.4.1. Design/revision/finalization of the *DRM Bill*, including integration of the relevant aspects of the NIDRMP.[118]
- N.4.2. Revise the draft *DRM Policy* (2011) to ensure it adequately covers all five DRM components, and is comprehensive and compatible with the NIDRMP as well as supporting and aligned with the revised *DRM Bill*. Ensure gender, environmental and CC issues are also considered.
- N.4.3. Design of other relevant policies (such as evacuation, shelter management policy, relief policy, donations policy, waste disposal) and revision of existing legislation to ensure comprehensive integration of DRM, gender, environmental and CC issues, and compatibility with the NIDRMP.
- N.4.4. Revision of the CDC structure, positions, functions, legislative authority (as embedded in the draft *DRM Bill* (2013) and draft *DRM Policy* (2011)), and name to ensure it is structured as a DRM organization and enabled to address and coordinate all DRM components. This re-structuring could include positions that would take responsibility for among the following areas: risk identification, financial protection

[118] This should include for example the clarification of mandated roles and responsibilities for all organizations as laid out in the NIDRMP.

and risk transfer, prevention and mitigation, preparedness and response, and recovery or identify liaisons for these areas to coordinate and work with the lead agencies in these areas.

- N.4.5. Revision of the National Disaster Preparedness and Response Structure with a view to making it a national DRM structure, focused on all DRM components.
- N.4.6. Revision of all national and regional sub-committees to ensure that together they comprehensively cover all DRM components, covering key hazards, all sectors and all levels. The number, composition, functions and terms of reference of all national and regional sub-committees are to be designed or revised/enhanced, as relevant in each case.
    - The suggested national sub-committees include: i) For risk identification: Risk Identification Sub-Committee; ii) for prevention and mitigation: Sea Defence Sub-Committee, Drainage and Irrigation Sub-Committee, Mitigation Sub-Committee; iii) for financial protection and risk transfer: Risk Transfer Sub-Committee; iv) for preparedness/response: Emergency Sub-Committees, Warning and Evacuation, Health, Security, Shelter management, Welfare/ Relief, Public information and Education, Agriculture, Tourism, Public Utilities, Transport, Road Clearance and Waste Disposal.; and v) for recovery: Recovery Sub-Committee, Reconstruction Sub-Committee.
- N.4.7. Revision of the National DRR Platform, its role, composition and functions, with a view to DRM.
- N.4.8. Finalize the establishment and integration of the volunteer corps into the national DRM structure, into preparedness initiatives and into emergency response planning and relevant plans
- N.4.9. Establish a national emergency planning process, including continuous updating and an assessment of linkages between and consistency/harmonization among all plans at all levels:
    - N.4.9.1: Development of key plans: Some of the emergency function plans to be developed include: tele-communications, emergency public information, and evacuation (beyond Mahaica). Plans for drought and fire[119] are to be developed. The other hazard-specific emergency plans that still need to be developed include: oil spills, landslides, earthquake, hurricanes/storms/severe weather systems, hazardous materials spill, sea wall breach, mass casualty events: aircraft accidents, vehicle accidents, epidemics, chemical/biological/radiological/nuclear events, mining accidents, and tsunami. Sectoral plans that still need to be developed/finalized include: education, agriculture, tourism, infrastructure, environment, and health.
    - N.4.9.2 Revision and updating of all existing plans, including the *National Multi-Hazard Preparedness and Response Plan, Flood Response and Preparedness Plan*, NEOC SOPs, EWS Protocol, DANA Plan, *Land Search and Rescue Plan, Aeronautical Search and Rescue Plan, Air Maritime Plan, Upper Mahaica Evacuation Plan*, and community plans developed by Guyana Red Cross Society. The *National Health Sector Disaster Plan* and the EPA Plan could be revised as well.
    - N.4.9.3 Depict harmonization among all plans and all levels, and ensure they are integrated into plans for annual simulations and exercises.

[119] The plan for fire could include the objective of increasing the number of functioning fire hydrants to reduce fire risks and occurrences, amongst other things.

    - N.4.9.4 Ensure that the appropriate plans integrate volunteers and define their roles and responsibilities
- N.4.10. Design and implementation of a national simulation exercise programme for testing and updating plans and ensuring they are well known, practiced and up to date.[120]
- N.4.11. Enhancement of the EWS Plan for flood and drought. This could include specific mechanisms for liaison with neighbouring countries, CIMH and CARICOM states for EWS; the establishment of the EWS Sub-Committee; the revision/integration and synergy of the current EWS with stakeholders (e.g.: text messaging); and the establishment of an EWS for the entire country, flood warning systems via satellite, radio, etc. among others.
- N.4.12. Assess the need for equipment, hardware and software and technical staff for EWS.
- N.4.13. Design and implementation of a national DRM training programme (including identification of DRM training needs at national, regional and local levels, design of new training courses[121] adapted to Guyana's specific needs and conditions, based on areas identified, and including allocation of budget for the implementation of trainings.)
- N.4.14 Design and implementation of a National DRM Public Education and Awareness Plan and Strategy.[122]
- N.4.15. Revision of NEOC structure, roles and responsibilities and then revision of NEOC manual, SOPs, staffing and equipment.
- N.4.16. Design of model regional and local EOC manuals[123] to be adapted at regional and local levels.
- N.4.17. Identification of specifics measures to integrate gender issues into DRM processes.

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[120] This programme will allow for the revision, update, and testing of all plans regularly, ensuring that plans remain up to date and well known by all stakeholders and practiced regularly.

[121] Some courses suggested, reflecting priorities identified, include: general DRM; drought management: prediction, prevention and response to its effects; search and rescue (land and maritime); shelter management; DANA using CDEMA guidelines; Damage and Loss Assessment (DaLA) using the methodology from the ECLAC; PDNA (using the methodology from ECLAC and World Bank); Contingency Planning; Contingency Planning for the Health Sector (using PAHO guidelines); Mass Casualty Management (with PAHO assistance); Incident Command System (with PAHO assistance); EOC management with assistance from the USAID; use of the SAHANA software; training of instructors with assistance of USAID; Community disaster preparedness with assistance of CDEMA and the Red Cross. Ultimately, CDC and its key partners stakeholders will need to decide the annual priorities to be implemented.

[122] Key activities could include: 1. Development of DRM messages for specific target audiences to be transmitted through TV, radio and published in newspapers, magazines, etc.; 2. Flyers, videos, posters, etc., with information about specific hazards, their characteristics, actions being done by government authorities and self-protection actions during emergencies and disasters; 3. Composing songs by well-known Guyanese/Caribbean artists with DRM themes. Production, release and distribution of CDs; 4. Continuous enhancement of the CDC website; 5. Activities in communities with social groups such as Rotary, Lions, community-based and faith-based organizations and others; 6. Activities such as contests, fairs, caravans, river and drainage clean-ups, etc., always with themes related to DRM.; 7. Design of Family Emergency Plans.; 8. Design an Emergency Public Information Plan to be activated during disasters.; 9. Design of the DRM information to be integrated into school curricula.

[123] The manual designed could include: a typical structure for the EOC, its members, lay-out, minimal resources and SOPs.

Key activities at the regional/local levels are:

- R.4.1. Establish regional DRM committees including regional DRM sub-committees[124], ensuring that all DRM components are addressed.
- R.4.2. Establish all local DRM committees (i.e. neighbourhood or community district DRM committees and EOCs) including local DRM sub-committees, ensuring that DRM components are addressed.
- R.4.3. Design, establish and properly equip all regional EOCs.
- R.4.4. Design, establish and properly equip all local EOCs.
- R.4.5. Design and test emergency response plans at the regional level and ensure they are compatible with those at the national and local levels.
- R.4.6. Design and test emergency response plans at the local level and ensure they are compatible with those at the regional and national levels.
- R.4.7. Design and deliver a community-based DRR/DRM capacity building programme.

5.5.5. Recovery

Strategic Objective 5

To establish recovery mechanisms from the impacts of floods and drought to ensure the continuity of operations of government, the private sector and communities through early recovery, business continuity, rehabilitation and physical and social reconstruction.

The purpose of recovery is to restore the affected area to a state of normalcy. While recovery may be initiated before the completion of the response phase, its focus is on issues and decisions needed once the immediate needs are addressed by the response. Recovery can be a lengthy process as it concerns efforts to repair and restore (rehabilitate and reconstruct) damaged and destroyed property, restore economic and social activity and repair other essential infrastructure. Recovery does not lead to a situation of pre-event "status quo". Although efforts are geared to approximate it, the reality is a new level of equilibrium that will be reached and, if the recovery is effectively conducted, it ought to lead to a more resilient situation.

Activities:

Key activities related to SO 5 at the national level are:

- N.5.1. Design a *National Early Recovery Plan* for floods that include actions for all three levels: national, regional and local.
- N.5.2. Design a *National Early Recovery Plan* for droughts that include actions for all three levels: national, regional and local.
- N.5.3. Design of COOPs and BCP guidelines for the government and the private sector based on vulnerability assessments.

[124] The suggested regional committees and sub-committees are: Risk Identification, Prevention and Mitigation, Warning and Evacuation Health, Shelter Management., Welfare/Relief, Public Information and Education, Transport and Clean-up.

- N.5.4. Design of COOPs for government offices and key/critical national infrastructure based on vulnerability assessments.
- N.5.5. Design of BCPs for the private sector.
- N.5.6. Design and delivery of a national training programme for COOPs and BCPs.
- N.5.7. Revise/update and enhance the National Contingency Fund and its mechanisms, including addressing the enabling environment. This could include improving the availability and timeliness of disbursement of funds to cover the immediate costs for relief and early recovery after an event and to compensate the population for the loss of housing and agricultural assets (crops, livestock); a commitment from the GoG to provide more funds after disasters, agreement on the general contingency fund mechanisms (eligibility, amounts of compensation, etc.). The legislative, policy and institutional framework would be addressed.
- N.5.8. Hold awareness raising sessions for government and the private sector about the need for recovery, COOPs and BCPs in Guyana.

Key activities to SO 5 at the regional/local levels are:

- R.5.1. Design COOPs for government offices and key/critical infrastructure at the regional and local levels.
- R.5.2. Design of BCPs for the private sector at the regional and local levels.
- R.5.3. Workshops for training in COOPs and BCPs for the regional and local levels.

A snapshot of all SOs and corresponding activities is presented in Annex III.

5.6. Conclusion

Overall, the NIDRMP is comprehensive as it addresses all phases and components of DRM: risk identification, prevention and mitigation, financial protection and risk transfer, preparedness and response, and recovery. The NIDRMP is further considered as comprehensive as it includes activities at the national, regional and local levels for the government, private and social sectors. In addition, it also considers the main hazards in Guyana, which are floods and droughts, while also speaking to other hazards such as fires. The NIDRMP is considered as integrated in that it is developed as an overarching document linked to the other DRM plans in the country.

For details on how the NIDRMP is to be implemented, please refer to the corresponding Implementation Strategy, which presents a ten-year strategy which contains the following:

- *Purpose of the Strategy;*
- *Set of Suggested Activities and Projects*: Includes suggested projects that regroup and address multiple priority activities. For each project, information is presented regarding: A general description, objectives, expected results, level of priority (short-, medium-, long-term), general data required, stakeholders, potential technical and financial resources and the activities addressed;
- *Proposed Structure for DRM in Guyana, Operational Plan and Coordination Mechanisms*: Briefly presents the new proposed structure for DRM in Guyana, how the Strategy will be implemented, and the mechanisms for coordination in the DRM system in Guyana and coordination of the Plan and Strategy;

- *Ten-year Implementation Plan*: Presents a ten-year plan for the implementation of each of the projects;
- *Technical and Financial Resources*: A general overview will be presented particularly on available funding sources in the region;
- Monitoring and Evaluation (M&E) Framework: The Strategy logical framework (LFA) presents a snapshot of the expected results (i.e., outputs and outcomes) of the Strategy, as well as the associated performance measurement indicators and risks. The expected results are then further expanded in a performance measurement framework (PMF), a tool used to measure and monitor results.

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ANNEX II. List of Persons Consulted in the Development of the NIDRMP and Strategy

Name	Designation	Organization
Colonel (Rtd.) Chabilall Ramsarup	Director General	CDC
Colonel Francis Abrahams	Deputy Director	CDC
Major Kester Craig	Training and Operations Officer	CDC
Mr. Geoffrey Vaughn.	Permanent Secretary	Ministry of Public Works and Communications
Mr. Neermal Rekha	Permanent Secretary	Ministry of Finance
Mr. George Jervis	Permanent Secretary	MOA
Mr. Lionel Wordsworth	Chief Executive Officer	NDIA
Dr. Dindyal Permaul.	Chief Executive Officer	Livestock Department
Dr. Oudho Homenauth	Chief Executive Officer	National Agriculture Research Extension & Institute
Ms. Bhaleka Seulall.	Chief Hydrometeorological Officer	HydroMet
Mr. Brahmanand Sing	Special Projects Officer	MLG&RD
Dr. Indrajit Ramdass	Executive Director	EPA
Ms. Shanta Gobardhan		GINA
Mr. Paul McAdam.		GINA
Anne Greene	Logistic Officer	Women Across Differences
Murtland Stewart	Senior Engineer District	Work Services Group
Mark Crawford	Regional Chairman	RDC
Lorraine Pollydore	Officer in Charge	M&CC Solid Waste Dept.
Paul Mc Adam	Editor	GINA/Office of the President
De Vaughn Lewis	First aid Coordinator	Guyana Red Cross Society
Gitaijal Chandrapal	Climate Change Specialist	Office of Climate Change
Anthony Gouveia	Electrical Engineer	CJIA
Bernard Lord	Planner	Ministry of Finance
Cullen Nelson	Photographer	GNNL
Manmohan Balram	Airport Operations Superintendant	CJIA
Lyndon Alves	Snr. Supt.	GPF
Stephen Thomas	Director, Maritime Safety	MARAD
Kenson Boston	Asst. City Engineer	M&CC
Ramona Dabee-Johnson	Lecturer	University of Guyana
Michael Welch	LDS	GLDA/MOA
Donessa David	Agriculture Meteorologist	Hydromet Service
Bridget Roberts	Senior Meteorological Technician	Hydromet Service
Ignatius Merai	Environmental Health Officer	Region 5
Sonia Luke	Senior Environmental Officer	EPA
Emil McGarrel	PS	MoH&W

Aggrey Azore	Probation Officer Social Services	Min. of LHS&SS
Shimbhudyal Naitram	Manager	GTT
Dwayne Bagot	Internal Security Officer	DIGICEL
Adrian Alleyne	Superintendent of Works	Ministry of Education
Janelle Leitch	Operations Analyst	IDB
Karen Anthony	Senior GIS Analyst	GLSC
I. Dill	Sales Manager	GTM Group Insurance Company
Malcolm Clarke	Retired Teacher	
Mr. Mariah		Ministry of Health
Marco Velasco		
Colonel Gaskin		GDF
Lt. Col. Claude Fraser		GDF
Ms. Sparrow		Canadian High Commission
Malcom Embleton	Consultant	

ANNEX III. Snapshot of Strategic Objectives and Activities.

Vision
A more sustainable and safe Guyana with reduced risk and enhanced resilience to impacts and consequences of the key hazards.
Goal
The establishment and continuous enhancement of Integrated Disaster Risk Management in Guyana mainstreamed across all sectors and at all levels in the country to minimize potential deaths, injuries , loss of property, livelihoods, socio-economic loss and damage to the environment, and underpinning sustainable development.

Risk Identification	**Prevention/Mitigation**
Strategic Objective 1. *To be able to identify and quantify the risks and possible consequences of the impacts of floods and droughts in Guyana and their possible interrelationship with the vulnerable elements of society and the environment in order to inform DRM and development activities in the country.*	**Strategic Objective 2.** *To reduce the risks of floods and droughts in Guyana through structural and non structural measures thereby reducing the vulnerability of society and the environment to the impacts and consequences of floods and droughts in order to better ensure sustainable development in the country.*
N.1.1. Design and implement a National Hazard, Vulnerability and Risk Mapping Plan N.1.2. Establish a mechanism for identification of information needed, data gathering, mapping and addressing the issue of availability. N.1.3. Undertake a holistic assessment of national flood and drought management needs, taking into consideration the impacts of increased rainfall, the threat of drought risk and the need to avoid maladaptation. N.1.4. Create and/or update hazard maps for: floods (river overflow), floods on the coastline (storm surge), drought, earthquake, tropical cyclone, landslide and wildfire. N.1.5. Create and/or update maps: of floodable/flood prone areas; of droughts and their effects by region; identifying location of critical infrastructure; about the status and location of the population; including small scale risk maps at the community level; and including the acquisition of satellite images of Guyana coastal area. N.1.6. Acquire Laser Imaging Detection and Raging (LIDAR) information model for the topography of the main rivers, areas and cities in the country. N.1.7. Design of vulnerability maps of prioritized areas (e.g. Georgetown, Anna Regina and New Amsterdam), and elements and assets (population, agriculture, infrastructure, floodable areas). N.1.8. Conduct vulnerability assessments of all identified (and potential) vulnerable elements (population, agriculture, infrastructure, floodable areas, etc.) to floods and droughts. N.1.9. Collect data and conduct analysis on: AAL, Pure Risk Premium (PRP), Loss Excedence Curve, PML N.1.10. Develop/update a baseline database of vulnerable and at-risk areas and elements (population, infrastructure, environment, etc.), including prioritization. N.1.11. Design of risk maps and disaster scenario maps for development and emergency planning. N.1.12. Purchase of hardware and software for the development and analysis of and access to GIS maps developed, as part of national GIS database. N.1.13. Develop/improve GIS-based flood and drought risk information system (database).	N.2.1. Design a National Prevention/Mitigation Plan that includes the creation and establishment of two national sub-committees: one for sea defences and sea walls and one for assessing vulnerability and mitigation measures for all other buildings/infrastructure. N.2.2. Implementation of mitigation activities according to the National Mitigation Plan (an ongoing activity). N.2.3. Conduct a diagnosis of structural reliability and a geotechnical and hydraulic assessment of all conservancy dams and drainage and irrigation systems. N.2.4. Conduct assessment of the vulnerability of the sea defences. N.2.5. Planning and implementation of mitigation/repair works for conservancy dams, drainage and irrigation systems based on vulnerability assessments. Establishment of a mitigation plan for conservancy dams, drainage and irrigation systems. N.2.6. Planning and implementation of mitigation/repair works in sea defences based on vulnerability assessments. Establishment of a mitigation plan for sea defences. N.2.7. Build capacity for regular inspection and maintenance of conservancy dams, sea defences and drainage systems (personnel, training, equipment, vehicles, materials, pumps, trucks, etc. as an ongoing activity). N.2.8. Design of emergency plans for breach or overflow in conservancy dams and sea defences (including allocation of personnel and equipment for response in the case of breaches or overflow in conservancy dams and sea defences). N.2.9. Conduct risk assessment studies to determine the feasibility of relocating specific human settlements in high risk areas. N.2.10. Conduct assessment studies in order to identify agricultural activities that reduce risk during the flooding season. N.2.11. Conduct assessment studies for the identification of specific measures to access and store water during droughts. N.2.12. Design/revise and enact Building Code for Guyana including specific mandatory building

N.1.14. Deliver training to key government staff in the design and use of mapping software and processes, including analysis. N.1.15. Hold awareness-raising and information sessions with government and decision-makers with a view to integrating hazard, vulnerability and risk mapping and analysis into national planning and decision making (including addressing enforcement). R 1.1 Design of community risk maps and HRVA. R 1.2 Deliver workshops to key stakeholders at the regional and local level for community risk mapping. R 1.3 Incorporation of information from the regional/local level into the national database of vulnerable and at-risk areas and elements and the GIS database.	measures against floods. N.2.13. Identify/assess specific needs and related challenges for enforcement of Building Code in Guyana (personnel, training, equipment, vehicles, etc) and develop a plan of action to address challenges identified. N.2.14. Build capacity for enforcement of the Building Code. N.2.15. Design/revise and enact a policy and plan for land use and human settlements. N.2.16. Identify/assess specific needs and related challenges for enforcement of the land-use plan in Guyana (personnel, training, equipment, vehicles, etc) and develop a plan of action to address challenges identified. N.2.17. Ensure that EIA is integrated adequately into the land-use planning and construction process in the country. N.2.18. Retrofitting and reinforcement of public and private assets and infrastructure as identified through previously completed vulnerability and risk assessments. R.2.1. Allocation of personnel and equipment for regular clean up/maintenance and inspection in conservancy dams, municipal drainage systems, channels, culverts, sluices/kokers, ducts, outlet, etc. R.2.2. Training of personnel at the regional and local levels in identified areas for prevention/mitigation. R.2.3. Design of maintenance and clean-up plans at the regional and local levels

Risk Identification	Preparedness / Response	Recovery
Strategic Objective 3. *To promote the transfer of risk to reduce the direct losses due to the impacts of floods and droughts affecting the government, private sector and society in general in Guyana.*	**Strategic Objective 4.** *To establish a continuous preparedness process in Guyana, ensuring a consistent adequate level of preparedness and response capacity for responding to floods and droughts through the ongoing improvement of contingency planning and emergency resources at all levels.*	**Strategic Objective 5.** *To establish recovery mechanisms from the impacts of floods and drought to ensure the continuity of operations of the government, private sector and communities through early recovery, business continuity, rehabilitation and physical and social reconstruction initiatives.*

N.3.1. Establish mandatory insurance for housing, agriculture activities and key/critical infrastructure in the DRM Bill. N.3.2. Develop and disseminate guidelines for the implementation of risk reduction measures for accessing flood insurance. N.3.3. Identification of risk transfer financing mechanisms and their requirements for Guyana in coordination with regional and international organizations, insurance companies and farmers. N.3.4. Identify requirements to access CCRIF insurance for floods (excess rainfall). N.3.5. Acquire CCRIF membership. N.3.6. Engage regional insurance with the CCRIF to access insurance for flooding in Guyana. N.3.7. Develop a national financial strategy for the management of the impacts of extreme events. R.3.1. Design and deliver workshops to train government officials and communities in risk transfer financial mechanisms. R.3.2. Develop and disseminate guidelines for best building practices to facilitate access to insurance. R.3.3. Develop and disseminate guidelines for best practices to ensure access to insurance to crops and animals.	N.4.1. Design/revision/finalization of the DRM Bill, including integration of the relevant aspects of the NIDRMP. N.4.2. Revise the draft DRM Policy (2011) to ensure it adequately covers all five DRM components, and is comprehensive and compatible with the NIDRMP as well as supporting and aligned with the revised DRM Bill. Ensure gender, environmental and CC issues are also considered. N.4.3. Design of other relevant policies (such as evacuation, shelter management policy, relief policy, donations policy, waste disposal) and revision of existing legislation to ensure comprehensive integration of DRM, gender, environmental and CC issues, and compatibility with the NIDRMP. N.4.4. Revision of the CDC structure, positions, functions, legislative authority (as embedded in the draft DRM Bill and draft DRM Policy (2011)), and name to ensure it is structured as a DRM organization and enabled to address and coordinate all DRM components. N.4.5. Revision of the National Disaster Preparedness and Response Structure with a view to making it a national DRM structure, focused on all DRM components. N.4.6. Revision of all national and regional sub-committees to ensure that together they comprehensively cover all DRM components, covering key hazards, all sectors and all levels. N.4.7. Revision of the National DRR Platform, its role, composition and functions, with a view to DRM. N.4.8. Finalize the establishment and integration of the volunteer corps into the national DRM structure, into preparedness initiatives and into emergency response planning and relevant plans N.4.9. Establish a national emergency planning process, including continuous updating and an assessment of linkages between and consistency/harmonization among all plans at all levels N.4.10. Design and implementation of a national simulation exercise programme for testing and updating plans and ensuring they are well known, practiced and up to date. N.4.11. Enhancement of the EWS Plan for flood and drought. N.4.12. Assess the need for equipment, hardware and software and technical staff for EWS. N.4.13. Design and implementation of a national DRM training programme N.4.14 Design and implementation of a National DRM Public Education and Awareness Plan and Strategy. N.4.15. Revision of NEOC structure, roles and responsibilities and then revision of NEOC manual, SOPs, staffing and equipment. N.4.16. Design of model regional and local EOC manuals to be adapted at regional and local levels. N.4.17. Identification of specifics measures to integrate gender issues into DRM processes. R.4.1. Establish regional DRM committees including regional DRM sub-committees, ensuring that all DRM components are addressed. R.4.2. Establish all local DRM committees (i.e. neighbourhood or community district DRM committees and EOCs) including local DRM sub-committees, ensuring that DRM components are addressed. R.4.3. Design, establish and properly equip all regional EOCs. R.4.4. Design, establish and properly equip all local EOCs. R.4.5. Design and test emergency response plans at the regional level and ensure they are compatible with those at the national and local levels. R.4.6. Design and test emergency response plans at the local level and ensure they are compatible with those at the regional and national levels. R.4.7. Design and deliver a community-based DRR/DRM capacity building programme.	N.5.1. Design a National Early Recovery Plan for floods that include actions for all three levels: national, regional and local. N.5.2. Design a National Early Recovery Plan for droughts that include actions for all three levels: national, regional and local. N.5.3. Design of COOPs and BCP guidelines for the government and the private sector based on vulnerability assessments. N.5.4. Design of COOPs for government offices and key/critical national infrastructure based on vulnerability assessments. N.5.5. Design of BCPs for the private sector. N.5.6. Design and delivery of a national training programme for COOPs and BCPs. N.5.7. Revise/update and enhance the National Contingency Fund and its mechanisms, including addressing the enabling environment. N.5.8. Hold awareness raising sessions for government and the private sector about the need for recovery, COOPs and BCPs in Guyana. R.5.1. Design COOPs for government offices and key/critical infrastructure at the regional and local levels. R.5.2. Design of BCPs for the private sector at the regional and local levels. R.5.3. Workshops for training in COOPs and BCPs for the regional and local levels.

Annex IV – Current Projects in Guyana

1. *IDB Project. Design and Implementation of an Integrated Disaster Risk Management Plan.*

a. Objectives

The general objective of this Technical Cooperation is to provide support to Guyana for the design and implementation of a national integrated disaster risk management plan. The specific objectives are to: (i) evaluate climate change-related disaster risk; (ii) strengthen national capacity for IDRM; and (iii) support the future implementation of the IDRM plan through an investment programme in disaster prevention and mitigation.

b. Component 1 - Country Risk Indicators and Risk Evaluation (US$ 330,000). This component includes the following activities: (i) development of the four IDB Indicators of Disaster Risk and Risk Management for Guyana; (ii) a comprehensive flood risk evaluation of vulnerable regions, with emphasis on the coastal zone; and (iii) presentation of the results to government authorities.

c. Component 2: Strengthening National and Local Capacity for Integrated Disaster Risk Management (US$ 550,000). This component will include the following activities: (i) preparation of a *DRM Bill*; (ii) development of a national IDRM plan, (iii) capacity building for key national and regional entities involved in the implementation of the IDRM plan and investment programme proposed in Component 3; and (iv) implementation of pilot projects (involving non-structural activities) designed to strengthen local capacity of regional and neighbourhood committees through community-based DRM.

c. Component 3: Design of Investment Program for Flood Prevention and Mitigation (US$ 370,000). This component will include the following activities: (i) based on the results of the World Bank–financed CAP in the EDWC: (a) the preparation of appropriate maintenance plans to improve flood control; (b) the preparation of a priority list of engineering works for flood protection; and (c) the preparation of engineering designs for prioritized flood protection works. The priority list of engineering works will be based on a review of existing designs for new proposed works as well as on the expected impact on flood risk as identified in Component 1; (ii) assessment of national shelter capacity, including vulnerability assessment of existing shelter facilities (such as schools and community centres) and the preparation of enhanced engineering designs, as appropriate; as well as designs for new multipurpose regional shelters; and (iii) improved design of flood EWS. The Bank will finance the services of a consulting firm.

d. Budget. The estimated total cost of the Technical Cooperation is US$ 1,250,000, with US$ 1,000,000 from the resources of the Disaster Prevention Fund (DPF) and local counterpart contribution of US$ 250,000, in kind.

2. *UNDP Project. Building National and Local Capacity for Disaster Response and Risk Reduction.* A three-year project: December 2008 - December 2012. This project has a budget of US$ 540,000 (UNDP Core funds).

a. Objective: To strengthen disaster response preparedness and risk reduction capacities at national and local levels.

b. Expected Results: (i) Disaster preparedness plans at national and local levels and in key sectors developed/reviewed. (ii) National DM structures strengthened based on the National DRM Policy and Bill. (iii) Response and preparedness capacity enhanced, both at national and community levels, with effective mechanisms in place for early warning, damage assessment, search and rescue, and response coordination. (iv) Disaster awareness raised through a national awareness campaign based on risk assessment and risk mapping.

c. Project Summary. The project aims to support the country to reduce the risks of disasters in a sustainable manner and to be better prepared for disasters at national and community levels. In particular, the project seeks to develop capacities of the national emergency management agencies (CDC and line ministries) to coordinate disaster response effectively. Furthermore, it aims to strengthen communities' capacities in disaster risk assessment and response planning. Activities are conducted in the following areas: awareness raising, institutional and legislative systems and small-scale disaster risk mitigation.

d. Activities.

(i) Support the CDC and other government agencies to coordinate disaster response and risk reduction activities effectively;

(ii) Strengthen the relevant legislative and institutional frameworks at national level by developing a DRM policy;

(iii) Raise awareness among the population about existing natural hazards and coping strategies;
(iv)Strengthen capacity of the most vulnerable communities to assess risks, plan for effective response and reduce immediate risks by implementing small-scale disaster risk mitigation projects;
(v) Establish EWS in vulnerable communities and train local authorities and the general population on primary emergency response, damage assessment, evacuation and mass casualty management; and
(vi) Promote gender equality in DRR and ensure gender-sensitive treatment (e.g., equal relief provision to men, women and children) and approach in response and recovery situations.

e. Achievements.

National DM structure

Capacity assessment of the national DM system completed and used as a baseline for programming in the main phase of the project.

Response and preparedness capacity at national and community level

(i) National EOC, located at the CDC office, refurbished and equipped to strengthen emergency response capacity.
(ii) Baseline study on EWS in Guyana produced jointly with the UNDP-GEF funded Sustainable Land Management project.
(iii) DANA framework, respective guidelines/forms developed and currently being reviewed by national stakeholders.
(iv) Virtual platform for emergency information management and coordination developed and located at the official website of the CDC.

3. *World Bank CAP.* A two year project: June 30, 2011 - March 31, 2013. With the support of the World Bank, with grant support (US$ 3.8 million) from the Special Climate Change Fund of the World Bank's GEF, the GoG has been implementing the CAP, designed to reduce vulnerability in the low-lying coast that is currently threatened by sea level resulting from climate change. The CAP is aimed at improving infrastructure and increasing storage capacity of the EDWC.

a. Objective: To reduce the vulnerability of catastrophic flooding in the Guyana low-lying coastal area that is currently threatened by sea level rise resulting from global climate change. This project has been developed to guide a comprehensive upgrading programme of the EDWC and lowland drainage system, aimed at increasing discharge capacity and improving water level management. The project will also provide a technical framework for future donor intervention in the drainage and irrigation sector. In addition to developing the technical baseline for adaptation measures, the project will include some small infrastructure improvements to help cope with the immediate threats to the drainage system. The tools developed under the analytical component of the CAP will be used by the Government of the Republic of Guyana (GoG) and donor agencies to guide future investments.

b. Component 1: Pre-investment studies for engineering design of works. The objective of this component is to provide the hydrologic baseline necessary for contemplating rational interventions aimed at increasing the current discharge capacity of the flood control system.

c. Component 2: Investments in specific adaptation measures. The objective of this component is to counteract the effects of sea level rise, which has decreased the GoG's ability to manage water levels of the EDWC system.

d. Component 3: Institutional strengthening and project management. The objective of this component is to strengthen the institutional framework for flood control within the context of the national emergency management sector headed by the CDC. The project will also support an institutional consolidation of flood control in Guyana to help create consensus around a medium- and long-term intervention strategy to help the country adapt to sea level rise

e. Activities:

(i) Hydraulic engineering foundation, critical for flood control management, analyzed and understood by GoG. Status: Hydraulic model calibrated.
(ii) Identification of activities for follow-up intervention using the hydraulic model. Status: 10 key drainage interventions identified and pre-engineering studies completed.
(iii) LIDAR data capture of coastal lowlands for regions 3, 4 and 5 for input into a 3D DEM. Status: DEM model created for regions 3 and 4.
(iv)1D-2D model developed to identify key interventions to be made within Conservancy to improve water flow into Demerara River. Status: Model calibrated.
(v) Measurements taken and dam safety analysis completed to highlight areas in critical need of repair. Status: Dam safety study completed.

(vi) Levelling and bathymetry completed. Dam safety study EDWC reservoir bathymetry completed.
(vii) Staff trained in use of DEM, flow models and monitoring equipment. Status: 10 GoG engineers fully trained.
(viii) Contingency plan with clear lines of responsibility developed and operational. Status: Contingency plan updated.
(ix) 100% of repairs identified at appraisal executed. Status: 100%.
(x) Key canal widened in compliance with national and project priorities. Status: Cunha canal to be pursued as a separate project.
(xi) Discharge capacity increased of key relief canal from EDWC to Demerara river. Status: increase of 30% of discharge capacity.
(xii) Key equipment purchased. Status: key equipment purchased.

4. *CADM Project. Phase 2.* Regionally coordinated by CDEMA and funded by the JICA. This project is also known as the JICA project. The CADM project started in January 2009 and finished in June 2012.
a. *Objective*. To develop and test a community-based flood risk reduction model by the integration of community-based disaster management planning, flood early warning system and flood hazard mapping. The pilot communities in Guyana selected to participate in this project were Little and Big Baiboo in Upper Mahaica, which is an area vulnerable to flooding during heavy rainfall and when water is released from the EDWC.
b. *Activities.*
(i) Flood analysis of the Mahaica River based on the outputs of the land and flood surveys and other data.
(ii) Preparation of flood hazard maps.
(iii) Testing of EWS, evacuation (residents and cattle), shelter management and response through a simulation exercise. The simulation exercise was executed in May 2012 and involved the establishment and testing of a community EOC and the activation of two shelters at the Health Centre and the Baiboo Government School. Forty residents were involved and participated in teams for early warning, evacuation, transportation, shelter management and relief to test the community flood preparedness and response plan.

5. *European Development Fund Project. Rehabilitation of Sea Defence and Coastal Management.* 2009-2013. Cost: 14.8 million Euros invested by the European Development Fund (EDF) Project.
a. *Objective:* Protection of economic and social assets in low-lying coastal areas.
b. *Outcome:* Improved infrastructure in targeted areas; enhanced institutional capacity of the administration to prioritize, rehabilitate and maintain said infrastructure.
c. *Output:* 6-12 km of sea defences rehabilitated; integrated maintenance strategy of infrastructure in implementation.
d. *Actions:* (i) prioritizing the investments needed to upgrade critical sea defence structures and locations, and (ii) supporting the preventive maintenance programmes.

6. *GoG Project. Purchase of Equipment, Construction, Rehabilitation and Operational Works of the National Drainage and Irrigation System*.[125] Started in 2011.
a. Activities:
(i) Sea and River Defence.
Government budgeted US$ 3 billion for the continued construction, reconstruction, rehabilitation, restoration and maintenance of sea and river defence structures throughout the country.
(ii) Drainage and Irrigation.
The GoG invested US$ 6.6 billion towards the purchase of equipment, and construction, rehabilitation and operational works of the national drainage and irrigation system.
Additional infrastructure works such as the construction of a drainage sluice at Cottage, and at Abary; rehabilitation of sluice at Lonsdale as well as rehabilitation and installation of pumps at Greenfield will also be completed.

7. *Hope Canal Project.* A GoG-funded US$ 15 million project initially planned for two years: October 2010-October 2012; the project has been extended to July 2013.
a. *Objective:* Increasing the discharge capacity of the conservancy.
b. *Activities:* (i) Construction of the canal by the National Drainage Irrigation Authority (NDIA); (ii) Erection of the head regulator; (iii) building of a bridge, and (iv) construction of the sluice.

[125] GoG. Disaster Risk Management Policy. Revised March 2012.

8. *Guyana Mangrove Restoration Project*. A 3-5 year project funded by the GoG: 100 million Guyanese Dollars in 2010. The 3-year National Mangrove Action Plan was approved by the Assembly. The project is managed by the MAC within the Climate Change and Agricultural Adaptation Unit of NARI.

a. Objectives: (i) Promote sustainable management of mangrove forest; (ii) develop effective protection of mangrove ecosystem and rehabilitation; (iii) increase public awareness and education on the benefits of the mangrove forests; (iv) establish and complete a legal framework for mangrove ecosystem management and encourage community-based mangrove management; and (v) establish the administrative capacity for the management of mangroves in Guyana.