



**NATIONAL
ADAPTATION
PLAN
FOR THE
REPUBLIC OF
TRINIDAD AND
TOBAGO**



NOVEMBER 2023

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Under the guidance of:

The Multilateral Environmental Agreements Unit, Ministry of Planning and Development
Republic of Trinidad and Tobago

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Trinidad and Tobago’s Inter-Island ferry, the *T&T Spirit*, boldly embarks on an uncertain journey. © *Christopher Attai Photography*



FOREWORD

The Government of the Republic of Trinidad and Tobago is pleased to present its first National Adaptation Plan (NAP) to manage climate change risks. As a Small Island Developing State, Trinidad and Tobago is vulnerable to extreme weather events, temperature changes, sea level rise, changes in rainfall patterns, inland and coastal flooding, stronger hurricanes and loss of coastal ecosystems. Climate threats are especially pronounced in our country's coastal zone which captures 70% of the population and 81% of all economic activity. Thus, they stand antithetical to lives, livelihoods and Trinidad and Tobago's thrust for a sustainable blue economy. Whereas the scale and nature of future conditions are uncertain, there is great certainty that the impacts of climate change present a cross-cutting threat to sustainable development progress.

This first NAP is a critical addition to the country's policy framework for addressing climate change which includes: The National Development Strategy 2016 – 2030 (Vision 2030, Theme V), the National Climate Change Policy, the Carbon Reduction Strategy, the Nationally Determined Contribution to the Paris Agreement, and the Long-term Strategy for Low Emissions Development. Created through a multi-year, inclusive development process, the NAP is a living policy document that provides clear guidance for navigating an uncertain future using climate resilient development pathways.

As the vehicle for our first Adaptation Communication to the UNFCCC, this NAP reaffirms our commitment to global action against climate change. We are pleased to share our experiences, successes, challenges and needs with the international community. The support of the United Nations Development Program, Global Environment Facility, European Union and the many sub-national actors who contributed to the preparation of this NAP is acknowledged with sincere appreciation.

Together we have devised a comprehensive plan and together we shall undertake the extraordinary effort to adapt to the present danger of climate change while building long-term resilience. For we must do no less if we are to surmount this global challenge and ensure that no one is left behind.



*The Honourable Pennelope Beckles,
Minister of Planning and Development.*

ACKNOWLEDGEMENTS

The Government of the Republic of Trinidad and Tobago (GORTT) expresses its deepest appreciation to everyone who supported the development of this National Adaptation Plan (NAP) for Trinidad and Tobago.

This NAP is a product of a robust, multi-year programme of work coordinated by the Multilateral Environmental Agreements Unit of the Ministry of Planning and Development. The time, creativity and knowledge of persons across multiple sectors were essential for creating a comprehensive, strategic plan for adapting to climate change whilst building long-term resilience. Therefore, the GORTT extends sincere thanks to the following stakeholders who have influenced this NAP:

1. Academic institutions including but not limited to the University of the West Indies, and University of Trinidad and Tobago.
2. Governmental entities including, but not limited to, the Tobago House of Assembly, Ministerial Divisions and Units, local government, statutory bodies, and State-owned companies.
3. Private sector companies and consulting firms.
4. Civil Society Organizations (CSOs) including community-based groups and non-governmental organizations.
5. All individuals and/or entities in the Climate Change Focal Point Network, and other participants in the various stakeholder engagements.

Special thanks are also extended to the Global Environmental Facility, European Commission and United Nations Development Programme for their generous technical and financial support, without which the preparation of this NAP would not have been possible.

If we have inadvertently omitted any name, entity or group, we sincerely apologise. Be assured, it is not intended to diminish or overlook the useful contributions which are immensely appreciated.

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LIST OF ACRONYMS AND ABBREVIATIONS

ADCOM	Adaptation Communication
BPOA	Barbados Programme of Action
BTR	Biennial Transparency Report
BUR	Biennial Update Report
CEC	Certificate of Environmental Clearance
CO ₂	Carbon Dioxide
COP	Conference of Parties
CCA	Climate Change Adaptation
CCMC	Climate Change Ministerial Committee
CEA	Cost Effectiveness Analysis
CIMS	Coastal Information Management System
CCFPN	Climate Change Focal Point Network
CCRIF-SPC	Caribbean Catastrophe Risk Insurance Facility – Segregated Portfolio Company
CDRM	Comprehensive Disaster Risk Management
CNCMP	Comprehensive National Coastal Monitoring Programme
COPE	Council of Presidents for the Environment
CRDP	Climate Resilient Development Pathway
CReW	Caribbean Regional Fund for Wastewater Management
CREWS	Coral Reef Early Warning Systems
CSO	Civil Society Organizations
DAE	Direct Access Entity
DAPP	Dynamic Adaptive Policy Pathway
DMAC	Disaster Management Advisory Council
DRR	Disaster Risk Reduction
EBA	Ecosystems Based Adaptation
Eco-DRR	Ecosystems-based Disaster Risk Reduction
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMA	Environmental Management Authority
EM Act	Environmental Management Act Chap. 35:05
ERIC	Environmental Research Institute Charlotteville
GCF	Green Climate Fund

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GCM	Global Climate Models
GHG	Greenhouse Gas
GoLoCarSe	Global to Local Caribbean Socio-Economic Climate Change Scenarios Project
GORTT	Government of the Republic of Trinidad and Tobago
IADB	Inter-American Development Bank
ICAT	Initiative for Climate Action Transparency
ICZM	Integrated Coastal Zone Management
IMA	Institute of Marine Affairs
IPCC	Intergovernmental Panel on Climate Change
IWRM	Integrated Water Resources Management
KMS	Knowledge Management System
LARPDU	Local Area and Regional Planning and Development Unit
LEG	LDC Expert Group
LT-LEDS	Long-Term Low-Emissions Development Strategy
M&E	Monitoring and Evaluation
MEA	Multilateral Environmental Agreements
MEAU	Multilateral Environmental Agreements Unit
MSI	Mauritius Strategy for Implementation
MPD	Ministry of Planning and Development
MRV	Monitoring Review and Verification
NAP	National Adaptation Plan
NC	National Communication
NCCP	National Climate Change Policy
NCCTS	National Climate Change Transparency System
NCSD	National Council for Sustainable Development
NDA	National Designated Authority
NDC	Nationally Determined Contribution
NEP	National Environmental Policy
NGC	National Gas Company of Trinidad and Tobago
NIE	National Implementing Entity
NRCSWLP	National Restoration, Carbon Sequestration, Wildlife and Livelihoods Project
NRWRP	National Reforestation and Watershed Rehabilitation Programme
NWRF	National Waste Water Revolving Fund.
ODPM	Office of Disaster Preparedness and Management
PSIP	Public Sector Investment Programme
RCM	Regional Climate Models
SAMOA	SIDS Accelerated Modalities of Action
SEI	Stockholm Environmental Institute
SEIP	State Enterprise Investment Programme
SIDS	Small Island Developing States
SIMS	Spatial Information Management System

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SNC	Second National Communication to the UNFCCC
THA	Tobago House of Assembly
TNC	Third National Communication to the UNFCCC
TTGF	Trinidad and Tobago Green Fund
TTMS	Trinidad and Tobago Meteorological Service
TWG	Technical Working Group
UNFCCC	United Nations Framework Convention on Climate Change
UN SDGs	United Nations Sustainable Development Goals/ 2030 Agenda for Sustainable Development.
UWI	University of the West Indies
VCA	Vulnerability and Capacity Assessment
WASA	Water and Sewerage Authority
WGA	Whole-of-Government-approach
WRA	Water Resources Agency

EXECUTIVE SUMMARY

1. The Republic of Trinidad and Tobago is especially vulnerable to the effects of climate change.

- The country’s geography exposes it to several climate-exacerbated natural hazards including earthquakes, tropical cyclones, drought, intense rainfall, sea-level rise and flooding.
- Over 80% of economic activity is concentrated within the coastal zone – inclusive of the country’s oil and gas sector – which contributes to as much as 35-36% of the country’s GDP. Over 70% of the population, 80% of urban centres and 50% of essential transportation arteries exist within the coastal zone.
- Most of the country’s natural ecosystems face pressures from human activity in addition to climate risks, resulting in increased vulnerabilities to both natural capital and the communities that depend directly on their provisional services.
- Climate change threatens to worsen existing gender disparities in Trinidad and Tobago.

2. Trinidad and Tobago has experienced and will continue to experience the adverse effects of climate change based on the country’s observed data, and best-available scientific projections.

- Temperature recordings have shown an increasing trend of 0.27°C /decade for Trinidad and 0.17°C /decade for Tobago since 1961; becoming more pronounced within the last three decades.
- Tobago’s rainfall data exhibits a declining trend when recent decades are compared to the 1969-1990 average.
- The peak values of one-day rainfall recordings have increased over the last two decades, occurring within the dry season.
- General Circulation Models and Regional Climate Models project worsening climate conditions for Trinidad and Tobago towards the year 2100.
- Caribbean tidal gauging stations reveal an increase in sea level rise of about 1.5 mm – 3 mm per year. IPCC projections indicate that this can range from 0.18 m – 1.45 m by 2100 depending on the extent of ice sheet melt by 2100.

AIR TEMPERATURE	ANNUAL RAINFALL	MONTHLY RAINFALL	SEA SURFACE TEMPERATURE	SEA LEVEL RISE
↑	↓	+ 7mm ↕ - 40mm	↑	↑
2.4 – 3.6°C	22% - 30%		0.9°C – 3.1°C	75 – 126cm

Projected shifts in climate variables through to 2100.

3. Climate risks pose a direct economic threat. These threats will increase the economic costs of disasters while constraining GDP growth toward the end of the century.

- For three (3) consecutive Octobers (2017 – 2019) Trinidad and Tobago has received pay outs from the CCRIF due to flooding caused by excess rainfall “anomalies”. The most significant event in 2018 resulted in over US\$3,700,000 in infrastructure damage and adversely impacted the lives of over 150,000 people.
- It is estimated that hurricane damages alone may exceed US\$24,000,000 per year by the end of the century, with the aggregated cost of unmitigated damages from sea level rise and hurricanes to exceed US\$12 billion by 2100.
- The impacts of climate change threaten the sustainability and productivity of most economic sectors. Considering only the anticipated changes in temperature, Trinidad and Tobago’s GDP may be reduced by 9% in 2030, 30% in 2050, and 82% by 2100 unless adaptation actions are taken.

4. This National Adaptation Plan was prepared through a multi-year, participatory approach spanning several projects supported by the European Union and the United Nations Development Programme/Global Environmental Facility.

- This NAP satisfies the provisions of Article 7 of the Paris Agreement which calls for countries to prepare national adaptation plans (NAPs) and to communicate adaptation actions to the UNFCCC. This NAP also serves as Trinidad and Tobago’s first Adaptation Communication.
- Through a series of Conference of Parties (COP) decisions and technical documents the UNFCCC presents a recommended framework for preparing NAPs, recognizing that each NAP should be country-driven, appropriate to their context, and avoid duplication of effort.
- Since 2014, the GORTT has engaged in several projects with overlapping elements of the NAP process and has opted to leverage these synergies to prepare the NAP instead of creating it through a stand-alone process.
- Each project was highly participatory and consultative, with a diverse cross-section of stakeholders contributing to project outcomes. Sectoral Technical Working Groups (TWGs) led the national vulnerability and capacity assessment which forms an integral part of this NAP.

5. Trinidad and Tobago has a strong legal and institutional framework for addressing climate change risks, composed of various actors from the public, private and non-governmental sectors.

- The primary policy governing climate change adaptation is the National Climate Change Policy which describes a clear adaptation mandate, coordinating mechanism, and implementation mechanism. Implementation will be overseen by a Climate Change Ministerial Committee (CCMC). The Secretariat to the CCMC, the Multilateral Environmental Agreements Unit (MEAU), shall utilize the Climate Change Focal Point Network (CCFPN) to form sub-committees to guide sectoral implementation. Sectoral actors – which are public, private and non-governmental stakeholders – are responsible for the execution as well as the project level monitoring and evaluation of adaptation actions.
- Central to this coordination and implementation framework will be the expansion of National Climate Change Transparency System (NCCTS) to include adaptation Monitoring and Evaluation (M&E) into the Knowledge Management System (KMS) of the National Climate Monitoring, Reporting, and Verification (MRV).
- Four policies explicitly mandate climate change adaptation action: The National 2015 Development Strategy (VISION 2030) 2016 – 2030, the 2017 Integrated Water Resources Management Policy, the 2018 National Environmental Policy, and the 2020 Integrated Coastal Zone Policy Framework.
- Dozens more domestic policy instruments are thematically aligned with adaptation and resilience building although ‘adaptation’ is not explicitly mentioned.
- This NAP is aligned with ten (10) international and regional strategies and agreements related to sustainable development, climate change, and disaster risk reduction.

6. This National Adaptation Plan adds to the climate change policy landscape by setting a clear vision, objectives, principles, approaches and strategies for adaptation.

- NAP Vision:
“A climate-resilient nation that routinely evaluates and reduces its physical, social and economic vulnerability through timely, cost-effective adaptation measures.”
- NAP Mission:
“To enhance the adaptive capacity of all sectors while simultaneously contributing to sustainable development and building long-term resilience to the effects of climate change.”
- NAP Objectives:

- i. Understanding the national development context and synthesizing available information, resources, programmes, projects, stakeholders, gaps and needs regarding adaptation*
 - ii. Enhancing capacity to analyse and understand climate change scenarios and risks*
 - iii. Defining and strengthening governance arrangements for adaptation action*
 - iv. Identifying and executing adaptation strategies and actions that address immediate climate impacts to human and natural systems, while building long-term resilience*
 - v. Ensuring that adaptation pathways are sustainable, cost-efficient, inclusive and considerate of the most vulnerable*
 - vi. Communicating climate risk and adaptation information to all stakeholders and international entities, as required*
 - vii. Continuously monitoring, evaluating, reporting, improving and learning from adaptation efforts*
- NAP Principles:
 - i. Prioritize “no regret”, “low regret” and “win-win strategies”*
 - ii. Be participatory and inclusive of all genders and socio-economic groups*
 - iii. Be evidence-based*
 - iv. Be dynamic to allow for learning and innovation to suit the local context*
 - v. Demonstrate transparency, efficiency and integrity*
 - vi. Avoid damage*
 - vii. Harmonize with national planning and development*
 - viii. Leave no one behind*
 - ix. Build capacity and enhance resilience*
 - NAP Approaches:
 - i. Multi-partite Climate Risk Management*
 - ii. Climate Resilient Development Pathways*
 - NAP Strategies:
 - ✓ Ninety (90) adaptation strategies proposed
 - ✓ Nine (9) strategies identified as ‘enabling strategies
 - ✓ Eighty-one (81) strategies identified as “Sectoral” and specifically focus on Tobago, and seven (7) climate-affected economic sectors: Coastal Zone Resources,

Agriculture and Food Security, Water Resources, Human Health, Biodiversity, Infrastructure and Human Settlements, Financial Services

- ✓ Sixteen (16) strategies classified by sectoral working groups as being “No Regret-High Impact” strategies

7. Since 2013, the Government of Trinidad and Tobago has led several projects geared to adaptation, or that yielded adaptation co-benefits across the 7 “sectors” most affected by climate change. Barriers and Gaps exist, but strategies to address these are proposed in this NAP.

- The government recognizes that civil society and the private sector have undertaken meaningful adaptation efforts; however, there has not been a methodical system of documenting these efforts.
- The government has undertaken at least 30 projects that support adaptation and resilience building within the affected sectors since 2013.
- Barriers and Gaps that have stymied adaptation action include, but are not limited to, issues with: Information quality and access, regulatory and institutional frameworks, availability of financial resources, technical capacity of institutions, and social awareness regarding climate change.

8. Trinidad and Tobago’s top priority is strengthening the human and technical resources of twelve (12) key public and non-governmental institutions which are core actors to the Strategic Programme for Climate Risk Management.

- Project cost of this intervention is US\$19,725,857.00 ¹over five years.

This intervention provides the foundation for a multi-partite risk management approach to climate change. It supports improved data collection, modelling, public education, institutional strengthening and stakeholder coordination.

9. To fully implement this National Adaptation Plan the GORTT will require a total of US\$150,723,357.00 in financial support which it will access through a blend of domestic and international sources.

Summary Table showing the financial requirements of Trinidad and Tobago’s National Adaptation Plan

^{*1} Based on 2019 values.

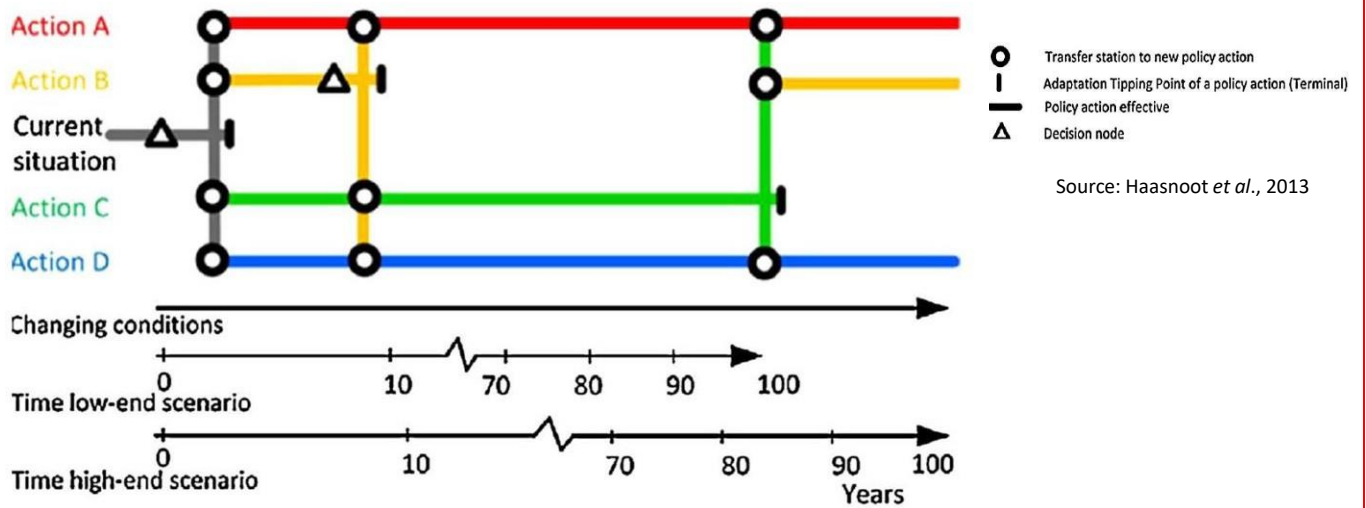
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CATEGORY OF STRATEGY /ACTION	ESTIMATED COST (USD)		
	NO REGRET-HIGH IMPACT	OTHER PRIORITY STRATEGIES	
EADF <i>Adaptation Financing</i>	US\$ -	US\$	350,000.00
EMOE <i>Monitoring and evaluation</i>	US\$ -	US\$	70,000.00
EMNP <i>Mainstreaming into National Planning</i>	US\$ 19,725,857.00	US\$	20,000.00
SCZN <i>Coastal Zone Resources</i>	US\$ 50,000.00	US\$	2,035,000.00
SAFS <i>Agriculture and Food Security</i>	US\$ 1,920,000.00	US\$	1,460,000.00
SWRA <i>Water Resources</i>	US\$ 892,500.00	US\$	80,095,000.00
-SWRH			
SHUH <i>Human Health</i>	US\$ 200,000.00	US\$	28,100,000.00
SBDV <i>Biodiversity</i>	US\$ -	US\$	600,000.00
SIHS <i>Infrastructure and Human Settlements</i>	US\$ 95,000.00	US\$	5,230,000.00
SFIS <i>Financial Services</i>	US\$ -	US\$	450,000.00
STGO <i>Tobago</i>	US\$ 50,000.00	US\$	9,380,000.00
SUB- TOTAL	US\$ 22,933,357.00	US\$	127,790,000.00
	TOTAL	US\$	150,723,357.00

10. This National Adaptation Plan is a living document that will change over time as the national context changes and new knowledge is developed. The primary mechanism for this evolution will be a climate resilient development pathway approach that has been applied to the target sectors of this NAP.

- Trinidad and Tobago will continuously monitor and pivot its adaptation action based on best available information using the UNFCCC-recognized ‘dynamic adaptive policy pathway’ technique.
- The pathway approach is ideally suited to adaptation given the uncertainties that exist around the nature and extent of future climate change, sub-national issues, and the effectiveness of adaptation measures in our unique context.
- This NAP presents fifteen (15) indicative sector-based Climate Resilient Development Pathways. However, these pathways can be improved upon through subsequent analyses of costs and co-benefits.
- Indicative sectoral pathways utilize the visualization model of Haasnoot et al (2013) which has been widely adopted globally.

Illustrative figure showing dynamic adaptation policy pathway approach utilized by Trinidad and Tobago.



11. This National Adaptation Plan provides foundational guidance for a NAP Communications Strategy and an Enhanced Transparency System for ensuring successful NAP Outcomes.

- The Communication Strategy will build on past trainings of media personnel and be led by public and non-governmental institutions and will target various audiences.
- The National Climate Change Transparency System will be expanded to programmatic and project-level monitoring and evaluation (M&E) of adaptation actions.
- M&E will be coordinated by the MEAU and supported by public sector and non-governmental entities.

“Climate change is the single greatest threat to a sustainable future but, at the same time, addressing the climate challenge presents a golden opportunity to promote prosperity, security and a brighter future for us all.”

Ban Ki-Moon,

Former Secretary-General of the United Nations

1.0 Introduction

1.1 Understanding Climate Change Adaptation and this National Adaptation Plan

In 2020, the World Economic Forum reported that climate-related issues such as extreme weather, failure of climate action and natural disasters were among the most likely and impactful global risks facing humanity over the next decade.^[1] For Small Island Developing States (SIDS) such as Trinidad and Tobago and its Caribbean neighbours, the social, environmental and economic cost of inaction can be staggering.^{[2][3]} Conversely, these changes have created prospects for research, innovation and business as countries make the best of the rapidly evolving situation.^{[4][5]} Action is needed to reduce our vulnerabilities and to capitalize on the opportunities that can arise from these global changes. There is a need for climate change adaptation. The Intergovernmental Panel on Climate Change (IPCC) defines climate change adaptation as the “*adjustment in natural or human systems in response to an actual or expected climate stimuli or their effects, which moderates harm or exploits beneficial opportunities*”.^[6] However, making these adjustments is not a straightforward endeavour.

Firstly, the scientific techniques used to project future effects and risks are continuously improving, and experience has shown that best-available models have historically underestimated risks.^[7] Adaptation measures that are not properly grounded in a holistic assessment of circumstances can lead to “maladaptation” which has deleterious consequences to the economic, environmental and social systems.^[8] Still, even well intended measures that yield immediate positive adaptation benefits in the short term, can become maladaptive and increase vulnerability at longer time scales.^{[8][9]} Given the cost of adaptation, such uncertainty can make long-term adaptation planning impractical, if not impossible.^[10] Adaptation planning must be continuous, iterative and flexible so that adjustments can be made as new information is presented, contexts change, and lessons are learned.

Secondly, balancing adaptation, mitigation, and development measures can be challenging given the limitless range of approaches available under those areas of work.^{[10][11]} Climate Change mitigation is a critical, supporting effort to adaptation: Reducing greenhouse gas (GHG) emissions today may reduce future climate risks and thus, lower the long-term costs of adaptation.^[12] However, some mitigation and adaptation strategies do not always complement each other and may even be counterproductive.^{[13][14]} Identifying and utilizing synergistic strategies that balance the trade-offs between approaches can reduce costs while advancing both goals.^[15] Thus, it is critical that adaptation be considered in the context of continuous development planning, towards low-carbon, climate-resilient development.

Thirdly, some degree of climate change is now inevitable, and its effects may exceed the limits of adaptation.^[16] It is estimated that the lag-time between emissions and the manifestation of their impacts can vary from a decade to a century.^[17] For Caribbean SIDS, the unmitigated impacts are expected to exceed US\$22 billion annually by 2050 due to their inherent vulnerabilities.^{[18][19][20]} At the national scale, these impacts can erode decades of developmental gains.^[21] More critically however, is the significant impact to the poor and marginalized communities that traditionally exist in the transitional spaces between ‘safe’ and ‘unsafe’ known as “adaptation frontiers”.^[22] Proper adaptation planning must be considerate of this reality and ensure that a proper adaptation framework is in place to enhance the resilience of ecosystems, economies and communities that exist at the frontline of climate change consequences.

Considering these factors and the increasing urgency to act, the Government of the Republic of Trinidad and Tobago (GORTT) has prepared this National Adaptation Plan (NAP). The NAP is a product of years of participatory development and is complementary to Trinidad and Tobago’s *Long-Term Low-Emissions Development Strategy (LT-LEDS)*. This plan describes an integrated approach to climate change adaptation with leadership coming from governmental, private and civil society actors. This plan differs from convention by recognizing that maximum flexibility is needed for facing the uncertain future and adopting a “climate resilient development pathways approach” to adaptation implementation. The Trinidad and Tobago NAP is agile, utilizing the combination of approaches needed at the right times to ensure that cost-effective adaptation against the short-term effects of climate change is met while building long-term resilience through climate-smart, low-emission development pathways.

1.2 Mandate for the NAP and Adaptation Communications

The Paris Agreement establishes climate change adaptation as a key issue for global governance.^[23] Article 7(1) sets a clear global goal for adaptation, namely^[24]:

- i. *to enhance adaptive capacity and resilience;*
- ii. *to reduce vulnerabilities, with a view to contributing to sustainable development; and*
- iii. *to ensure an adequate adaptation response in the context of holding average global warming well below 2°C and pursuing efforts to hold it below 1.5°C.*

Article 7(9) establishes a requirement of all parties to engage in adaptation planning and implementation which includes, *inter alia*, the development of a national adaptation plan^[24].

Article 7(10) and 7(11) recommends that parties should submit and update an “Adaptation Communication” (ADCOM) as appropriate, as a component of, or in conjunction with, other National Communications (NC) to the United Nations Framework Convention on Climate Change (UNFCCC).^[24] This means that the ADCOM can be a stand-alone document or a component/companion of other communication instruments including but not limited to the NAP, NC, Biennial Update Reports (BURs), Biennial Transparency Reports (BTRs), or Nationally Determined Contributions (NDCs).^{[24][25]} At the 24th Conference of Parties (COP) of the UNFCCC held in Katowice (2018), further guidance on the structure of an AC was adopted under decision 9/CMA.1 and its accompanying Annex.^[26]

Towards ensuring that its obligations to the Paris Agreement are met, the GORTT has sought to use this NAP as the vehicle for its first Adaptation Communication. Thus, this document goes beyond what is required of a typical NAP and includes the core components of an ADCOM as well.

1.3 Trinidad and Tobago’s NAP Process

At the 16th COP of the UNFCCC in 2010, The Cancun Adaptation Framework established NAPs as a means of identifying medium and long-term adaptation needs for reducing vulnerabilities to climate impacts and developing and implementing strategies and programmes for addressing those needs.^[27] At COP 17 (2011) in Durban, parties defined the process of developing NAPs (i.e., “the NAP process”) by outlining its objectives and principles and providing an initial guideline in an Annex.^[28] Especially relevant are the following paragraphs:

*“Further agrees that enhanced action on adaptation should be undertaken in accordance with the Convention, should follow a **country-driven, gender-sensitive, participatory and fully transparent approach**, taking into consideration vulnerable groups, communities and ecosystems, and should be **based on and guided by the best available science** and, **as appropriate, traditional and indigenous knowledge**, and by gender-sensitive approaches, with a view to **integrating adaptation into relevant social, economic and environmental policies** and actions, where appropriate”* (Decision 5/CP.17, par 3)

And

*“Agrees that the national adaptation plan process should **not be prescriptive, nor result in the duplication of efforts undertaken in-country**, but should rather facilitate country-owned, country-driven action.”* (Decision 5/CP.17, par 4)

The initial guidelines contained four elements of a NAP. The following year, in 2012, the LDC Expert Group (LEG) prepared technical guidelines elaborating the NAP process which expanded the number of suggested elements to 17.^[29] Still, they maintained that there is no prescriptive format for a NAP and that flexibility remains a core tenet of NAP development.^[29] This is evident in that each of the 23 NAPs submitted to the UNFCCC by developing countries to date has its own unique structure with few overlapping elements.^[30]

The GORTT has recognized that many of the steps that comprise the elements of an effective NAP process overlap with measures the government has pursued since 2014 towards satisfying its UNFCCC reporting requirements and meeting its national climate change goals. To minimize duplicity, the NAP process that underpins this first NAP was not established as its own stand-alone project. Instead, synergies with long-standing and new climate change efforts were exploited to create a unique, nationally appropriate process that transcends multiple projects and project donors. Some LEG recommended steps were overlooked as they were not aligned with the country’s context and vision for the NAP. For example, “*setting a long-term implementation strategy*” is incongruent with the GORTT’s preferred reiterative pathways approach. Still, the result is a comprehensive, participatory and gender-sensitive NAP.

Table 1 – Summary of activities undertaken towards the preparation of the Trinidad and Tobago NAP

NAP Element	Activities Undertaken	Project (Funding Support)	Year
Laying the groundwork and addressing the gaps	<i>Established spearheading/coordinating entity</i>	N/A (GORTT)	2011
	<ul style="list-style-type: none"> The National Climate Change Policy (NCCP) identifies the Multilateral Environmental Agreements Unit (MEAU) of the Ministry of Planning and Development (MPD) as the coordinating entity for Trinidad and Tobago’s climate change obligations, inclusive of preparing national adaptation planning through the National Climate Change Policy. 		
	<i>Operationalized the adaptation planning process by accessing support through several projects.</i>	N/A (GORTT)	2014 – 2021
Preparing Elements	<i>Conducted a stocktake of on-going/ past adaptation activities</i>	Vulnerability and Capacity Assessment (VCA) Report for Trinidad and Tobago (European Union)	2018
	<ul style="list-style-type: none"> Literature review under the national Vulnerability and Capacity Assessment. 		
	<i>Synthesized available analysis of current and future climate at the broad scale.</i>	Vulnerability and Capacity Assessment (VCA) Report for Trinidad and Tobago (European Union)	2018
	<ul style="list-style-type: none"> Modelling done through the national Vulnerability and Capacity Assessment 		

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NAP Element	Activities Undertaken	Project (Funding Support)	Year
	<p><i>Assessed potential barriers and gaps to undertaking adaptation</i></p> <ul style="list-style-type: none"> • Discussion of the national Vulnerability and Capacity Assessment 	<p>Vulnerability and Capacity Assessment (VCA) Report for Trinidad and Tobago (European Union)</p>	<p>2018</p>
	<p><i>Developed and implemented climate change programmes on communication, public awareness and education</i></p> <ul style="list-style-type: none"> • Media Sensitization Sessions on Climate Change Reporting 	<p>NDC Support Programme (UNDP/GEF)</p>	<p>2019</p>
	<p><i>Examined gender data with regards to climate change action</i></p> <ul style="list-style-type: none"> • Gender Analysis and Action Plan for the NDC Implementation Plan. 	<p>NDC Support Programme (UNDP/GEF)</p>	<p>2019</p>
	<p><i>Analysed current climate to identify trends and indices that could help in decision-making</i></p> <ul style="list-style-type: none"> • Trend Analysis of the national Vulnerability and Capacity Assessment 	<p>Vulnerability and Capacity Assessment (VCA) Report for Trinidad and Tobago (European Union)</p>	<p>2019</p>
	<p><i>Assessed vulnerability to climate change at sector, subnational and national levels through robust consultative processes</i></p> <ul style="list-style-type: none"> • Vulnerability Assessment and Adaptation Strategy of the national Vulnerability and Capacity Assessment • VCA of coastal zones for the Third National Communication (TNC)/ 1st Biennial Update Report (BUR) 	<p>Vulnerability and Capacity Assessment (VCA) Report for Trinidad and Tobago (European Union)</p> <p>Third National Communication (TNC) and 1st Biennial Update Report (BUR) Project. (UNDP/ GEF)</p>	<p>2019</p> <p>2019</p>
	<p><i>Ranked climate change risks and vulnerabilities</i></p> <ul style="list-style-type: none"> • Hazard Assessment of the national Vulnerability and Capacity Assessment • Sectoral Assessment of the national Vulnerability and Capacity Assessment 	<p>Vulnerability and Capacity Assessment (VCA) Report for Trinidad and Tobago (European Union)</p>	<p>2019</p>
	<p><i>Appraised individual adaptation options through participatory stakeholder processes</i></p> <ul style="list-style-type: none"> • Sectoral Assessment of the national Vulnerability and Capacity Assessment 	<p>Vulnerability and Capacity Assessment (VCA) Report for Trinidad and Tobago (European Union)</p> <p>Third National Communication (TNC) and 1st Biennial Update Report (BUR) Project. (UNDP/ GEF)</p>	<p>2019</p> <p>2019</p>

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NAP Element	Activities Undertaken	Project (Funding Support)	Year
	<p><i>Compiled information on the main development objectives, policies and plans</i></p> <ul style="list-style-type: none"> Preparation of the NAP and LT-LEDS 	<p>Capacity Development for Improved Management of Multilateral Environmental Agreements for Global Environmental Benefits (UNDP/ GEF)</p>	2021
	<p><i>Identified synergies between development and adaptation objectives, policies, plans and programmes</i></p> <ul style="list-style-type: none"> Preparation of the NAP and LT-LEDS 	<p>Capacity Development for Improved Management of Multilateral Environmental Agreements for Global Environmental Benefits (UNDP/ GEF)</p>	2021
	<p><i>Identified opportunities and constraints for integration of climate change into planning</i></p> <ul style="list-style-type: none"> Preparation of the NAP and LT-LEDS 	<p>Capacity Development for Improved Management of Multilateral Environmental Agreements for Global Environmental Benefits (UNDP/ GEF)</p>	2021
	<p><i>Prepared National Adaptation Plan</i></p> <ul style="list-style-type: none"> Preparation of the NAP and LT-LEDS 	<p>Capacity Development for Improved Management of Multilateral Environmental Agreements for Global Environmental Benefits (UNDP/ GEF)</p>	2021
Implementation Strategies	<p><i>Strengthened institutional and regulatory framework for implementation through national and sectoral levels</i></p> <ul style="list-style-type: none"> Institutional Capacity Assessment Draft Climate Change Legislation Delineated Main Ridge Forest Reserve Tobago GIS capacity building NDC Financial Implementation Plan Climate Finance Opportunities Assessment 	<p>NDC Support Programme (UNDP/GEF)</p>	2019
		<p>Vulnerability and Capacity Assessment (VCA) Report for Trinidad and Tobago (European Union)</p>	2019
		<p>Third National Communication (TNC) and 1st Biennial Update Report (BUR) Project (UNDP/ GEF)</p>	2019
		<p>Third National Communication (TNC) and 1st Biennial Update Report (BUR) Project. (UNDP/ GEF)</p>	2019
		<p>Capacity Development for Improved Management of Multilateral Environmental Agreements for Global Environmental Benefits (UNDP/ GEF)</p>	2021
	<p><i>Developed criteria for choosing adaptation pathways.</i></p> <ul style="list-style-type: none"> Preparation of the NAP and LT-LEDS 	<p>Capacity Development for Improved Management of Multilateral Environmental Agreements for Global Environmental Benefits media (UNDP/ GEF)</p>	2021

NAP Element	Activities Undertaken	Project (Funding Support)	Year
	<p><i>Identified opportunities and synergies between the NAP and other Multilateral Environmental Agreements (MEAs)</i></p> <ul style="list-style-type: none"> Preparation of the NAP and LT-LEDS 	Capacity Development for Improved Management of Multilateral Environmental Agreements for Global Environmental Benefits (UNDP/ GEF)	2021
Reporting Monitoring and Review	<p><i>Established review cycle for the NAP</i></p> <ul style="list-style-type: none"> Preparation of the NAP and LT-LEDS 	Capacity Development for Improved Management of Multilateral Environmental Agreements for Global Environmental Benefits (UNDP/ GEF)	2021
	<p><i>Establish areas for improvement of the NAP</i></p> <ul style="list-style-type: none"> Preparation of the NAP and LT-LEDS 	Capacity Development for Improved Management of Multilateral Environmental Agreements for Global Environmental Benefits (UNDP/ GEF)	2021
	<p><i>Disseminate the NAP to the UNFCCC and other relevant stakeholders, as it becomes available</i></p> <ul style="list-style-type: none"> Preparation of the NAP and LT-LEDS 	Capacity Development for Improved Management of Multilateral Environmental Agreements for Global Environmental Benefits (UNDP/ GEF)	2021

2.0 Legal and Institutional Basis for Adaptation

2.1 Legal Frameworks

Whereas the GORTT has long undertaken action to address climate change at the national, regional and international level, its policy focus has traditionally been towards greenhouse gas mitigation.^[31] Notwithstanding, the GORTT has established five policies that provide an explicit basis for adaptation action:

1. The National Climate Change Policy (NCCP), 2011 ^[32]

The NCCP firmly addresses climate change adaptation (CCA) in its vision and in its policy statements under Section 9.3 – *Adaptation*. Aligned with the requirements of the UNFCCC, the NCCP commits the GORTT to, *inter alia*, strengthening its institutional arrangements for research and modelling, assessing vulnerability and developing adaptation options, incorporating adaptation into sectoral policies and national plans, enhancing resilience of human and natural environments, and promoting community-based adaptation through the Trinidad and Tobago Green Fund (TTGF).

2. The National Development Strategy (NDS), 2015 ^[33]

Under its fifth theme “*Placing the Environment at the Centre of Social and Economic Development*” the NDS identifies two explicit strategic initiatives that directly speak to adaptation: (i) determine areas of greatest climate risk, and (ii) design and implement adaptation action for vulnerable sectors.

3. Integrated Water Resource Management Policy (IWRM), 2017 ^[34]

The IWRM Policy recognizes the adverse effects of climate change on watersheds and water systems, as well as the roles that water systems, such as wetlands, can play in adaptation. It makes explicit reference in sub-section 6.1.1 “Climate Adaptation Instruments” wherein the GORTT reaffirms its commitment to action by, *inter alia*, reducing vulnerability; developing resilient infrastructure, water and food systems; developing integrated plans for the coastal zone, water resources and agriculture; and protecting and rehabilitating areas affected by drought and flooding.

4. The National Environmental Policy (NEP), 2018 ^[35]

The NEP places “*Addressing Climate Change and Environmental and Natural Hazards*” as one of six priority areas for Trinidad and Tobago. Within that priority, the GORTT reaffirms and expands on the policy statements previously provided in the NCCP in relation to adaptation and resilience building. Among adaptation actions are establishing global partnerships to mobilize adaptation financing, conducting vulnerability and risk assessments, establishing early warning systems, mainstreaming adaptation in national and sectoral policies, strengthening institutional arrangements, supporting community-based adaptation and enhancing climate-resilient ecosystems, human settlements and infrastructure.

5. Integrated Coastal Zone Management (ICZM) policy framework 2020 ^[36]

The ICZM Policy Framework highlights strategies to “*Plan and manage development in the coastal zone to avoid increasing exposure of people, property and economic activities to significant risk from natural and anthropogenic impacts including climate change (e.g. coastal flooding, salinization)*” as one of its eleven strategic objectives. The policy framework lists four strategies that speak to this objective, including encouraging the protection and maintenance of dynamic coastal features that protect the coast, conducting coastal vulnerability and risk assessments, developing and implementing holistic programmes for coastal zone protection, and establishing legislation for coastal protection infrastructure and measures.

Additionally, the GORTT has established several policies that have significant co-benefits to adaptation or enhancing resilience through disaster risk reduction (DRR). A non-exhaustive, cross-section of these policies is provided in Table 2. The GORTT especially recognizes the 2014 Comprehensive Disaster Risk Management (CDRM) Policy Framework ^[37] The provisions of these sectoral policies contribute directly to CCA and are interconnected with the contents of this NAP.

The GORTT has not yet established legislation to specifically address climate change. As such there is not an explicit legislative basis for undertaking climate change adaptation. Draft legislation for this is currently being considered. Still, there are some legislative frameworks through which adaptation and resilience action may be executed in accordance with national policy. These include the Environmental Management Act Chap 35:05 (“EM Act”) ^[38] and its subsidiary legislation, as well as the Disaster Measures Act Chap 16:50, ^[39] and the Tobago House of Assembly (THA) Act Chap. 25:03.^[40] Consequently, the Environmental Management Authority (EMA), the Office of Disaster Preparedness and Management (ODPM) and the Tobago House of Assembly shall have a critical role as Trinidad and Tobago embarks on its “whole of government approach” (WGA) to addressing CCA.

This NAP adds to the library of policy instruments that reflect Trinidad and Tobago’s continued commitment to addressing climate change. It serves as a keystone that connects national policy, legislation and the government’s commitments under various multilateral environmental agreements (MEAs).

Table 2 – Sample of national policies and laws that also support climate change adaptation.

Policy Instrument	Year	METHOD OF SUPPORTING ADAPTATION.
Policy		
National Cooling Strategy for Trinidad and Tobago	2020	Sets strategies for GHG emissions reductions from the cooling sector that lowers future climate risks
Integrated Coastal Zone Management Policy	2019	Supports healthy coastal ecosystems, a coordinated mechanism for coastal activities, reduces vulnerability of people, properties and livelihoods
National Protected Areas System Plan	2019	Reduces ecosystem vulnerability and promotes ecosystem-based management
NDC Implementation Plan	2017	Outlines system for achieving GHG emission reductions that lowers future climate risks
Nationally Determined Contributions (NDC)	2015	Sets targets for GHG emission reductions that lower future climate risks.
Carbon Reduction Strategy	2015	Sets strategies for GHG emission reductions that lower future climate risks
Comprehensive Disaster Risk Management Policy Framework	2014*	Proposes structure for assessing and undertaking disaster risk reduction efforts
National Forest Policy	2011	Supports ecosystem services from forests

National Protected Areas Policy	2011	Supports ecosystem services from protected areas
National Tourism Policy	2010	Supports environmental protection, especially of coastal resources.
National Policy and Programmes on Wetland Conservation for Trinidad and Tobago	2001	Supports wetland conservation

Legislation

Environmental Management Act and its subsidiary legislation	2001+	Creates an Authority with the broad mandate to address environmental issues and the power to create subsidiary legislations. Mandates for education and pollution control exercised through subsidiary legislation support CCA.
Miscellaneous Taxes Act and Green Fund Regulations	2007+	Provides Funding to civil society organizations (CSO) and governmental entities for environmental efforts.
Tobago House of Assembly Act	1996	Creates governing body for Tobago with a responsibility for, <i>inter alia</i> , the environment.
Disasters Measures Act	1978*	Establishes an Authority with the mandate to undertake relief action in the face of disasters.

* These policy instruments are being actively revised in 2021 concurrent with the production of this NAP.

2.2 Institutional Frameworks

As articulated in the NCCP, the national response to climate change must be multipartite.^[32] Effective adaptation and long-term resilience building depend on the meaningful collaboration and participation of academia, research institutions, public and private sector, non-governmental organisations (NGOs), community-based organisations (CBOs), business and industry organisations, and the citizenry at large. This NAP constitutes the *Strategic Framework and Programme for Climate Resilience* and, as such, aims to build the capacity of national actors towards long-term resilience.

Whereas multiple policies address adaptation and carry within them their own institutional framework, this NAP shall be coordinated using the mechanism described in the NCCP, which is considered the primary policy for the climate change ‘sector’. The relevant provisions of the 2011 NCCP are:

*“The implementation of this policy shall be coordinated by the **Multilateral Environmental Agreements Unit** of the Ministry, which has primary responsibility for the implementation of the UNFCCC and Kyoto Protocol as well as other multilateral environmental agreements to which Trinidad and Tobago is signatory, and for which the Ministry is the National Focal Point” (Section 9.1 pg.27).*

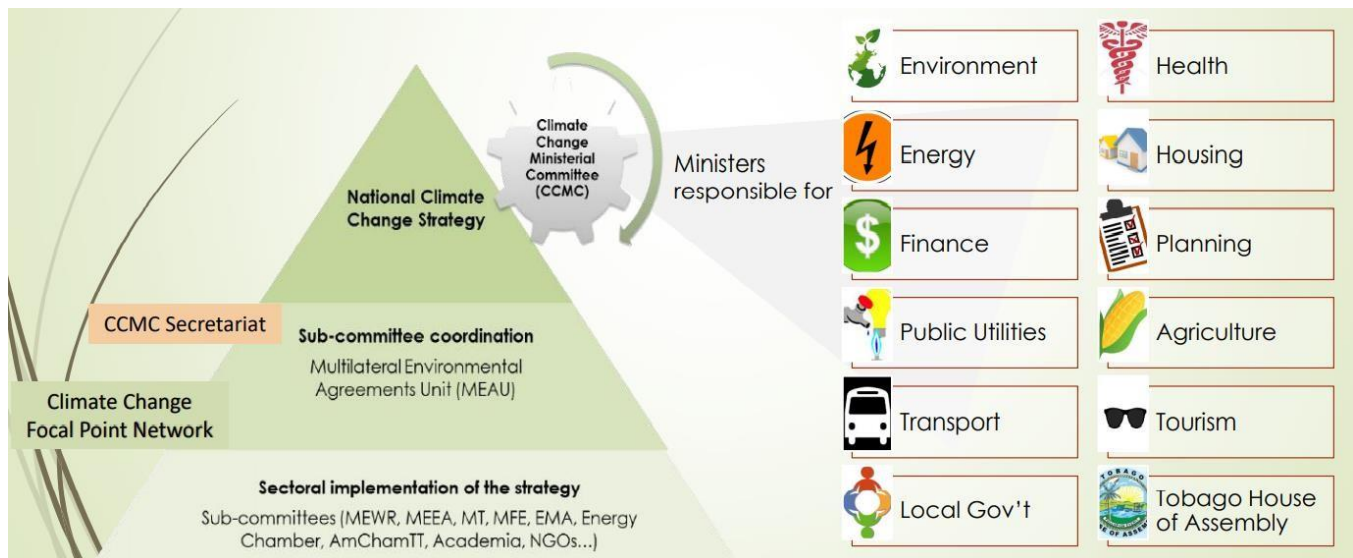
And

*“Implementation of this policy will be done through the setup of relevant **stakeholder networks** designed to facilitate **self-monitoring and reporting**” (Section 10, pg.21)*

This framework has been operationalized towards Trinidad and Tobago’s mitigation targets and is elaborated in its NDC Implementation Plan (Figure 1).^[41] This institutional framework shall also be applied for the NAP.

NAP implementation will be overseen by a Climate Change Ministerial Committee (CCMC). The Secretariat to the CCMC, the Multilateral Environmental Agreements Unit (MEAU), shall utilise the Climate Change Focal Point Network (CCFPN) to form sub-committees to guide sectoral implementation. Sectoral actors responsible for executing adaptation actions shall also be responsible for self-monitoring and reporting on these activities. The general roles and responsibilities of sub-national institutions are presented in Table 3.

Figure 1 – Schematic of the NDC Implementation framework to be adopted for the NAP.



Source: UNDP, 2017^[41]

The GORTT has established a robust Monitoring Review and Verification (MRV) system for the purpose of tracking and reporting on its mitigation targets. Vital to this system is a climate change Knowledge Management System (KMS) which is operated by the Environmental Management Authority (EMA). It is proposed that the KMS also be the repository of adaptation information for the purpose of centralizing national climate change information and exploiting synergies that exist between data collected on mitigation actions for national reporting. In doing this, reporting on adaptation will be made more efficient and there will be reduced burden on institutional actors who may need to reiterate information to multiple monitoring agencies operating under

various policy frameworks. For example, monitoring progress on the 2018 NEP, VISION 2030, 2017 IWRM Policy, and UN SDGs all advocate for adaptation action.

The GORTT recognizes that measuring the effectiveness of adaptation efforts is much more complex given that it is context specific and lacks a common global reference metric for external verification.^[42] Whereas mitigation has an MRV system, adaptation will utilise an enhanced Monitoring and Evaluation (M&E) system aimed at assessing the adaptive value of interventions, improvement and learning. The Monitoring & Evaluation framework is elaborated upon in Chapter 11 of this NAP. Like the emissions MRV system, the M&E system will rely on the institutional relationships between the MEAU, EMA and sectoral actors tasked with self-reporting. Both the MRV and M&E systems will comprise the National Climate Change Transparency System (NCCTS).

Institutional frameworks established under policies other than the NCCP shall consult with the CCMC Secretariat before establishing and undertaking adaptation action, to minimize duplication of effort and maximize synergies. This includes but is not limited to the National Council for Sustainable Development (NCSA) established under the NEP, and the Disaster Management Advisory Council (DMAC) established under the CDRM Policy Framework.

Towards holistic management of climate risks – including through adaptation – the GORTT has conceptualized a ‘*Strategic Programme for Climate Risk Management*’. This programme ascribes specific responsibilities to key governmental and civil society institutions. The role of and responsibilities for the institutions in this programme are presented in the following table.

Table 3 - Roles and responsibilities of various institutions in the strategic programme for climate risk management

ROLE	INSTITUTION	CLIMATE RISK MANAGEMENT RESPONSIBILITIES
Coordination of climate change risk management, mitigation MRV and adaptation M&E.	<i>Multilateral Environmental Agreements Unit, Ministry of Planning and Development</i>	<ul style="list-style-type: none"> • Coordinate review and implementation of NCCP • Coordinate the design and implementation of climate change risk management framework • Coordinate the development of climate change management legislation • Coordinate the NAP process and production of the NAP and NDCs • Coordinate development and implementation of a national MRV framework for mitigation and national M&E framework for adaptation • Coordinate GHG, mitigation, support, and adaptation data into the climate change KMS • Coordinates the CCFPN

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ROLE	INSTITUTION	CLIMATE RISK MANAGEMENT RESPONSIBILITIES
		<ul style="list-style-type: none"> • Develop, monitor and report on indicators for costs and losses associated with climate change • Serve as the National Focal Point and National Designated Authority for international frameworks related to climate change management • Provides oversight to NDC implementation, and NAP implementation
	<i>Ministry of Finance</i>	<ul style="list-style-type: none"> • Integrate climate change risk management into budget processes, including into the Public Sector Investment Programme (PSIP) and State Enterprise Investment Programme (SEIP) • Collate data and information on costs and losses associated with climate change • Input of cost and loss data into the national budget, financial planning processes, and the KMS • Coordinate and oversee climate change risk assessments and management across the financial sector
	<i>Tobago House of Assembly (THA)</i>	<ul style="list-style-type: none"> • Integrate climate change risk management into THA budget and operations • Develop, monitor, and report on indicators for THA costs and losses associated with climate change • Input of climate change impacts, costs, and losses for Tobago into KMS
Management of climate change risk, mitigation MRV and adaptation M&E	<i>Environmental Management Authority (EMA)</i>	<ul style="list-style-type: none"> • Integrate climate change risk management into the subsidiary legislation of the Environmental Management Act Chap. 35:05. • Host and manage the national climate change KMS • Ensuring quality control of the national GHG inventory system • Serve as the national implementing entity (NIE) accredited by the Green Climate Fund (GCF) • Serve as the operational entity to the Global Environment Facility • Develop, monitor, and report on indicators for climate resilience in terrestrial ecosystems & natural resources • Input of terrestrial data for MRV GIS • Produce national communications to the UNFCCC • Support public education, sectoral alignment and mainstreaming of climate change
	<i>Institute of Marine Affairs (IMA)</i>	<ul style="list-style-type: none"> • Integrate climate change risk management into the design and implementation of coastal zone management plans • Develop, monitor, and report on indicators for climate resilience in coastal ecosystems

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ROLE	INSTITUTION	CLIMATE RISK MANAGEMENT RESPONSIBILITIES
	<i>Office of Disaster Preparedness and Management (ODPM)</i>	<ul style="list-style-type: none"> • Provide coastal and marine data to the KMS • Undertake national and site-specific hazard mapping • Provide training to communities in managing climate change risk • Coordinate the development, execution, and periodic review of training exercises on climate change risk management targeting households, businesses, communities, and sectors • Coordinate the collection of data on costs, loss, and damage from natural disasters to infrastructure and human health • Coordinate the integration of climate change projections in building codes • Provide hazard mapping data to the KMS
	<i>Trinidad and Tobago Meteorological Services</i>	<ul style="list-style-type: none"> • Continuous monitoring and sharing of robust, high-quality climate data • Climate change research and projections for climate variability • Develop, produce, and disseminate climate risk products to each sector • Undertake education and awareness campaigns on climate change hazards and risks • Provide climate data, projections, and modelling to the KMS
	<i>Ministry of Public Utilities</i>	<ul style="list-style-type: none"> • Build capacity for climate change risk management within the energy sector and electrical utilities • Build capacity for climate change risk management within the water and wastewater sectors • Develop a list of critical infrastructure to be outfitted with emergency back-up solar panels and electrical storage facilities
Management of climate change risk, mitigation MRV and adaptation M&E	<i>Water Resources Agency (WRA)</i>	<ul style="list-style-type: none"> • Integrate climate change risk management into development and implementation of water resource management policy and plans • Develop, monitor, and report on indicators for climate resilience in water ecosystems • Input of water resources data into the KMS • Continuously monitoring and sharing robust and high-quality hydrological data to inform decision making • Make projections on water demand and water availability studies in the context of climate change • Conduct education and awareness programmes on climate variability and climate change impacts that affect water management • Support flood mapping and undertake flood early warning monitoring

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ROLE	INSTITUTION	CLIMATE RISK MANAGEMENT RESPONSIBILITIES
	<i>Ministry of Works and Transport</i>	<ul style="list-style-type: none"> Assess and manage climate change risks to critical infrastructure, assets, and properties Develop, produce, and disseminate guides on integrating climate change risks into the design of critical infrastructure, assets, and properties Coordinate the development, adoption, and implementation of Climate Resilient and Green Energy Building Codes Input of climate change impacts, costs and losses on critical infrastructure, assets, and properties into the KMS
	<i>Ministry of Health</i>	<ul style="list-style-type: none"> Assess and manage climate change risks to public health and health service delivery Assess and manage climate change risks to health infrastructure Develop, produce, and disseminate information on climate change risk to health sector Education and awareness on climate change risks to public health Input of climate change impacts, costs, and losses to the health sector into KMS
	<i>Ministry of Agriculture, Lands and Fisheries</i>	<ul style="list-style-type: none"> Assess and manage climate change risks to agriculture, fisheries, and food security Integrate climate change and disaster hazard maps into Spatial Information Management System (SIMS) and the KMS Provide education and awareness on climate change risks to farmers, fisherfolk, and aquaculturists Input of climate change impacts, costs and losses to the agriculture, fishery, and aquaculture sector into the KMS
Management of climate change risk, mitigation MRV and adaptation M&E	<i>Ministry of Rural Development and Local Government</i>	<ul style="list-style-type: none"> Assess and manage climate change risks to local government critical infrastructure and service delivery Integrate climate change risks into local level disaster management plans Develop, produce, and disseminate guides on integrating climate change risks into the design and construction of homes and commercial buildings Input of climate change impacts, costs and losses on local government and communities into KMS Coordinate the collection of data on costs, loss, and damage from climate change at the Municipal level Hazard mapping at the Municipal level using real time data as well as utilize indigenous knowledge

ROLE	INSTITUTION	CLIMATE RISK MANAGEMENT RESPONSIBILITIES
		<ul style="list-style-type: none"> • Coordinate plot level hazard and risk assessments to be filed with the Land Information System. • Continuous and ongoing training in climate change risk management and data collection
Support for climate change risk management, mitigation MRV and adaptation M&E	<i>Financial Services Sector</i>	<ul style="list-style-type: none"> • Utilize hazard mapping for mortgages, commercial loans, and insurance programmes • Develop products with incentives for climate adaptation and mitigation. • Develop and implement micro-finance and micro-insurance products that support the most vulnerable
	<i>Utility Companies</i>	<ul style="list-style-type: none"> • Integrate climate change risk management into the design and operation of utility infrastructure and operations
	<i>Town and Country Planning Division (TCPD)</i>	<ul style="list-style-type: none"> • Develop and implement a climate resilient building code • Integrate climate change risk management, hazard mapping and the climate resilient building code into the physical development application process
	<i>Non-Governmental Organizations (NGOs), and Community-based Organizations (CBOs).</i>	<ul style="list-style-type: none"> • Execute climate change education and awareness programmes that target the individual, household, and community levels, with special emphasis on at-risk and vulnerable groups • Build the climate change risk management capacity in local communities • Undertake resilience building and adaptation projects • Support the Monitoring and Evaluation of adaptation projects
	<i>Tertiary-level Education Institutions.</i>	<ul style="list-style-type: none"> • Develop and implement climate risk management accreditation • Conduct Training programmes on climate risk management
	<i>Regional and International Institutions.</i>	<ul style="list-style-type: none"> • Provide technical and financial support to adaptation efforts • Support project implementation

3.0 National Circumstances

3.1 Geographic

The twin-island Republic of Trinidad and Tobago is the southernmost island state in the Caribbean. Located northeast of Venezuela, and south of Grenada, the country is roughly between 10°N and 11.5°N (degrees North) latitude, and between 60°W and 62°W (degrees West) longitude. This also means that it shares maritime boundaries with Barbados to the northeast, and Guyana to the southeast. The country measures in at 5,128 square kilometres (1,979 square miles) and consists of two main islands, Trinidad and Tobago, along with numerous smaller landforms[♦]. Approximately 45.7% of its land surface is covered by primary and secondary forests, while the remaining 54.3% consists of various agricultural, residential, commercial, and industrial usage.^[43] Due to the movement of both the Caribbean and South American tectonic plates, several fault systems run across Trinidad, including the El Pilar Fault system, the Northern Range Fault, Central Range Fault, Darien Ridge, Los Bajos Fault and the Arima Fault.

Trinidad and Tobago, as a tropical island nation, has a corresponding climate, with distinct wet- and dry-seasons that are heavily influenced by the northeast trade winds. The island of Trinidad features three mountain ranges, the Northern Range, the Central Range, and the Southern Range, all of which determine the island's drainage and watershed patterns and provide most of the potable water that the nation consumes. Trinidad's seabed also contains an oil-bearing belt, and this underground hydrocarbon storage aids in giving rise to several mud volcanoes on the island. This supply of fresh crude oil also contributes to the formation of the largest natural deposit of pitch in the world, the 'Pitch Lake', in La Brea, Trinidad. The smaller island of Tobago features one prominent mountain range, the Main Ridge, that runs through the island's centre. Tobago's main marine feature is its coral plains which give rise to several coral reefs along its perimeter. These reefs are home to a variety of marine species, and contribute greatly to Trinidad and Tobago's biodiversity and tourism and fishing sectors.

3.2 Environmental

The tropical climate combined with its geological origins as a former part of South America results in a wide array of distinct physical environments and ecosystems. These include rivers, streams, mangrove forests, evergreen and deciduous forests, savannahs, beaches, seagrass beds and coral reefs. This diversity gives rise to

[♦] Gaspar, Grande, Monos, Chacachacare, Huevos, Little Tobago and St. Giles island.

robust biological diversity. Trinidad and Tobago boast of over 6000 species, with 78 confirmed endemics.^[43] Over the past decade, terrestrial and mangrove forest cover has increased.^{[43][44]} On the other hand, marshlands have been decreasing and the state of the country's freshwater systems are increasingly poor due to pollution and development activities.^[43] Marine ecosystems have seen a decline as well due to localized pollution and unsustainable harvesting, exacerbated by the effects of climate change.^{[43][45]}

Terrestrial forests have been valued at US\$2,195 per hectare per year for the ecosystem services they provide.^[46] Similarly, the environmental services provided by coastal ecosystems have been estimated to be US\$924 per hectare per year, providing as much as US\$49.6 million annually in protective services against the effects of climate change.^{[47][48]} Considering this, Trinidad and Tobago has made a concerted effort to implement ecosystem-based adaptation (EBA) and ecosystem-based disaster risk reduction (Eco-DRR) methodologies to improve biodiversity conservation and support local communities.^[49]

3.3 Economic

Due to the oil-bearing belt on the west coast, Trinidad and Tobago was able to achieve significant economic growth because of its energy industry since the early 20th century. The sector currently contributes as much as 36% of the country's annual gross domestic product (GDP) of approximately US\$24 billion.^{[50][51]} Notwithstanding, the country has registered negative 'real GDP' growth rates since 2014.^[52] This has been exacerbated by the on-going COVID-19 pandemic which has resulted in widespread contractions in all indices of 'real economic activity'.^[52] Reduced revenues and large COVID-19 driven expenditures have resulted in a fiscal deficit equivalent to roughly 10% of its GDP, bringing the country's debt-equivalent to almost 81% of its GDP.^[53]

3.4 Social

The population of Trinidad and Tobago is estimated at roughly 1.4 million persons with 4% (60,000 people) living in Tobago. It is estimated that roughly 70% of the population is located along the coastal zone, with population densities greater along the Western sides of both islands.^[54] In 2020, Trinidad and Tobago's total labour force was estimated to be 637,047 persons, with roughly 250,000 persons earning up to TT\$7000 per month.^{[55][56]} Trinidad is split into 14 Regional Corporations and municipalities, consisting of 9 regions and 5 municipalities, which have a limited level of autonomy. Tobago is administered by the Tobago House of Assembly.

3.5 Gender

In Trinidad and Tobago, most women have access to excellent healthcare, maternity services, and education. Approximately 74.5% of all girls and 71.2% of all boys in Trinidad and Tobago have some degree of secondary school education, while enrolment at the tertiary level is skewed towards women: 37% men and 63% women.^[57] However, these statistics are not directly transferred into the working environment.

In the formal labour market 51% of all women participate in comparison to 73.7% of all men. In every sector of employment and occupational group women comprise the majority of the unemployed and are paid less than men.^{[57][58]} Pay inequality, unfavourable working conditions, sexual harassment and unequal opportunities for upward mobility are common barriers for women entering the labour market, except when employed by the State.^[59] Gender-based violence is a persistent problem, with one in three women aged 15 – 64 having experienced some form of sexual or physical violence from an intimate partner in their lifetime.^[60] Despite these challenges, Trinidad and Tobago has in recent times experienced positive trends regarding women in authority. Women occupy 21% of leadership positions within Trinidad's 14 municipal districts: 32% of Parliamentary seats, and account for over 70% of the high-court judges.^{[57][58]} The country had its first female Prime Minister over the period 2010 – 2015 and has had a female President since 2018.

Trinidad and Tobago has a Gender Inequality Index of 0.324, making it a “medium to high” inequality country.^[57]

4.0 Rationale for Climate Change Adaptation

4.1 Climate Change Analysis and Projected Changes

4.1.1 Current Climate

Trinidad and Tobago’s overall climate is shaped by several interacting and counteracting forces, but its geographical position is a predominant factor. The country is close to the equator and its location places it within the zones of influence of the Inter-Tropical Convergence Zone (ITCZ), the North Atlantic Sub-Tropical High-pressure cell and the Tropical Atlantic Cyclone or Hurricane Belt which collectively contribute to the temperature, rainfall and wind regimes that are experienced on the twin-island republic. Key climate statistics for these parameters are presented in Table 4. The spatial pattern of rainfall is presented in Figure 2.

Figure 2 – Spatial distribution of rainfall in Trinidad and Tobago

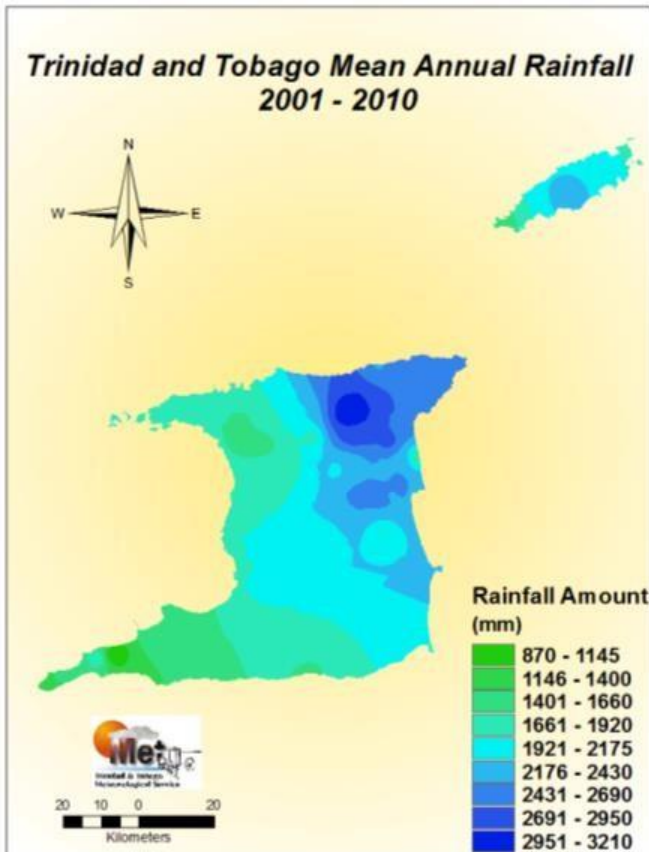


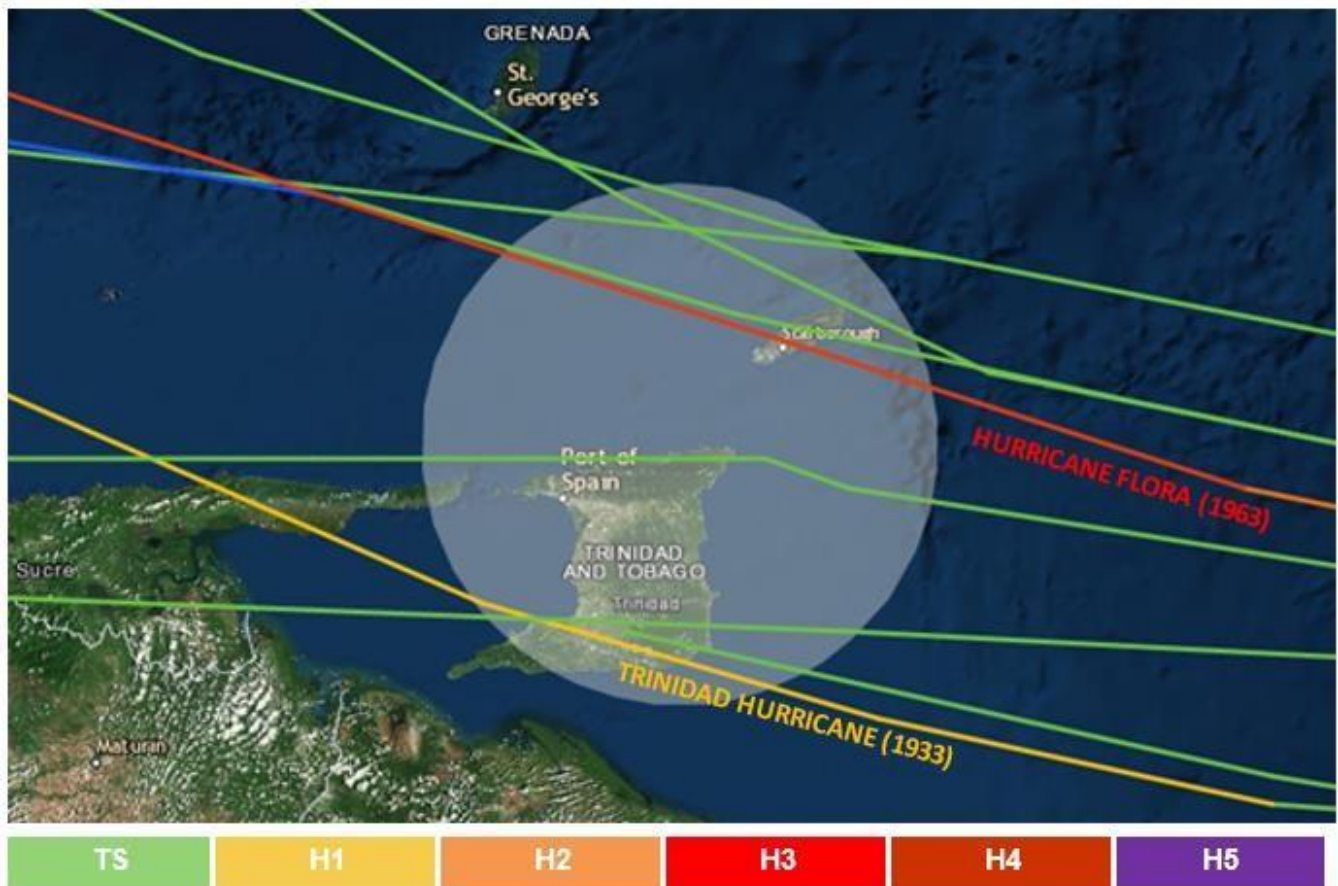
Table 4 – Key Climate Statistics for Trinidad and Tobago

TEMPERATURE [°C]	
Average Daily	26.5
Average Maximum	31.3
Average Minimum	22.7
RAINFALL [mm]	
Trinidad Average	2000
Tobago Central	3800
Tobago Coastal	1250
WINDSPEED [m/s]	
Annual Average	3.15
Wet Season Average	3.35
Dry Season Average	2.61

D Distinct dry and wet seasons, a characteristic of many other Caribbean territories, last from January through May and June through to December, respectively. Variances in temperature, rainfall and wind patterns are observed across seasons, due to meso- and macro-climatic determinants. Trinidad and Tobago also exhibit varied climates, conditioned by factors of land size, orography, elevation, orientation in terms of the trade winds and geographical location.

Due to its location at the southern border of the Tropical Atlantic Hurricane Belt, Trinidad and Tobago, is not as frequently affected by tropical disturbances and cyclone activity as its neighbours in the Eastern Caribbean. However, Tobago, the more northerly of the two islands, is more vulnerable to impacts than Trinidad. Figure 3 shows the tracks of historical systems passing directly over or near to Trinidad and Tobago between 1916 and 2015 (100 years).

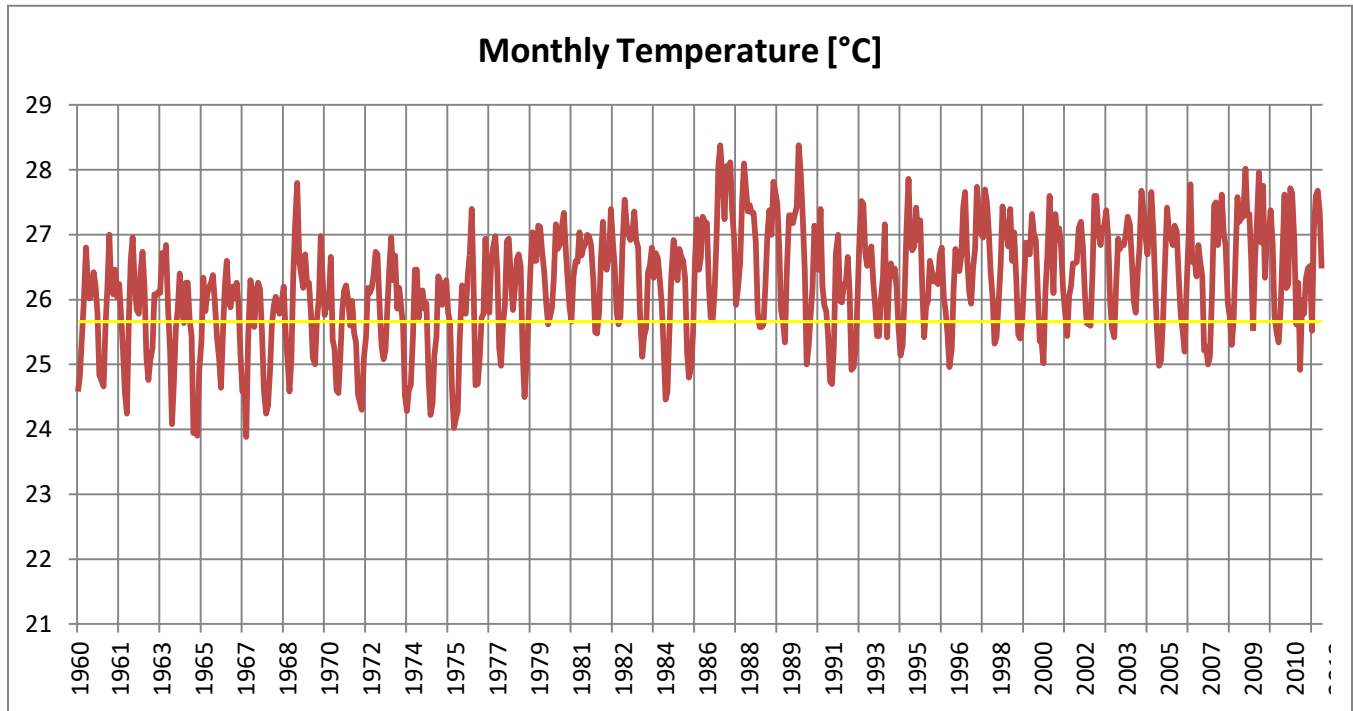
Figure 3 – Historical tracks of tropical cyclone systems relative to Trinidad and Tobago from 1916 – 2015



4.1.2 Historical Climate Trends

Observed data for Trinidad and Tobago indicate varied degrees of change in temperature and rainfall variables over the last half-century. Temperature recordings for Trinidad and Tobago exhibit an increasing trend averaging 0.27°C and 0.17°C per decade, respectively. The increase measured over the last three decades has been especially marked as shown in the figure below.

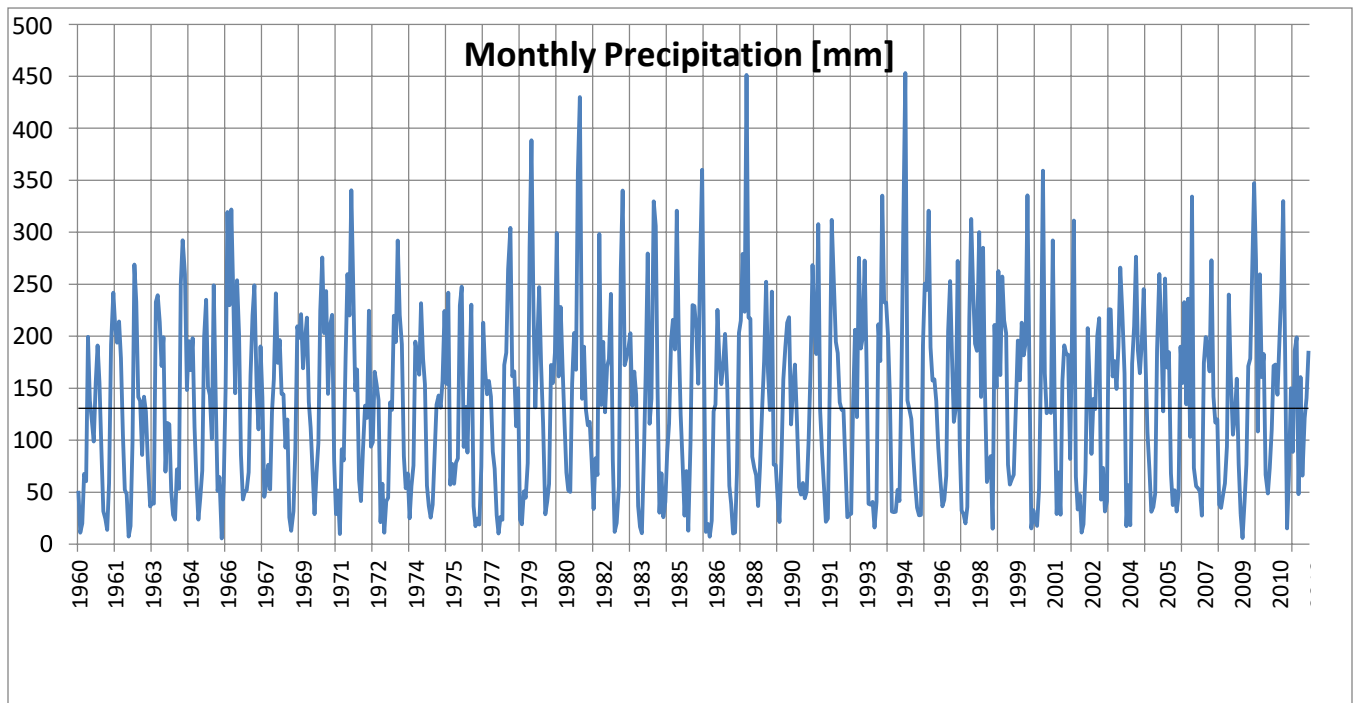
Figure 4 – Average monthly temperature in Trinidad and Tobago, 1960 – 2012.



Rainfall changes over the same period are less clear cut with more sporadic changes that vary both spatially and temporally. However, some key trends have been observed:

- a) Tobago’s rainfall data exhibits a declining trend when recent decades are compared to the 1969-1990 average.
- b) The highest values of one-day rainfall recordings have increased over the last two decades, occurring within the dry season.
- c) The highest number of extremely wet days recorded at Piarco for the last five decades were observed during the most recent 2001 – 2010 decadal period, lending to a possible trend of recent increase in intense, short-duration rainfall.
- d) Dry seasons in the drier, southern region of Trinidad have become 10% drier over the last century (1901-2010), based on gridded data records.

Figure 5 – Average monthly rainfall in Trinidad and Tobago, 1960 – 2012.



4.1.3 Projected Climate Trends

Projected climate trends have been assessed using General Circulation Models (GCM) and Regional Climate Models (RCM) outputs from climate modelling work recently conducted for Trinidad and Tobago as well as Caribbean regional data from the IPCC’s 5th Assessment Report.^{[61][62]} A summary of findings is presented below.

Figure 6 – Summary of projected climate change trends for Trinidad and Tobago until 2100

AIR TEMPERATURE	ANNUAL RAINFALL	MONTHLY RAINFALL	SEA SURFACE TEMPERATURE	SEA LEVEL RISE
↑	↓	+ 7mm ↕ - 40mm	↑	↑
2.4 – 3.6°C	22% - 30%		0.9°C – 3.1°C	75 – 126cm

Tidal gauging stations around the Caribbean reveal an increase in sea level rise (SLR) of about 1.5 mm – 3 mm per year. IPCC projections range between 0.18 to 0.56 m by 2100 under emissions scenarios A2, whilst alternative scenarios based on accelerating ice sheet melt indicate increases of up to 1.45 m.^[62]

4.2 Hazard Profile

Trinidad and Tobago, like most SIDS, are especially vulnerable to the effects of climate change because of their developing status, small physical size, low-lying coastal areas, low availability of resources, small but rapidly growing population and increasing pressures on natural resources, remoteness, susceptibility to natural disasters, excessive dependence on international trade and vulnerability to global developments.^{[63][64]} Data gathered by the ODPM has indicated that Trinidad and Tobago is susceptible to a variety of natural and anthropogenic hazards.^[65] Categories of hazards include, but are not limited to biological, industrial/technological, social/organizational, and environmental.^[65] Historically, the most frequent environmental hazards have been geological or hydrometeorological in nature – both of which must be understood and considered for robust CCA.

Trinidad and Tobago has benefited from multiple studies of its climate change hazards, vulnerabilities, risks and impacts. This chapter summarizes the information provided from the 2014 preliminary vulnerability assessment conducted by the ODPM;^[65] 2014 assessments on the economics of climate change adaptation conducted by the Inter-American Development Bank (IADB);^[2] 2019 national VCA conducted by the EU;^[66] and 2019 VCA on the coastal resources of Trinidad and Tobago conducted by the UNDP.^[67] Additional contemporary data has also been provided where possible.

4.1.1 Geological Hazards

A major fault line runs through the islands making it highly susceptible to seismic events.^[65] High-magnitude earthquakes are few and far between; however low magnitude tremors are felt as often as once per month. The UWI Seismic Research Centre estimates that roughly 280 earthquakes have been detected around Trinidad and Tobago annually since 1990, with less than 50 being greater than magnitude 3.5.^[68] Given the number of fault lines that run through urban areas, and the extent of development along the coast, earthquakes and corresponding liquidation and tsunami events are low-probability, high-impact hazards. The most recent earthquake of note was a 6.9 tremor in 2018 which caused damage to buildings throughout the country.^[68]

Seismic hazards have the potential to adversely impact physical adaptation and mitigation initiatives. Earthquakes may cause immediate physical damage to adaptive infrastructure while sea level rise (SLR) associated with climate change may exacerbate the impact of earthquake generated tsunamis.^[69] There is also evidence to suggest a correlation between global temperature rise and seismic activity, with glacial melt resulting in enhanced seismic activity globally due to “isostatic rebound” of tectonic plates.^{[70][71]}

4.2.2 Hydrometeorological Hazards

Due to its geographic location, tropical cyclones rarely make direct contact with Trinidad and Tobago. Historically, only 2 hurricanes and 5 tropical storms have affected Trinidad since 1850 while Tobago has experienced 21 tropical storms and 6 hurricanes since 1872. This makes tropical cyclones a low-probability, high-impact hazard.

Meteorological hazards are weather-related events such as flooding, lightning, landslides, tides, fires and high wind events. Excessive rainfall related hazards, *viz.*, landslips, riverine flooding and flash flooding, are especially frequent and problematic. During the period 2011-2014, Trinidad recorded 695 floods, 277 strong wind events and 179 landslides.^[72] Conversely, low-rainfall hazards in the form of meteorological drought occur with moderate frequency, several years apart and lasting several months. The most notable droughts in recent history occurred over the period 1997- 1998, 2002 – 2004, and 2009 -2010 with the last due to the average precipitation being reduced by 75%.^[2]

Hydrometeorological hazards are greatly exacerbated by projected climate change.^[64] These hazards have the potential to directly impact physical mitigation and adaptation initiatives as well as pervasively disrupt human health, livelihoods, and social networks. CCA efforts will primarily focus on building resilience against anticipated hydro meteorological hazards.

4.2.3 Hazard Ranking for Trinidad and Tobago

The GORTT recognizes that the threats presented by hazards are not uniform across communities, sectors, or islands. The vulnerability and adaptive capacity are highly localized and context driven. Nevertheless, through an inclusive, participatory process with sector experts, a national level appraisal of hazards was undertaken to broadly rank the hazards facing Trinidad and Tobago based on frequency, area of impact, and magnitude.^[66] The result of this assessment is presented in Table 5.

Table 5 – Hazard Ranking of selected hazards affecting Trinidad and Tobago

PRIORITY	HAZARD	FREQUENCY	AREA IMPACT	MAGNITUDE	POTENTIAL DAMAGE
1	Earthquake	3	3	3	18
2	Flooding	3	2	3	15

NATIONAL ADAPTATION PLAN FOR THE REPUBLIC OF TRINIDAD AND TOBAGO

3	Tropical Cyclone	2	2	3	12
3	Landslides	2	2	3	12
5	Tsunami	1	2	3	9
7	Pollution/ Contamination	3	3	1	6
8	Sea Level Rise	3	2	1	5
9	Coastal Erosion	2	2	1	4
9	Storm Surges	2	2	1	4
9	Saltwater Intrusion	2	2	1	4
10	Land subsistence	1	1	1	2
10	Ocean Acidification	1	1	1	2

***Notes:**

- Potential damage = (Frequency + Area Impact) x Magnitude
- Frequency was assessed on a 4-point scale: (0) No occurrences, (1) below average (2) average (3) above average.
- Area Impact was assessed on a 4-point scale: (0) No areas affected, (1) one community, no sensitive areas affected (2) one or more communities with sensitive areas affected (3) entire country affected.
- Magnitude was assessed on a 4-point scale: (0) No damages or disruptions (1) No major disruptions in the day-to-day activities, (2) physical and environmental damage, loss of property, minor injuries (3) death, loss of livelihoods, severe environmental degradation.

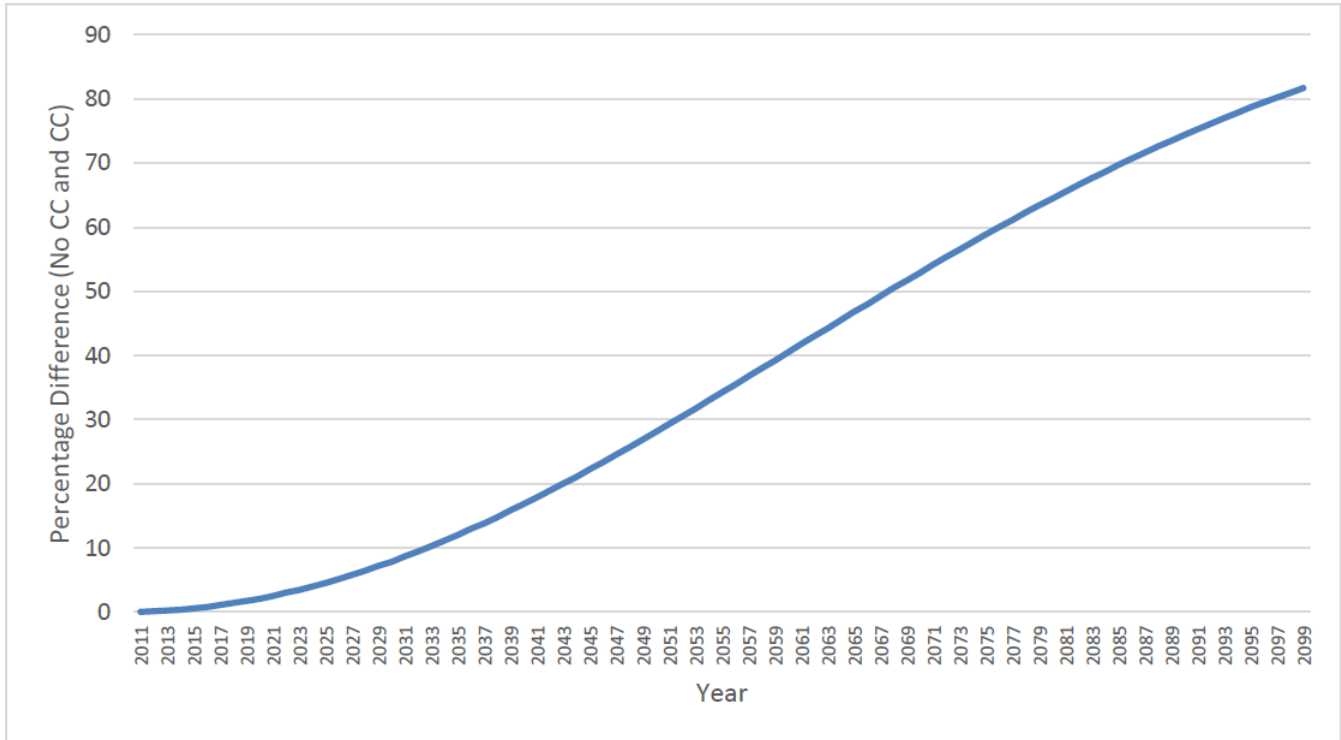
Adapted from: de Berdt Romilly, 2019 ^[66]

4.3 Sovereign Risk

Climate change represents a significant sovereign risk to Trinidad and Tobago. The observed and anticipated changes to Trinidad and Tobago’s climate adversely impact social and economic activity across a multitude of sectors, particularly those dependent on natural resources. Additionally, the anticipated effects promise to exacerbate the frequency and severity of natural hazards which pose a direct threat to Trinidad and Tobago’s environmental, social and economic assets. This creates an untenable situation in which the GORTT may be constrained in servicing its debts and serving public interests.

It has been estimated that unless adaptation measures to address the anticipated temperature increases are adopted, Trinidad and Tobago’s GDP would be reduced by 9% in 2030, 30% in 2050 and 82% by 2100.^[73]

Figure 7 – Percentage Difference in GDP per capita in “no climate change” and “climate change” scenarios.



Source: Clarke, 2019 ^[67] adapted from Burke et al., 2015 ^[73]

This does not consider potential losses that may occur from climate-change exacerbated natural disasters, which could also be significant. The historical impacts of natural hazards over the period 1933 – 2018 are presented in Table 6. In October 2018, Trinidad and Tobago experienced an unprecedented flooding event because of a series of weather ‘anomalies’ which led to an entire month’s worth of rain being released over 48 hours.^[74] This resulted in 80% of the country being affected by flash and riverine flooding which severed transportation routes, affected over 150,000 people, and caused an estimated US\$3.7 million in infrastructural damage.^[75] It is estimated that the aggregated cost of unmitigated damage from sea level rise and hurricanes to Trinidad and Tobago could exceed US\$12 billion by 2100.^[76]

Table 6 – Historical costs of hydrometeorological disasters in Trinidad and Tobago

NATIONAL ADAPTATION PLAN FOR THE REPUBLIC OF TRINIDAD AND TOBAGO

Year	Disaster type	Total deaths	Injured	Affected	Homeless	Total affected	Total damage ('000 US\$)
1933	Storm	13					3 000
1963	Storm	24					30 000
1974	Storm	2		50 000		50 000	50 00
1990	Storm			1 000		1000	
1993	Flood	5			10	10	70
1993	Storm						57
1996	Flood			200		200	
1997	Earthquake		2		15	17	25 000
2004	Landslide	2		1 200		1 200	
2004	Storm	1		560		560	1 000
2005	Storm						
2008	Flood	No data					
2009	Flood	No data					
2010	Drought						
2011	Flood	No data					
2012	Flood	No data					
2018	Flood			150 000		150 000	3 700

Source: *Fontes de Meira and Phillips, 2019* ^[75]

The decline in GDP along with increasing costs of disaster creates a macro-economic imperative for CCA. The following section details the specific vulnerabilities, risks and impacts faced by specific economic sectors.

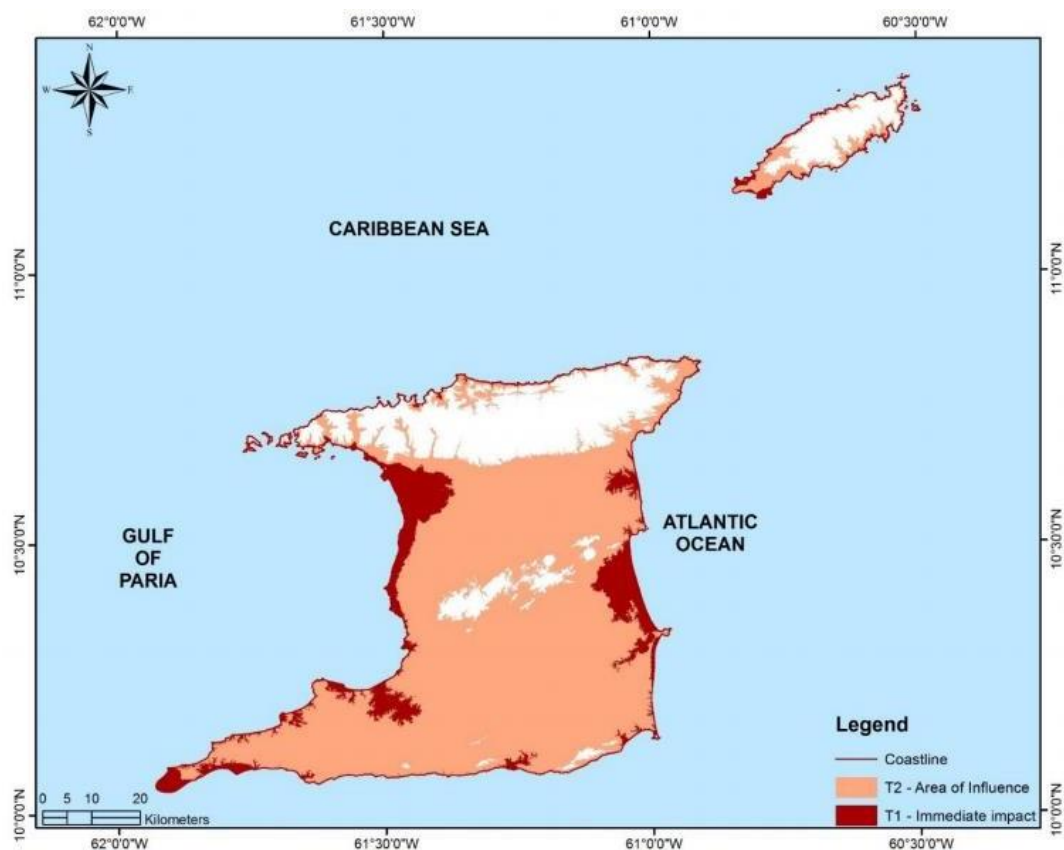
4.4 Sectoral Vulnerability, Risks and Impacts

4.4.1 Coastal Zone Resources

The GORTT considers its coastal resources to be the natural capital found within its coastal zone. This includes marine and coastal ecosystems, their ecosystem services and natural resources. Trinidad and Tobago's ICZM Policy framework defines the coastal zone as:

*“the geographical area covering both the maritime and terrestrial parts of the shore, including off-shore islands, salt-water ponds, and wetlands in contact with the sea. The coastal zone of Trinidad and Tobago shall mean all **areas of sea extending to the limit of the Exclusive Economic Zone (EEZ)** and includes the shoreline and coastal lands, which are **inland areas above the high-water mark that influence the quality or composition of coastal waters, or are influenced in some way by their proximity to coastal waters**” (Section 3, page 5) ^[36]*

Figure 8 – Terrestrial area within Trinidad and Tobago’s Coastal Zone



Source: GORTT, 2020 [36]

Such wide jurisdictional space not only covers a marine area 15 times larger than the country’s landmass but also encompasses the majority of Trinidad and Tobago’s surface area.^[36] Consequently, the ‘coastal resources sector’ intersects, protects and supports many other economic sectors including, but not limited to oil and gas, agriculture and fisheries, tourism, water resources, human health, biodiversity and transportation. It is estimated that within the coastal zone lies:

- 70% of the population and 80% of urban areas
- 80% of critical economic infrastructure and activities, including oil and gas
- 60% of small-scale economic activities that are significant to supporting human lives
- 50% of the country’s total roads and national transportation arteries
- 90% of tourist facilities and hotels
- Fisheries infrastructure responsible for 90% of annual production; and
- 81% of annual GDP activity^[77]

Oceans and coastal ecosystems are critical for their direct provisional benefits as well as their protective benefits across the entirety of Trinidad and Tobago’s economy. Trinidad and Tobago’s coastal zone and coastal resources are highly vulnerable to climate change. These impacts are expected to stem from rising temperature, decreased precipitation and SLR. Yet, maintaining healthy, functioning ecosystems is critical for maximizing their effectiveness in reducing human vulnerability and supporting adaptation to climate change. CCA in the coastal resources sector is critical for the GORTT’s thrust for a ‘blue economy’ centred on oceans as good business.^[78]

The risk assessment of Trinidad and Tobago’s coastal resources by the TWG is presented in Table 7. It was determined that the highest risk to this sector is from extreme weather events, resulting in damage and destruction of coastal infrastructure, fisheries infrastructure and equipment, coastal ecosystems and biodiversity and terrestrial ecosystems, agriculture, forests. However, it was believed that the probability in the short term is low.^[66]

Table 7 – Climate risks and impacts on the coastal resources sector

CLIMATE RISK	POTENTIAL IMPACT ON COASTAL RESOURCES SECTOR
Sea Level Rise	<ul style="list-style-type: none"> • The loss, damage, erosion or retreat of ecosystems • Coastal inundation leading to loss of fishery nurseries, freshwater ecosystems, agriculture and related saltwater intrusion
Sea Level Rise and Storm Surge	<ul style="list-style-type: none"> • Coastal and inland flooding leading to impact on freshwater ecosystems, agriculture, aquaculture and coastal infrastructure • Damage to fisheries infrastructure, vessels, gear, and equipment, leading to loss of earnings by fisher folk • Loss of habitat and destruction to nesting sites of migratory and other bird species • Loss of nesting sites for marine turtles • Disturbance and destruction of seagrass beds • Accelerated loss of beach sediment impacting beach fauna, tourism and land protection services
Variations in temperature (Air)	<ul style="list-style-type: none"> • Negative impact on forest biodiversity • Influence on sex ratio of turtle hatchlings • Spatial changes in biodiversity and species distribution
Increased GHG emissions leading to changes in Carbon Sequestration levels	<ul style="list-style-type: none"> • Increased ocean acidification leading to impacts on calcareous organisms and ecosystems • Increases in sea grass and forestry productivity
Variations in temperature (Sea surface)	<ul style="list-style-type: none"> • Increase in coral bleaching and death to coral reefs resulting in adverse impacts to fishery nurseries and coastal defences, leading to reduced ecotourism and income

CLIMATE RISK	POTENTIAL IMPACT ON COASTAL RESOURCES SECTOR
	<ul style="list-style-type: none"> • Reduction in dissolved oxygen concentration • Increase in algal blooms, planktonic concentration and variation in composition of these, leading to increased fish kills and incidence of food poisoning • Migration of pelagic species out of the region to cooler waters impacting upon viability of fisheries • Increases in sea grass and forestry productivity • Changes in growth and life cycle of biodiversity
Variations in precipitation (localized)	<ul style="list-style-type: none"> • Change in precipitation may affect fish catch and change behaviour of some commercially viable species such as fish schooling after rains, and mollusc reproduction. • Coastal erosion, flooding, inundation and pollution to nearshore water which can reduce shellfish quality. • Reduced salinity from excessive runoff with possible impact on estuarine and nearshore species • Reduction in beach and water quality • Increased risk of fungal and bacterial related diseases in biodiversity and proliferation of water and vector borne diseases • Changes in location of migratory species • Spatial changes in biodiversity leading to species distribution changes • Overall negative impacts on biodiversity, leading to shortfalls in the eco-tourism sector
Extreme Weather Events (intense precipitation)	<ul style="list-style-type: none"> • Flash flooding leading to increased runoff, coastal erosion, inundation and may in turn cause pollution to shellfish, increased instances of fish kills and food poisoning from coastal runoff, coastal infrastructure and fish landing sites • Reduced salinity from excessive runoff may affect estuarine and nearshore species
Extreme Weather Events (extreme heat)	<ul style="list-style-type: none"> • Increase in instances of heat related health issues for fisherfolk • Increase in instances of heat stress on biodiversity and disruption of breeding cycles • Hypersalinity of wetland ecosystems • Impacts on soil moisture, chemistry and productivity leading to negative impact on agricultural and soil biodiversity • Increase in instances of forest fires • Localized increase in sea surface temperature resulting in changes to dissolved oxygen concentration resulting in fish mortality • Drying out of small pools and ponds leading to die off in biodiversity

CLIMATE RISK	POTENTIAL IMPACT ON COASTAL RESOURCES SECTOR
Extreme Weather Events (likelihood of increase in category 4 and 5 hurricanes and change in hurricane tracks)	<ul style="list-style-type: none"> • Damage and destruction of coastal infrastructure, fisheries infrastructure and equipment, coastal ecosystems and biodiversity, terrestrial ecosystems, agriculture and forests. • Loss of life and injury to fisherfolk. • Short term negative impacts on beaches, coastal erosion, water quality. • Destruction or damage of genetic diversity and collections of interest such as the cocoa gene bank.
Increase in climate variability	<ul style="list-style-type: none"> • Changes in seasonally dependent biodiversity such as pollinators, birds, amphibians, reptiles and insects. • Increase in range and population of invasive species, pests, vectors and diseases. • Agricultural systems, productivity increases for some crops. • Negative impact on marine food chain.

Adapted from: de Berdt Romilly, 2019 [66]

4.4.2 Agriculture and Food Security

Trinidad and Tobago’s agricultural sector has shifted from an export-oriented industry to one geared towards meeting domestic demands to ensure food security. Currently only 10.5% of the total land area is categorised as agricultural land and the country is highly dependent on food imports. The decline of the agriculture sector especially in terms of real contribution to GDP, threatens the seeming relevance of the sector to the national economy and thus places it at a disadvantage in terms of investments. Crop production is affected biophysically by meteorological variables, including rising temperatures, changing precipitation patterns, increased atmospheric carbon dioxide (CO₂) levels, the availability of water resources and the anomalous presence of extreme events.

Key climate-related impacts already being observed include increased aridity of soils and decreased crop yields due to an increase in air temperature, salinization of soils and ground water due to coastal inundation as well as reduced availability of freshwater due to lower precipitation. Assessments indicate that by 2050 there will be a significant reduction in the area suitable for growing tomatoes due to changing climatic conditions, and though cocoa may be less affected by temperature precautions are necessary to ensure sufficient irrigation.^[79] Shifts in agroecological conditions by 2050 suggest that agricultural encroachment may occur on upland forested areas.^[79] For root crops, fisheries and vegetables combined, the cumulative loss under A2 is calculated as approximately

US\$ 352.8 million and approximately US\$ 270.8 million under B2 by 2050. This is equivalent to 1.37 % and 1.05 % of 2008 GDP under the A2 and B2 scenarios, respectively.^[80]

Projected climate change impacts are expected to negatively affect the agricultural sector nationwide, with more pronounced effect in the central to southern parts of Trinidad compared to other areas and Tobago.^[66] The vulnerability of agricultural systems globally and the continued reliance of Trinidad and Tobago on imports of staples such as wheat and maize coupled with declines in domestic agriculture is an important consideration for climate change planning.

The risk assessment of Trinidad and Tobago’s agriculture and fisheries sector by the TWG is presented in Table 8. It was determined that the highest risks from climate change are from sea level rise and storm surges with associated flooding and damage to fisheries infrastructure, fishing vessels, gear and equipment. Using the multi-criteria evaluation system, the impact of this risk was ranked as “high” with a “very high” ranking based on frequency and probability. The following communities were identified as those being most vulnerable to this risk^[66]:

1. Salybia/ Balandra.
2. Blanchisseuse.
3. Claxton Bay.
4. Charlotteville - Tobago.
5. Coastal and low-lying areas.

Table 8 – Climate risks and impacts on the agriculture and food security sector.

CLIMATE RISK	POTENTIAL IMPACT ON AGRICULTURE AND FOOD SECURITY
Sea Level Rise	<ul style="list-style-type: none"> • Destruction of nurseries and breeding grounds of commercial species via inundation and shoreline erosion. • Saltwater intrusion into marshlands and agricultural areas such as the Nariva Swamp which will reduce crop quality and change land productivity. • Loss of arable land near coastline due to erosion and inundation. • Increase in risk of flooding of landing sites and fisheries infrastructure. • Negative impact on coral reefs via changes in light penetration, productivity, temperature and species migration. • Gradual detrimental effects on crop production and food security. • Change in the type of species in swamp areas due to salinity changes.
Sea Level Rise and Storm Surge	<ul style="list-style-type: none"> • Damage to fisheries infrastructure such as fish landing sites. • Damage and loss of fishing vessels, gear, and equipment. • Increase in risk to human health, injury and death to farmers and fisherfolk. • Short term changes in migration of coastal fish species. • Short term damage to coastal nurseries and fish stocks. • Short term disruption of transportation of food and other resources between islands. • Increase in coastal erosion causing loss of coconuts and other products.

CLIMATE RISK	POTENTIAL IMPACT ON AGRICULTURE AND FOOD SECURITY
	<ul style="list-style-type: none"> • Short term disruption of food imports via marine transport. • Short term flooding of food processing and storage areas in lowland coastal areas.
Variations in temperature (Air)	<ul style="list-style-type: none"> • Increase in humidity negatively affecting aspects of food production • Increase in evapo-transpiration rates resulting in reduced water for irrigation • Reduced productivity of ecosystems due to lower stream flow • Reduction in nutritional profile of crops such as mangoes • Reduction in productivity and health of employees such as labourers and fisherfolk • Reduction in the diversity of crops that are heat tolerant • Increase in heat resilient pests and diseases • Increased soil aridity leading to lowered soil production • Reduced livestock production due to heat stress, water stress, mortality, biological contaminants and disease
Variations in temperature (Sea surface)	<ul style="list-style-type: none"> • Impact to spawning rates of fish species, variably depending on the species. • Atypical migrations of fish species • Increase of algal blooms and changes in plankton concentrations leading to fish kills and food poisoning • Coral bleaching and die off which affects nurseries and habitat
Variations in precipitation (localized)	<ul style="list-style-type: none"> • Disruption in production cycle from planting times and application of agrochemicals to bearing and reaping times • Reduced water run-off leads to reduced crop yields • Types of crop species will seasonally change • Disruption in agricultural practices and land use
Extreme Weather Events (intense precipitation)	<ul style="list-style-type: none"> • Intense flooding of agricultural lands and access roads with a negative impact on yields • Destruction of agriculture infrastructure, equipment, crops and processing plants • Increased risk of flooding and destruction by landslides to fisheries landing sites, storage and processing facilities. • Short term disruptions in food transportation. • Reduction in the supply and quality of locally produced agricultural products resulting in price increases in the short term.
Extreme Weather Events (extreme heat)	<ul style="list-style-type: none"> • Negative impact on livestock, dairy production and increase in mortality • Heat stress amongst agriculture workers and fisher folk • Increased crop mortality • Increased water stress for aquaculture • Increased water demand for irrigation • Increased incidence and variation of disease and pests • Structural collapse of agricultural sector and reliance on imports leading to an increase in the food import bill and loss of jobs
Extreme Weather Events (likelihood of increase in Category 4 and 5)	<ul style="list-style-type: none"> • Catastrophic destruction of crops, livestock and infrastructure • Catastrophic destruction of fisheries and aquaculture infrastructure as well as vessels, gear, and equipment

CLIMATE RISK	POTENTIAL IMPACT ON AGRICULTURE AND FOOD SECURITY
Hurricanes and change in hurricane tracks)	<ul style="list-style-type: none"> • Loss of revenue, life and employment in the Agriculture and Fisheries sector. • Increased payment to farmers and fisherfolk.
Increase in climate variability	<ul style="list-style-type: none"> • Disruption of production cycle • Increased pests and diseases • Increased in livestock mortality • Changes in microclimates in areas of agriculture production • Changes in viability of certain crops

Adapted from: de Berdt Romilly, 2019 ^[66]

4.4.3 Water Resources

There are 55 watersheds in Trinidad and 15 in Tobago. However, large scale development of surface water has been limited to just four rivers: the Caroni and Oropouche Rivers in Trinidad’s Northern Basin; the Navet River in Trinidad’s Central Range; and the Hillsborough River in Tobago, which is the principal source of supply for Scarborough and southwest Tobago.

Prior to 1981, 60 % of the total municipal water supply was provided by groundwater. After large surface water plants were constructed, such as the Caroni-Arena Pump Storage Complex and the North Oropouche Scheme, groundwater has accounted for only about 25 % of the total water supply of Trinidad. ^[66]

While the Water and Sewerage Authority (WASA) is the major abstractor of water resources, other users include industrial and agricultural facilities. Approximately 94.7 % of the population in Trinidad and 84.8 % in Tobago are connected to the piped water supply network. ^[66] A 24-hour supply is provided to only 16.6 % and 39.6 % of the population in the islands of Trinidad and Tobago, respectively. ^[66]

The quality of the surface water is deteriorating in many locations as evidenced by high levels of biological oxygen demand, bacterial content, turbidity and the presence of chemical pollutants in rivers. The main threats are uncontrolled point waste discharges, from industries and domestic sources, as well as the high level of erosion in the upper reaches of watercourses. Pollution of surface water not only affects the production of drinking water, but also the ability of the rivers to provide productive habitats for terrestrial and aquatic species.

Reduced freshwater supply has also been reported due to decreased rainfall and subsequent reduction in stream flow. Projections suggest an increase in intense rainfall events over shorter periods that will result in lower surface water quality and a reduction in the recharge of ground water due to increased runoff. Longer dry spells and drought events, coupled with warmer temperatures will increase the demand for agricultural irrigation, while affecting crop scheduling and increasing health impacts, coral bleaching and saline intrusion.

Given the climate risk factors to water resources, the increasingly warmer climate, frequency of intensifying cyclones, droughts and floods are of major concern. These factors also present varying degrees of challenges to developing adaptation strategies. The risk assessment of Trinidad and Tobago’s water resources sector by the TWG is presented in Table 9.

It was determined that the highest risks from climate change are from variations in localized precipitation resulting in a higher incidence of water contamination as pollution control systems are not designed to deal with increased pollution and sedimentation of water resources. Using the multi-criteria evaluation system, the impact of this risk was ranked as “high” with a “very high” ranking based on frequency and probability of occurring within the next 10 years. The TWG determined that the following communities are most vulnerable to this risk:

1. Caroni River Basin (15 watersheds).
2. South West Tobago.

Table 9 – Climate risks and impacts on the Water Resources Sector.

CLIMATE RISK	POTENTIAL IMPACT ON WATER RESOURCES SECTOR
Sea Level Rise	<ul style="list-style-type: none"> • Declining water quality due to salt water intrusion • Increased flooding around rivers affecting water supply and ecosystems • Increased risk to coastal water-related infrastructure e.g., septic tanks, water treatment plants and other facilities affected by erosion
Sea Level Rise and Storm Surge	<ul style="list-style-type: none"> • Increased flooding leading to negative impact on water pipelines and infrastructure • Increased risk to coastal water related infrastructure, including issues related to availability, accessibility and potential contamination • Changes in salinity of ecosystems which may affect mangroves and agriculture, in particular • Salt water intrusion into groundwater sources
Variations in temperature (Air)	<ul style="list-style-type: none"> • Increase in stress on water treatment plant processes resulting in the pollution of nearby water resources • Increased evaporation rates at reservoirs and rivers, reducing the available water supply and affecting ecosystem resilience
Variations in temperature (Sea surface)	<ul style="list-style-type: none"> • n/a
Variations in precipitation (localized)	<ul style="list-style-type: none"> • Changes in seasonality leading to changes in reservoir and river recharge or rain not falling in traditional areas such as where reservoirs are located, leading to challenges in water resource management and water supply • Higher incidence of water contamination as pollution control systems are not designed to treat with variations, resulting in increased pollution and sedimentation of water resources

CLIMATE RISK	POTENTIAL IMPACT ON WATER RESOURCES SECTOR
	<ul style="list-style-type: none"> • Increased conflict in water resource allocation and access • Reduced ability to rely on rainwater harvesting in areas where there is less rainfall and reduced adequacy and quality of storage in areas of high precipitation • Increased sedimentation in reservoirs and higher maintenance costs
Extreme Weather Events (intense precipitation)	<ul style="list-style-type: none"> • Flash flooding and related impact on floodplains resulting in the shutdown of water facilities, damage to water infrastructure, excessive sediment intakes and increased conflict in water resource allocation • Increased cost for providing water and finding alternative sources of water for supply • Significant changes in water quality due to sedimentation and breaches in the controls for other sources of contamination • Challenges in management of reservoirs as extreme precipitation may cause breaches due to higher volume collected than volume of storage capacity available as there are limitations with design
Extreme Weather Events (extreme heat)	<ul style="list-style-type: none"> • Increased evaporation rates at reservoirs and rivers resulting in less water available for distribution and affecting ecosystem resilience • Increased water demand from workforce, livestock, farmers, ecosystems • Changes to water cycle such as reduced infiltration, increased runoff, evapotranspiration and forest fires causing changes to water capture and ecosystems with the further potential for salt water intrusion and an increase in conflict
Extreme Weather Events (likelihood of increase in category 4 and 5 hurricanes and change in hurricane tracks)	<ul style="list-style-type: none"> • Damage, destruction and loss of functionality of water infrastructure including monitoring equipment and related management systems • Increased instance of pollution due to infrastructural damage and failures • Increased cost of recovery, retrofitting and replacement of damaged water infrastructure • Increased demand for potable water and water extraction licenses for truck borne and bottled water companies
Increase in climate variability	<ul style="list-style-type: none"> • Seasonality of water demand from farmers, dependent on growing seasons. • Seasonality of precipitation leading to variability in water demand and impacting water planning and management throughout the year. • Negative impact on aquatic ecosystem health.

Adapted from: de Berdt Romilly, 2019 ^[66]

4.4.4 Human Health

Human health is of paramount importance to the socio-economic state of the people of Trinidad and Tobago; and healthcare is provided through both public and private health facilities across the country.

The Caribbean region, including Trinidad and Tobago, has been plagued recently by mosquito-borne communicable diseases with outbreaks of Chikungunya in 2015 and Zika in 2016. The social sector investment

programme (2017) indicated that the number of laboratory-confirmed cases for Chikungunya and Dengue was 38 and 23 respectively as of July 2015 and Zika cases were 335 as of August 2016. There have been no endemic cases of malaria recorded in recent history as it is not endemic to Trinidad and Tobago. However, several imported cases of malaria are reported every year along with cases of local persons travelling to malaria endemic countries.

Epidemiological research has confirmed that outbreaks of Dengue fever are a rainy season phenomenon which may be exacerbated by warmer temperatures which have been observed ^[66]. As observed, increases in Dengue cases tend to follow an increase in both rainfall and temperature by about three weeks.

The impact of climate change on human health, especially for SIDS like Trinidad and Tobago, can be devastating. Although the island has a well-developed health system, the varying threats and the unpredictability with regard to timing and types of disease, and their relation to climate is hard to predict. Trinidad and other SIDS will face direct health impacts from heatwaves, floods, droughts and storms, as well as indirect impacts, such as changes in infectious disease patterns, pollution, malnutrition, mass migrations and conflicts.

It was found that in years with early warmer periods epidemics appeared to occur early. Direct effects include increased deaths/injuries from heatwaves among the elderly/infirm, the young, and outdoor workers, direct injury or death – from flooding, landslides or hurricanes; increase in hunger and malnutrition from crop failure and increased food prices, increase in respiratory morbidity and mortality from increased dust and ground-level ozone, psychological effects such as anxiety and depression from increasing insecurities and stress; increased coronary diseases from decreasing quality of life and resulting increased stress and trauma from permanent loss of homes from inundation through sea level rise or increased seasonal flooding or landslides. Indirect effects include increase in water-borne diseases, diarrhoeal diseases, vector-borne diseases such as Dengue (high risk); leptospirosis (high risk); Lyme disease; malaria (medium risk); and long term physical and psychological conditions resulting from disease and increasing insecurity of water, food and shelter.

The risk assessment of Trinidad and Tobago’s human health sector by the TWG is presented in Table 10. It was determined that the highest risks from climate change are from extreme weather events such as intense rainfall; increase in flash flooding leading to power supply interruption, injury, interruption of routine health service delivery and response. Using the multi-criteria evaluation system, the impact of this risk was ranked as “high” with a “very high” ranking based on frequency and probability of occurring within the next 10 years. Given the small size of Trinidad and Tobago the climate risks to public health apply to the entire country. However, the TWG identified the following communities as being especially vulnerable^[66]:

- | | | |
|--------------------|------------|------------------|
| 1. Tunapuna-Piarco | 4. Siparia | 7. Sangre Grande |
|--------------------|------------|------------------|

- | | | |
|----------------------------|------------------|-----------|
| 2. Penal - Debe | 5. Port-of-Spain | 8. Tobago |
| 3. Couva-Tabaquite-Talparo | 6. Diego Martin | 9. Mayaro |

Table 10 – Climate risks and impacts on the Human Health Sector.

CLIMATE RISK	POTENTIAL IMPACT ON THE HUMAN HEALTH SECTOR
Sea Level Rise	<ul style="list-style-type: none"> • Increased risk to structures in low lying land • Increased flooding in river systems and poor drainage such as in Las Lomas which suffers infrastructure damage and vector borne disease • Increased risk to transportation infrastructure and access for health service delivery in certain areas • Changes to salinity of environmental biomes and water resources for human and biodiversity consumption • Changes in time and range of disease vectors due to changes in inundation patterns and other related features • Increase in stress and mental health issues along with physical implications of these due to changes in environment
Sea Level Rise and Storm Surge	<ul style="list-style-type: none"> • Risk to transportation infrastructure, electricity, water and access for health service delivery in certain areas • Increased risk to water quality and waste disposal which impacts spread of diseases via overflowing sewage tanks and related spread of contaminated matter • Increased instance of injury, death and spread of disease. • Runoff impeded by SLR and storm surges leading to spread of disease from stagnant water • Increase risk to agriculture and livestock, vermin and domesticated animals and related spread of diseases • Disruption to marine transport of food and medical supplies • Disruption of electrical supply resulting in health impacts such as inability to boil potentially contaminated water or not having cold storage, heat stroke, and deteriorated conditions for storage of vaccines and blood supply
Variations in temperature (Air)	<ul style="list-style-type: none"> • Sewage treatment negatively impacted by temperature increase • Increase in vector activities and biospheres in which they proliferate • Increase in instances of respiratory illness and diseases • Increased stress in managing heat for workplaces and impact on workers both indoors and outdoors
Variations in temperature (Sea surface)	<ul style="list-style-type: none"> • Negative impact on coral and other marine environments impacting food security and in turn nutrition • Increase in frequency of algal blooms; increasing incidence of food poisoning
Variations in precipitation (localized)	<ul style="list-style-type: none"> • Potential negative impact on farmers and related food security leading to negative health impacts • Increase in number of potential breeding sites and range of vector and water borne diseases

CLIMATE RISK	POTENTIAL IMPACT ON THE HUMAN HEALTH SECTOR
Extreme Weather Events (intense precipitation)	<ul style="list-style-type: none"> • Increase in flash flooding leading to power supply interruption, injury, interruption of routine health service delivery and response • Expansion of vulnerable areas and communities, increasing the number of persons requiring health intervention and services • Strain on human resources, support services, financial and physical resources during response activities • Strain on health service planning and management
Extreme Weather Events (extreme heat resulting in drought)	<ul style="list-style-type: none"> • Increased instances of drought affecting local food security and higher food prices impacting health and nutrition. • Water quantity and quality challenges during extreme dry seasons and related restrictions. • Increased instances of bushfires leading to death, injury, respiratory disease, loss of food security, wildlife, movement of vectors, vegetation change and local food production loss. • Increased instances of dry conditions exacerbating respiratory disease. • Increased incidence of heat waves and dehydration and related heat stress on workers.
Extreme Weather Events (likelihood of increase in category 4 and 5 hurricanes and change in hurricane tracks)	<ul style="list-style-type: none"> • Health infrastructure damages, compromised health service delivery and related costs • Strain on workforce and access; availability of security, vaccines and blood; overstretched capacity of healthcare sites, dilemma of warded patients vs. emergency cases • Inadequate emergency response capacity, problem of access to and supply of safe food, water and medical supplies to facilities and public • Impacts to mental health and stress of workers and the public • High incidence of death and injury • Displacement of population and related outbreaks of violence, crime and communicable diseases • Increased risk due to public's complacency, dependence on the State and lack of preparedness and sense of risk which leads to increased exposure and vulnerability to risk
Increase in climate variability	<ul style="list-style-type: none"> • Local food production and related food security and lifestyle diseases • Economic impact on tourism with a spill-over effect on health service delivery and resources • Impact on planning of health infrastructure and health service delivery

Adapted from: de Berdt Romilly, 2019 ^[66]

4.4.5 Biodiversity

Trinidad and Tobago's biodiversity includes an abundance of species and ecosystems.^[43] Ecosystems include forest ecosystems; inland freshwater systems (rivers and streams); coastal and marine ecosystems (*viz.*, coral reefs, mangrove swamps, seagrass beds and open ocean); savannas; karst landforms (including caves); and

Man-made/induced systems (such as secondary forests, agricultural lands and freshwater dams). The services provided by these systems support human well-being in direct and tangible ways such as through the provision of freshwater, forest products and fisheries. These systems also offer indirect benefits in the form of regulatory services, supporting services and cultural services.^{[35][43]}

The risk assessment of Trinidad and Tobago’s terrestrial/coastal biodiversity sector by the TWG is presented in Table 11. It was determined that the highest risk from climate change to this sector is from extreme weather events resulting in damage and destruction of coastal infrastructure, fisheries infrastructure and equipment, coastal ecosystems and biodiversity and terrestrial ecosystems, agriculture, forests. However, using a multi-criteria evaluation system, the impact of this risk was ranked as “very low to low” with a “very low” ranking based on frequency and probability of happening within the next 10 years.

Table 11 – Climate risks and impacts on the Terrestrial Biodiversity Sector.

CLIMATE RISK	POTENTIAL IMPACT ON THE TERRESTRIAL/COASTAL BIODIVERSITY SECTOR
Sea Level Rise	<ul style="list-style-type: none"> • The loss, damage, erosion or retreat of ecosystems • Coastal inundation leading to loss of fishery nurseries, freshwater ecosystems, agriculture and related saltwater intrusion
Sea Level Rise and Storm Surge	<ul style="list-style-type: none"> • Coastal and inland flooding leading to impact on freshwater ecosystems, agriculture/aquaculture, coastal infrastructure • Damage to fisheries infrastructure, boats, landing sites, leading to loss of earnings by fisherfolk • Loss of habitat and destruction to nesting sites of migratory and other bird species • Loss of nesting sites for marine turtles • Disturbance and destruction of seagrass beds • Accelerated loss of beach sediment impacting beach fauna, tourism and land protection services
Variations in temperature (Air)	<ul style="list-style-type: none"> • Negative impact on forest biodiversity • Influence on sex ratio of turtle hatchlings • Spatial changes in biodiversity and species distribution
Variations in temperature (Sea surface)	<ul style="list-style-type: none"> • Increase in coral bleaching and death to coral reefs resulting in adverse impact on fishery nurseries and coastal defences, leading to reduced ecotourism and income • Reduction in dissolved oxygen concentration • Increase in algal blooms and planktonic concentration and composition leading to increased fish kills and incidence of food poisoning • Migration of pelagic species out of the region to cooler waters impacting upon viability of fisheries • Increases in sea grass and forestry productivity • Changes in growth and life cycle of biodiversity

CLIMATE RISK	POTENTIAL IMPACT ON THE TERRESTRIAL/COASTAL BIODIVERSITY SECTOR
Variations in precipitation (localized)	<ul style="list-style-type: none"> ● Change in precipitation may affect fish catch and change behaviour of some commercially viable species such as fish schooling after rains, and mollusc reproduction. ● Coastal erosion, flooding, inundation and pollution to nearshore water which can reduce shellfish quality ● Reduced salinity from excessive runoff may affect estuarine and nearshore species. ● Reduction in beach and water quality ● Increased risk of fungal and bacterial related diseases in biodiversity and proliferation of water and vector borne diseases ● Changes in location of migratory species ● Spatial changes in biodiversity leading to species distribution changes
Increased GHG emissions leading to changes in Carbon Sequestration levels	<ul style="list-style-type: none"> ● Increased ocean acidification leading to impacts on calcareous organisms and ecosystems like shellfish and viability of oceans to sustain marine life ● Increases in sea grass and forestry productivity
Extreme Weather Events (intense precipitation)	<ul style="list-style-type: none"> ● Flash flooding leading to increased runoff which in turn may cause coastal erosion, flooding, inundation and pollution to shellfish, increase instances of fish kills and food poisoning from coastal runoff, coastal infrastructure and fish landing sites. ● Reduced salinity from excessive runoff may affect estuarine and nearshore species.
Extreme Weather Events (extreme heat)	<ul style="list-style-type: none"> ● Increase in instances of heat related health issues for fisherfolk ● Increase in instances of heat stress on biodiversity and disruption of breeding cycles ● Hypersalinity of wetland ecosystems ● Impacts on soil moisture, chemistry and productivity leading to negative impact on agricultural and soil biodiversity ● Increase in instances of forest fires ● Localized increase in sea surface temperature resulting in changes to dissolved oxygen concentration resulting in fish mortality ● Drying out of small pools, ponds leading to die-off in biodiversity
Extreme Weather Events (likelihood of increase in category 4 and 5 hurricanes and change in hurricane tracks)	<ul style="list-style-type: none"> ● Damage and destruction of coastal infrastructure, fisheries infrastructure and equipment, coastal ecosystems and biodiversity, terrestrial ecosystems, agriculture and forests ● Loss of life and injury to fisherfolk ● Short term negative impacts on beaches, coastal erosion, water quality ● Destruction or damage of genetic diversity and collections of interest such as the cocoa gene bank
Increase in climate variability	<ul style="list-style-type: none"> ● Changes in seasonally dependent biodiversity such as pollinators, birds, amphibians, reptiles and insects. ● Increase in range and population of invasive species, pests, agricultural systems, agricultural productivity increase in vectors and diseases.

CLIMATE RISK**POTENTIAL IMPACT ON THE TERRESTRIAL/COASTAL BIODIVERSITY SECTOR**

- Impact on marine food chain and ecology.

Adapted from: de Berdt Romilly, 2019 ^[66]

4.4.6 Infrastructure and Human Settlements

For administrative purposes, Trinidad is now typically divided into fourteen (14) municipalities and Tobago into seven (7) parishes. In Trinidad and Tobago, areas are classified as urban or rural based primarily on the population density per square kilometre. By this standard, 71% of the population lives in urban areas, while the remaining 29% reside in smaller rural villages and towns. Settlement patterns show a marked concentration of urban settlements in the western half of Trinidad, and the south-west of Tobago. A large proportion of Trinidad's population is concentrated in urbanised regions of the East/West and North/South Corridors. This contrasts with eastern Trinidad and the southwest peninsula which are relatively sparsely populated. In Tobago, the lowest population is found in the north-east.

Trinidad and Tobago does not yet have a formal inventory of critical facilities, therefore specific conclusions on vulnerability cannot be drawn.^[65] However, it is understood that critical facilities exist within the area of influence of the coastal zone, and as such may be vulnerable to SLR, flooding and tropical cyclone events. Settlements in high-risk zones are those found on marginal lands such as hillsides, flood plains and surrounding industrial areas.^[66] Growing development on reclaimed land in Port of Spain and Point Lisas is also a concern, as these settlements are at high risk for seismic hazards and are particularly susceptible to the hazard of liquefaction. Studies have found that many of the settlements established on high-risk zones have traditionally been low-income squatter settlements, where homeowners have not received building approval. Such informal settlements typically feature poorly constructed buildings, have little or no access to basic amenities, proper sewage facilities and mechanisms for risk transfer.

The risk assessment of Trinidad and Tobago's infrastructure and human settlements sector by the TWG is presented in Table 12. It was determined that the highest risks from sea level rise and storm surge are: damage to access roads and major roads and transportation links like marinas, ports, jetties and sea defences and offshore industrial, residential infrastructure, utilities, industrial facilities and plants including sewerage. The highest risks from intense rainfall events were found to be flash flood damage to bridges, roads, residential and commercial properties, utilities, access, services, critical infrastructure, cultural historical buildings and recreational structures along with impacts on sewage and garbage management and infrastructure. Using the multi-criteria evaluation system, the

impact of this risk was ranked as “high” with a “very high” ranking based on frequency and probability that it will happen within the next 10 years. The TWC identified the key areas that were vulnerable to damage of access roads and major roads and transportation links like marinas, ports, jetties and sea defences and offshore industrial, residential infrastructure, utilities, industrial facilities and plants including sewage. These areas are:

- | | |
|-------------------------------------|-------------------------------|
| 1. Guayaguayare/ Mayaro/ Manzanilla | 4. Penal |
| 2. Sangre Grande/ Toco/ Matelot | 5. Roxborough/ Charlotteville |
| 3. Oropouche (Mosquito Creek) | 6. Cap-de-ville |

Specific areas vulnerable to flash flood damage to bridges, roads, residential and commercial properties, utilities, access, services, critical infrastructure, cultural historical buildings and recreational structures as well as on sewage and garbage management and infrastructure were identified as follows:

- | | |
|-----------------------------|----------------------|
| 1. Penal/ Debe/ Barrackpore | 3. Port-of-Spain |
| 2. Caroni Central. | 4. Mafeking/ Mayaro. |

Table 12 – Climate risks and impacts on the infrastructure and human settlements sector.

CLIMATE RISK	POTENTIAL IMPACT ON THE INFRASTRUCTURE AND HUMAN SETTLEMENTS SECTOR
Sea Level Rise	<ul style="list-style-type: none"> • Increase in flooding of coastal settlements and infrastructure and other low-lying areas/ flood plains
Sea Level Rise and Storm Surge	<ul style="list-style-type: none"> • Damage to access roads and major roads and transportation links like marinas, ports, jetties and sea defences, and offshore industrial, residential infrastructure, utilities, industrial facilities and plants including sewage. • Flooding causing agricultural damage and loss of access and transportation of resources such as goods and services
Variations in temperature (Air)	<ul style="list-style-type: none"> • Costs will increase for cooling and refrigeration • Reduction in efficiency of sewage treatment plants
Variations in temperature (Sea surface)	<ul style="list-style-type: none"> • Substantial coastal damage due to loss of coral defences • Increased instance of flash flooding from precipitation causing damage to infrastructure and human settlements • Negative impact on the viability of fishing communities due to migration of fish stocks and increased instances of invasive species
Variations in precipitation (localized)	<ul style="list-style-type: none"> • Increase in runoff and localized flooding events, landslides and coastal erosion causing damage to infrastructure and access roads • Affects availability of water for human activities and location of human settlements such as agriculture and access to water • Negative effect on tourism industry, support services and water infrastructure. • Increased outbreaks of mold in buildings and increased costs of HVAC unit cleaning

CLIMATE RISK	POTENTIAL IMPACT ON THE INFRASTRUCTURE AND HUMAN SETTLEMENTS SECTOR
Extreme Weather Events (intense precipitation)	<ul style="list-style-type: none"> • Damage to coastal sewage treatment plants impacts on human health • Flash flood damage to bridges, roads, utilities, residential and commercial properties, utilities, access, services, critical infrastructure, cultural historical buildings and recreational structures and Impacts on sewage and garbage management and infrastructure • Increase in water and vector borne diseases causing loss of viability of services and functionality of buildings and infrastructure. Increased costs of providing water and sewage services • Undermining of land use and construction options in vulnerable areas prone to flooding and landslides such as cemeteries and cremation sites and may exacerbate flooding events or cause them in new areas
Extreme Weather Events (likelihood of increase in category 4 and 5 hurricanes and change in hurricane tracks)	<ul style="list-style-type: none"> • Increase in destruction and damage of buildings and infrastructure and offshore petroleum structures • Increased instance of migration to less vulnerable areas • Disruption of essential services to communities • Extreme increase of waste and debris at dumps which increases stress on garbage collection services and infrastructure • Demand for hurricane resistant infrastructure and change in buildings, architecture and technologies to resist hurricanes such as green resilient housing
Increase in climate variability	<ul style="list-style-type: none"> • Seasonality of construction such as wet and dry season inconsistency with increased cost of maintenance and rebuilding • Drainage and pooling of water on major roadways

Adapted from: de Berdt Romilly, 2019 ^[66]

4.4.7 Financial Services

The financial services sector encompasses finance, insurance and real-estate. The commercial banking industry has been the primary driver for growth in this sector and plays a critical role in climate-related financing and investment into. Given that credit-risk management is essential to business, understanding how climate change will impact or enhance their client portfolios is essential. Likewise, understanding the economic risks associated with the effects of climate change is of major importance to the insurance industry. However, there has been no systematic collection of data and information concerning costs and losses associated with climate change which is urgently needed to manage financial and economic risks resulting from flooding and other extreme events associated with climate change.

It was clearly identified that the financial services sector is cross cutting, and if impaired, would have adverse consequences in other sectors adapting and recovering from the effects of CCA. The dearth of information

connecting climate change risks and financial services is a major impediment to the sector and represents a key vulnerability. It was also noted that the entire Caribbean is also grouped with Florida and neighbouring states for reinsurance purposes. This means that damage and losses incurred in these states and neighbouring territories, will affect insurance rates in the Caribbean although the Caribbean may not have been directly impacted. Given the threat of climate change to sovereign debt and personal livelihoods, the financial services sector has established some mechanisms to offer disaster protection at the national scale, such as sovereign risk insurance, and personal scale, such as individual flood insurance. Still, as of January 2021, the country's penetration rate for general insurance, which includes protection of assets from environmental hazards, stands at just 1.8% of GDP – roughly the same as it was in 2013.^{[81][82]} The potential loss and associated recovery costs represents another risk to the financial services sector.

The TWG on financial services was not able to connect the expected climate risks to potential impacts on their facilities or operations. Notwithstanding, proposals for CCA were made based on the following understandings by the TWG:

- a. Climate change will increase costs for the financial sector if no action is taken. Banks and investors in particular need a clear regulatory framework on climate policy which they can adapt and base their investment and lending decisions on, while insurers face the prospect of heavy losses.
- b. The financial sector is well placed to prepare itself for the negative effects that climate change may have on its business and on its customers; and to significantly help mitigate the economic risks and enter the low-carbon economy by providing appropriate products and services.
- c. The financial services sector is well placed to:
 - Engage with company management to understand how climate change is impacting their business and what strategies they are employing to minimize its risks or maximize opportunities;
 - Educate clients about the benefits and processes being used to incorporate extra-financial issues in the management of their assets;
 - Evaluate their client portfolios for climate change risks and opportunities to be able to respond to changes in climate change policy and legislation; and
 - Request and reward external research providers, such as brokers, to produce consistent, high quality, long term research, which incorporates extra-financial issues such as climate change and to integrate such issues into their mainstream analysis and investment decisions, by utilizing in-house or external SRI expertise.

- d. New science needs to be integrated with financial models to allow better evaluation of investments most at risk.
- e. To adapt their own operations to the new challenge, financial services companies should include climate change risk in their internal governance procedures, in line with existing financial corporate risk identification, controlling and reporting structures and best practice in reporting requirements.
- f. Renewable energy technology and carbon capture and storage attract major investment with enormous growth opportunities.

5.0 Trinidad and Tobago's Approaches to Adaptation and Delivering Climate Resilience

5.1 Purpose of the NAP

5.1.1 Trinidad and Tobago's Adaptation Vision

Arising from the National Climate Change Policy, the adaptation from this vision is:

“A climate-resilient nation that routinely evaluates and reduces its physical, social and economic vulnerability through timely, cost-effective adaptation measures.”

5.1.2 Trinidad and Tobago's Adaptation Mission

In congruence with the GORTT's obligations under the UNFCCC and its Paris Agreement, as well as national policies on the environment and development, the Mission of this NAP is:

“To enhance the adaptive capacity of all sectors while simultaneously contributing to sustainable development and building long-term resilience to the effects of climate change.”

5.1.3 Trinidad and Tobago's Adaptation Objectives

Adaptation actions will be taken towards the following mutually interactive objectives:

- I. Understanding the national development context and synthesizing available information, resources, programmes, projects, stakeholders, gaps and needs regarding adaptation.
- II. Enhancing capacity to analyse and understand climate change scenarios and risks.
- III. Defining and strengthening governance arrangements for adaptation action.
- IV. Identifying and executing adaptation strategies and actions that address immediate climate impacts to human and natural systems
- V. Ensuring that adaptation pathways are sustainable, cost-efficient, inclusive and considerate of the most vulnerable.
- VI. Communicating climate risk and adaptation information to all stakeholders and international entities, as required.
- VII. Continuously monitoring, evaluating, reporting, improving and learning from adaptation efforts.

5.1.4 Trinidad and Tobago's Adaptation Principles

This NAP adds to the library of national policies and plans used to guide sustainable development. All the activities undertaken towards its production were guided by the principles contained within the country's overarching policies on climate change, such as: The National Climate Change Policy, National Development Strategy, and National Environmental Policy. Likewise, actions occurring because of the implementation of this NAP shall be in accordance with the principles of these critical national documents.

In addition to these overarching principles, the GORTT recognizes that climate change adaptation calls for specific, flexible guidance to ensure equitable and effective implementation. To this end, the GORTT commits that adaptation action at the national level shall:

1. Prioritize “no regret”, “low regret” and “win-win strategies”.

The GORTT shall firstly prioritize “no regret” options which do not involve hard ‘trade-offs’ with other policy options and which are cost-effective under present and future climate scenarios. Secondly, it shall prioritize “low-regret” options which have relatively low costs compared to large benefits under future climate scenarios. Finally, “win-win” options which yield adaptation benefits and co-benefits regarding mitigation and sustainable development will be preferred. High-cost, high-emission options shall be avoided as far as practicably possible.

2. Be participatory and inclusive of all genders and socio-economic groups.

Adaptation efforts are most effective and efficient when informed, led and executed at the local scale by those who benefit directly from the adaptation effort. Thus, the development of adaptation measures shall be done through participatory processes. As far as possible and appropriate, implementation and monitoring shall be community-based. Adaptation action shall be gender-sensitive and inclusive of vulnerable and/or under-represented groups such as women, youth and the elderly.

3. Be evidence-based.

The appraisal of adaptation options and their effectiveness shall be done in an evidence-based manner. Evidence shall be obtained through the best available science and, as appropriate, traditional and indigenous knowledge. The GORTT recognizes the great uncertainties that exist around long-term climate projections and reaffirms its commitment to supporting action in the absence of absolute scientific certainty in keeping with the “*precautionary principle*”.

4. Be dynamic to allow for learning and innovation to suit the local context.

A pathways approach to adaptation, informed by local contexts and anticipated risks, will be used to ensure that maximum flexibility is kept. Reiterative cycles of learning will inform pathway changes.

5. Demonstrate transparency, efficiency and integrity

Adaptation options shall be developed, prioritized, funded, managed and executed in a manner that demonstrates transparency, efficiency. Implementation plans shall be monitored. Allocation of funding shall be done in a transparent manner. Mechanisms shall be established to address grievances and provide redress.

6. Avoid damage

Aligned with its nationally established principles of “*prevention*”, “*inter-generational and intra-generational equity*” and “*responsibility to avoid transboundary harm*”, adaptation options that cause in-situ damages, transboundary harm, or potentially non-retractable harm to future generations shall be avoided.

7. Harmonize with national planning and development.

Adaptation shall complement national planning and development strategy. The NAP shall be incorporated into national budgeting, planning and development processes to ensure long-term resilience building. This ensures national ownership of the NAP.

8. Leave no one behind.

Adaptation options shall, as far as practicably possible, create economic opportunities for the most economically vulnerable in society. The GORTT shall pursue adaptation strategies that protect the physical, psychological, social, environmental and financial stability of those most vulnerable to the effects of climate change.

9. Build capacity and enhance resilience.

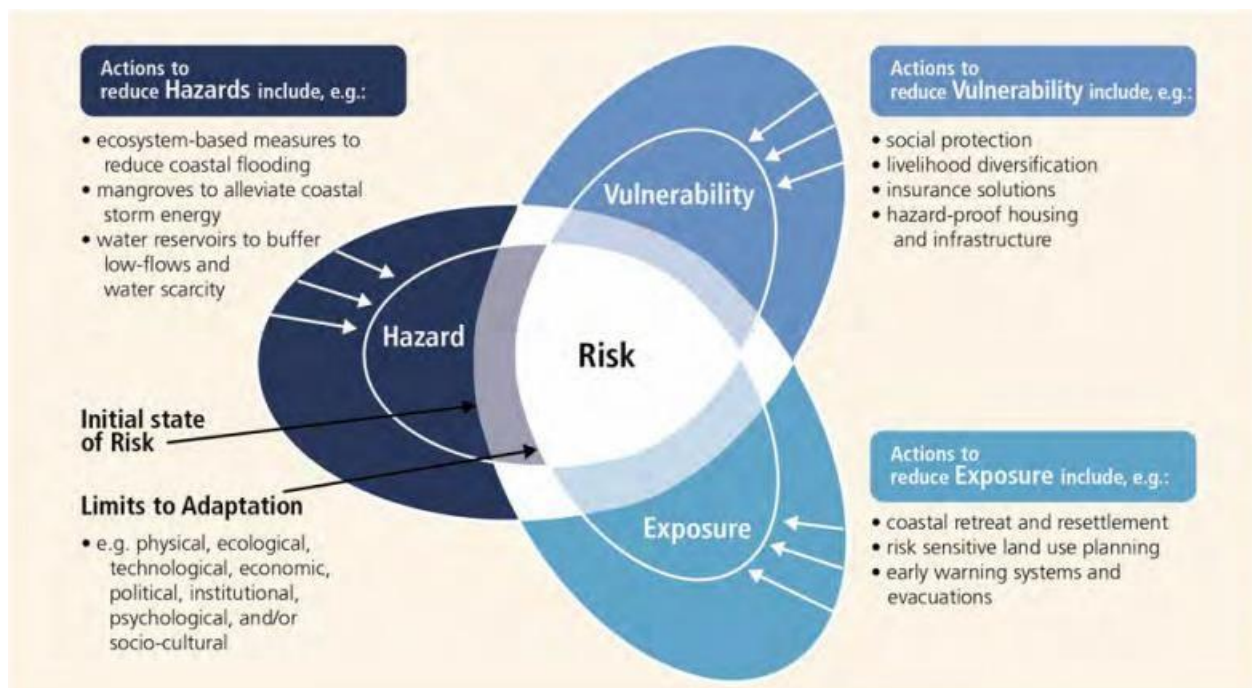
Adaptation options that increase the adaptive capacity of individuals, organizations and communities shall be undertaken. Adequate resources will be made available increasing social cohesion, livelihood protection, enhancing social capital and establishing adaptive physical infrastructure. Ecosystem-based approaches that build resilience to biodiversity, ecosystems and natural capital shall be considered.

5.2 Climate Risk Management Approach

The GORTT considers climate risk to be the product of (i) environmental hazards triggered or exacerbated by climate change, (ii) the exposure of people, infrastructure and ecosystems to those hazards, and (iii) the vulnerability of those social, financial, physical and natural systems. It recognizes climate change impacts to be the physical manifestation of climate risk, and that those impacts may vary across spaces, sectors and time.

Addressing climate change means addressing climate risks through policy and action. This shall be done through a combination of mitigation measures to reduce the long-term risk of climate change[▲], adaptation measures to reduce the immediate effects of climate change, and resilience-building to prepare for unavoidable future residual risks. This multi-pronged risk management approach links to the casual fabric of risks by reducing hazards, exposure and vulnerability. The IPCC recognizes this as an ideal approach to addressing climate risk.^[83]

Figure 9 – Conceptual Model showing the relationship between adaptation action and climate risk.



Source: IPCC, 2019^[83]

The GORTT recognizes however, that undertaking a risk management approach that is coordinated, efficient and effective requires a “whole of government approach” to provide appropriate evidence and leadership. It also requires that key stakeholders within the public sector, private sector and civil society are well

[▲] Mitigation measures are detailed in Trinidad and Tobago’s Nationally Determined Contributions and Long-Term Strategy for Low Emissions Development.

equipped to actively participate in the design, implementation and monitoring of adaptation action. Furthermore, it demands that the citizenry – and especially the most vulnerable – are informed of climate risks and the adaptation actions necessary. Climate change risk management must be inclusive and participatory. Thus, the GORTT must simultaneously create the enabling environment for adaptation action, while advancing sectoral adaptation. Chapter 7.2 details the enabling and sectoral strategies selected by Trinidad and Tobago through its NAP process.

5.3 Climate Resilient Development Pathway Approach

The GORTT recognizes that the management of climate risk through adaptation requires flexibility as new information is acquired, national and global conditions change, and the efficiency of adopted measures is assessed. Adaptation plans must be able to accommodate the complexity and uncertainties that surround climate change. Thus, the GORTT has adopted the approach of “adaptation pathways” towards climate resilience.

Adaptation pathways have risen to prominence within the past decade as an effective process for adapting to climate change.^[84] This is evidenced by the positioning of “climate resilient development pathways” (CRDP) by the IPCC and endorsement of the method by the UNFCCC’s Adaptation Committee.^{[85][86][87]} Adaptation pathways capture the implementation process by specifying which measure(s) are to be taken immediately and which are to be implemented progressively over time once certain conditions or thresholds are met.^[88] They are considered climate resilient pathways when mitigation and sustainable development considerations are included in decision making.^[85] The GORTT recognizes that this approach to planning and implementation yields several benefits, which include but are not limited to the following:

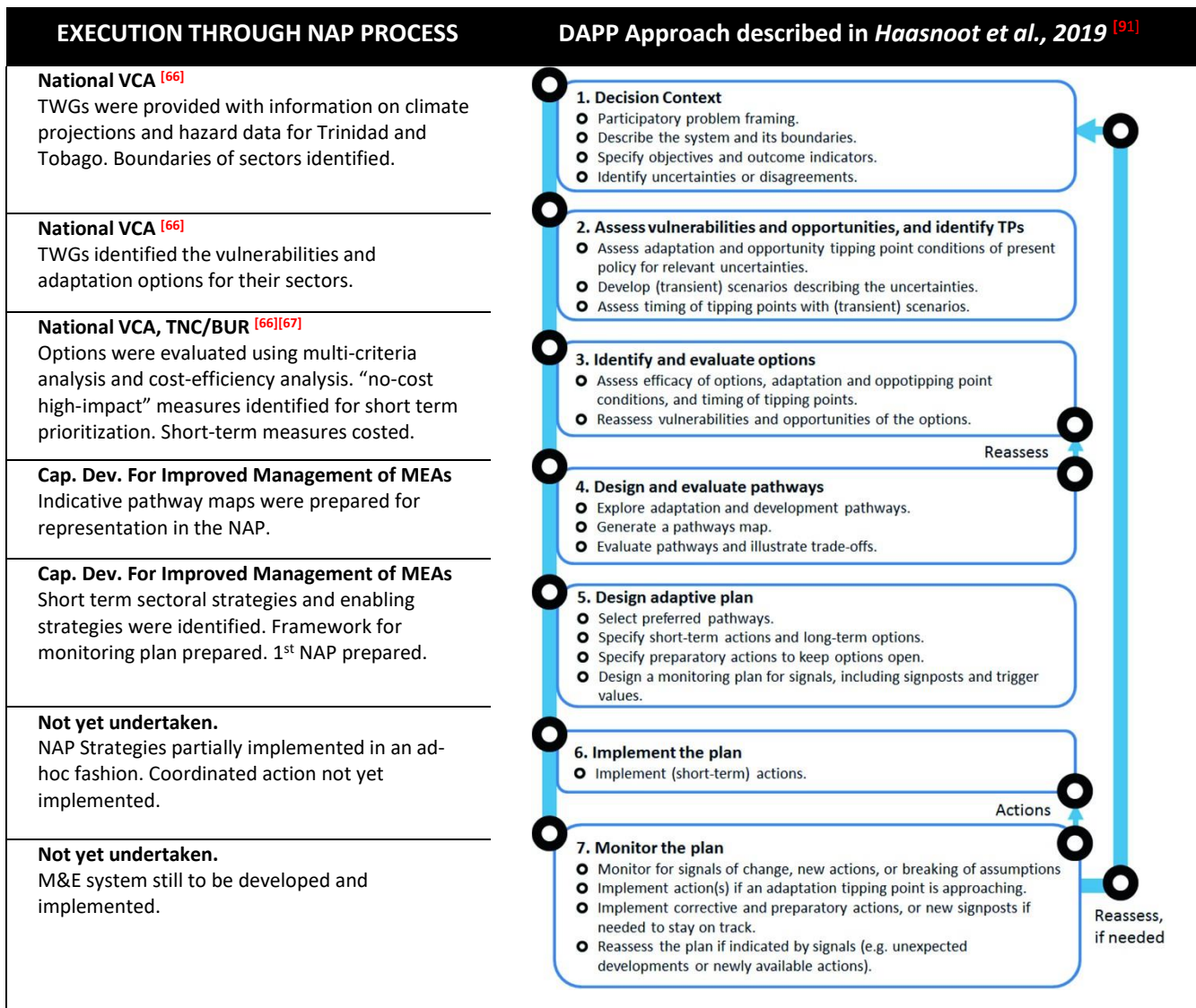
1. The ability to identify “no regret” or “low regret” interventions.
2. Supporting policymakers in prioritizing adaptation decisions that are beneficial to all
3. Meeting short-term and long-term adaptation needs
4. Promotes collaborative learning, adaptive planning and adaptive capacity
5. Accounts for complexity and long-term change including the potential need for transformative change
6. Avoiding a “lock-in” to adaptation decisions that may become maladaptive, i.e., increase climate vulnerability and risk in the long-term
7. Avoids “path-dependency” resulting from past-decisions.

The CRDP approach adopted by the GORTT, in keeping with its guiding principles for adaptation, shall be collaborative and informed by experts and stakeholders who are meaningfully engaged in the design, implementation and monitoring of adaptation actions.

5.3.1 Pathway Development for this NAP.

There is a diverse array of methodologies used to identify adaptation measures and represent adaptation pathways.^[84] However, the most prominent methodology is the “dynamic adaptive policy pathway (DAPP)” method developed by *Haasnoot et al*, for which they have made a public pathways generator app available.^{[84][89][90]} The execution of the DAPP approach in the preparation of the NAP is illustrated below:

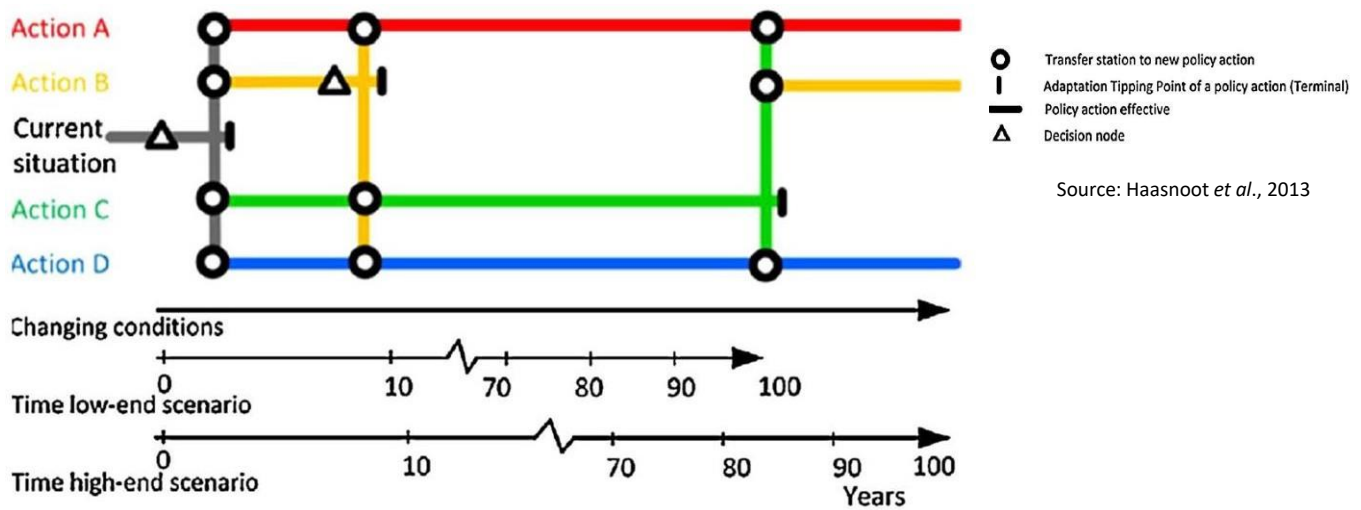
Figure 10 – Annotated DAPP process diagram showing Trinidad and Tobago’s approach to CRDP Development.



Adaptation options were derived through participatory, inclusive stakeholder consultations as well as expert judgement under two major projects: the national climate change VCA supported technical assistance through the EU Delegation, and the coastal zone VCA conducted in preparation of Trinidad and Tobago’s 1st BUR and TNC.^{[66][67]} Technical Working Groups identified the top-most climate risks using participatory multi-criteria analysis and then identified potential adaptation options to address the expected climate change impacts. Cost Efficiency Analysis (CEA) was then used to identify “no cost, high impact” strategies, also referred to as ‘no regret’ strategies. These were costed and form the priority actions to be undertaken by Trinidad and Tobago in the short-term.

In the preparation of this NAP, expert judgement was used to prepare indicative adaptation pathways for each sector, considering all the strategies proposed. A generic DAPP presented in *Haasnoot et al, 2013* is presented in Figure 11.

Figure 11 – Illustration of the DAPP method using 4 adaptation actions.



Given that adaptation planning is complex and dynamic, it is acknowledged that revisions to these pathways are to be done on a consistent basis (as seen in Steps 4 and 7 of the DAPP diagram in Figure 10). As such, the Pathway diagrams presented in Chapter 7.5 should be considered indicative rather than absolute.

6.0 Adaptation Priorities

The adaptation priorities can be broadly separated into two categories:

1. Priorities for Enabling Adaptation Action

These aim to create an enabling environment to support adaptation action across all sectors as well as proper monitoring and reporting of implementation. These actions are critical towards having an institutionalized process for satisfying Articles 13 and 14 of the Paris Agreement ^[24].

These strategies are classified into the following categories:

- i. Adaptation Financing
- ii. Monitoring and Evaluation
- iii. Mainstreaming into National Planning.

2. Priorities for Enabling Sectoral Adaptation Action

Based on extensive technical analysis of the historical and anticipated threats of climate change, seven sectors were identified as requiring urgent adaptation intervention:

- i. Coastal Zone Resources
- ii. Agriculture and Food Security
- iii. Water Resources
- iv. Human Health
- v. Biodiversity
- vi. Infrastructure and Human settlements
- vii. Financial Services

Within these broad categories of adaptation action, **16** specific strategies were identified as being “no regret” due to their “no cost-high impact” classification following a cost efficiency analysis. These sectoral strategies identified by the sectoral TWGs shall be prioritized in Trinidad and Tobago’s near-term adaptation actions. Among them, *EMNP-004 “Enhancing the human and technical capacities of key stakeholders to understand and manage climate risks towards informed decision making.”* is central to the GORTT’s strategic framework and programme for climate risk management and will be given special prioritization in the near term.

Although Trinidad and Tobago is one nation, it is recognized that Tobago has its own distinct cultural and local context. As such, Tobago is given special focus in the following discussion on past and future adaptation strategies.

7.0 Adaptation Strategies

7.1 Past Strategies and Actions

Historically, adaptation efforts and efforts which yield adaptation co-benefits have been undertaken by governmental, non-governmental, and private sector actors.^{[32][92]} However, the GORTT does not yet have a methodical system for recording these efforts or evaluating their success. Whereas this NAP proposes strategies to address those gaps among others, Table 13 highlights some government driven efforts undertaken since the Second National Communication (SNC) to the UNFCCC was submitted in 2013.

Table 13 – Non-exhaustive summary of past adaptation strategies and their benefits to various sectors

PAST ADAPTATION STRATEGY/ ACTIONS	DESCRIPTION OF PAST ADAPTATION ACTION LED OR SUPPORTED BY THE GORTT	SECTORAL BENEFICIARIES FROM INTERVENTION							
		CZ	AG	WR	HH	BIO	IHS	FS	TGO
2005-2019 National Gas Company (NGC) Reforestation Programme. ^{[93][94]}	Led by the NGC, 16,000 trees have been planted across 267 hectares of degraded forests in southern Trinidad as of 2019. Estimated to have sequestered 8,322 tons of CO ₂ in addition to providing adaptive co-benefits such as soil stabilization, water purification and enhancing food security.		X	X		X			
2007-2021 Caribbean Catastrophe Risk Insurance Facility - Segregated Portfolio Company (CCRIF-SPC) parametric insurance coverage. ^{[95][96][97]}	Since 2007 the GORTT has purchased parametric catastrophe insurance from the CCRIF-SPC for Tropical Cyclone and Earthquake coverage. The country's earthquake coverage is at least US\$90 million. In 2017, the GORTT purchased two additional policies: 1 excess rainfall for Trinidad and one for Tobago. Since then, the policies have triggered for 3 consecutive Octobers (2017-2019), rewarding the GORTT with a combined US\$9,905,418 which was spent on emergency relief and infrastructure repairs.	X			X		X	X	X
2012-2016 Project for Ecosystem Services (ProEcoServ). ^{[46][98]}	Collaborative effort between the UWI and the Cropper Foundation with GEF funding, this project calculated the value of ecosystem services at the Nariva Swamp, Buccoo Reef and eastern Northern Range. By ascribing a monetary value to otherwise intangible adaptation and resilience building services	X	X	X	X	X	X	X	X

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PAST ADAPTATION STRATEGY/ ACTIONS	DESCRIPTION OF PAST ADAPTATION ACTION LED OR SUPPORTED BY THE GORTT	SECTORAL BENEFICIARIES FROM INTERVENTION							
		CZ	AG	WR	HH	BIO	IHS	FS	TGO
	such as water purification and flood prevention, the outputs of this project support the rationale for EBA. Outputs were also used to prepare Trinidad and Tobago's first Environmentally Adjusted National Accounts (EANA)								
2010-2020	National Restoration, Carbon Sequestration, Wildlife and Livelihoods Project (NRCSWLP). ^[99]								
	Implemented by the EMA with funding from the TTGF, the project has replanted over 125 hectares of degraded forest and mangrove at the Nariva Swamp, Trinidad's largest wetland. Resilience and mitigation benefits include improving the livelihood and food security of local communities, biodiversity conservation, and protection from floods.	X	X	X	X	X	X		
2014-2017	Global to Local Caribbean Socio-Economic Climate Change Scenarios (GoLoCarSe) Project. ^[100]								
	Led by the UWI in collaboration with the Stockholm Environmental Institute (SEI), the project sought to build resilience and improve adaptive capacity by downscaling global climate projects presented in AR5 and creating locally relevant scenarios for vector borne diseases, coastal flooding, forest cover, biodiversity loss and cocoa coverage.	X	X	X	X	X	X		
2014-2019	National Reforestation and Watershed Rehabilitation Programme (NRWRP). ^{[101][102]}								
	Led by the Forestry Division of the Ministry of Agriculture Land and Fisheries this project aimed to establish 5,000 acres of commercial forest of plantations on State lands. The builds adaptive capacity and resilience through poverty alleviation, hillside erosion control, water conservation and carbon sequestration.	X	X	X		X		X	
2014	National Preliminary Vulnerability Assessment. ^[65]								
	Led by the ODPM, this national assessment analysed the factors that contribute to disaster vulnerability and made recommendations towards DRR and increasing resilience.	X						X	
2014	Established Comprehensive Disaster risk management framework. ^[37]								
	Established by the ODPM to guide DRR across Trinidad and Tobago. The framework includes systems for coordination and management of disaster risk and reducing vulnerabilities. This document is actively being updated as of 2021.	X			X			X	X

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PAST ADAPTATION STRATEGY/ ACTIONS	DESCRIPTION OF PAST ADAPTATION ACTION LED OR SUPPORTED BY THE GORTT	SECTORAL BENEFICIARIES FROM INTERVENTION							
		CZ	AG	WR	HH	BIO	IHS	FS	TGO
2014 National Wastewater Revolving Fund (NWRWF). ^[103]	Established by the GEF to support the GORTT, this revolving fund capitalizes wastewater projects. The first-generation project is the refurbishment of the Scarborough Wastewater Treatment Plant and construction of 215 sewer connections. This project enhances resilience and adaptive capacity by reducing risks to public health and reversing the degradation of coastal ecosystems from land-based sources of pollution.			X	X	X			X
2014 Institutional Strengthening of the Environmental Management Authority in Relation to Climate Change. ^[32]	This technical cooperation (TC) between the GORTT and the IADB reviewed the technical, human resource and legislative capacity of the EMA to support climate change mitigation and adaptation. Recommendations arising from this process constitute a core role in the <i>Strategic Programme for Climate Risk Management</i> and once implemented will benefit multiple sectors exposed to the EMA's regulatory processes.	X	X	X	X	X	X		X
2014 Assessment of the economics of climate change adaptation. ^[2]	This TC between the GORTT and the IADB presents the hazards due to climate change, calculates the potential economic losses, and presents a cost-benefit analysis of proposed climate risk mitigation options. Critical study for developing the rationale for climate change adaptation nationally and across sectors.	X	X	X	X	X	X	X	X
2015 Piloting of Coastal Zone Management and Climate Change Adaptation in Southwest Tobago. ^[104]	A TC between the GORTT and IADB, executed by the Institute of Marine Affairs (IMA) yielded several adaptation benefits in both policy and application. The project provided a gap assessment for ICZM, a VRA for Tobago, a coastal EBA response plan for southwest Tobago, the deployment of a coral reef early warning system (CREWS) at the Buccoo Reef, and best practices for adapting coastal economic activities at risk.	X				X	X	X	X
2015-2018 National Critical Coastal Protection Programme. ^[105]	Undertaken by the Coastal Protection Unit (CPU) of the Ministry of Works and Transport this programme establishes engineering measures to abate shoreline erosion and monitors	X					X		

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		CZ	AG	WR	HH	BIO	IHS	FS	TGO
	shoreline changes. Over the period 2015 – 2018 the project has established seawalls and coastal stabilization measures at Manzanilla beach (2015), North Cocos Bay (2015), Shore of Peace Coastal Cliff (2016), and Quinam (2018).								
2016	Feasibility studies for a risk-resilient coastal zone management programme. ^{[77][106]}	X				X	X		
2017	Integrated Water Resources Management Policy. ^[34]	X		X	X		X		X
2017	Establishment of San Fernando Wastewater Treatment Plant. ^[107]	X	X	X	X	X			
2018	Update of public weather early warning system. ^[108]				X		X	X	X

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		CZ	AG	WR	HH	BIO	IHS	FS	TGO	
2018	Revision of the 2006 National Environmental Policy. ^[35]	Led by the EMA, the revision of the 2006 NEP integrated the SDGs and contemporary issues into the national policy framework. CCA is given its own explicit section in the NEP under the priority area of “Addressing Climate Change and Environmental and Natural Disasters”. As the overarching policy document for sustainable development, the 2018 NEP enhances resilience and supports adaptation by addressing underlying drivers of risk across all environmental themes and promoting a green economy.	X	X	X	X	X	X	X	X
2018	Creation of the National Policy on Gender and Development – Green Paper. ^[59]	Led by the Gender and Child Affairs Division of the Office of the Prime Minister, this national policy creates a national mandate for the mainstreaming of gender into all facets of public interest, including addressing climate change. The policy increases the adaptive capacity across all sectors by advocating for the meaningful participation and inclusion of women.	X	X	X	X	X	X	X	X
2019	National Capacity and Vulnerability Assessment. ^[66]	A TC with the EU, this CVA was led by the MPD to provide the first comprehensive national assessment of climate change vulnerabilities across 7 economic sectors. A foundational document for understanding past and projected climate risks, and the potential impacts to sectors.	X	X	X	X	X	X	X	X
2019	Establishment of Malabar Wastewater Treatment Plant. ^[107]	In 2013 the GORTT received a US\$246,500,000 loan from the IDB to undertake a “Multiphase Wastewater treatment programme Phase-1”. In 2019 a new wastewater treatment plant was commissioned in Malabar to treat waste water from the entire catchment and meet the needs of a 2035 forecasted population of 108,630 persons. This state-of-the-art facility improves resilience and adaptive capacity by reducing water resource pollution and environmental degradation and improves sanitization.	X	X	X	X	X			
2019	Update of the ICZM Policy Framework. ^[36]	Led by the ICZM Inter-Ministerial Committee (2018), the updated framework is based on stakeholder comments received								

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PAST ADAPTATION STRATEGY/ ACTIONS	DESCRIPTION OF PAST ADAPTATION ACTION LED OR SUPPORTED BY THE GORTT	SECTORAL BENEFICIARIES FROM INTERVENTION							
		CZ	AG	WR	HH	BIO	IHS	FS	TGO
	through a continuous consultative process. This foundational document defines the coastal zone and explicitly calls for CCA through coastal EBA and other measures. It contributes to adaptation and resilience building by providing an overarching framework for climate-smart, environmentally responsible economic activity within the coastal zone of Trinidad and Tobago.	X	X	X	X	X	X	X	X
2019	Vulnerability and Adaptation Assessment of the Coastal Zone. ^[67]	Prepared by the MPD towards the preparation of Trinidad and Tobago's 1 st BUR and TNC, this document provides seminal work for Trinidad and Tobago's pathways approach as well as its existing capacity to manage climate risks within the coastal zone. It builds on the national VCA and provides pointed recommendations for capacity building.	X	X	X	X	X	X	X
2019	Revision to the Water Pollution Control Rules. ^[108]	Led by the EMA, the revision of the Water Pollution Control Rules was done to better reflect the Polluters Pay Principle in the national permitting structure. The revised fee structure serves as a form of resilience building and adaptation by lessening effluent discharge into the environment, and thus reducing pressures on water resources, human health, biodiversity and other sectors dependent on healthy freshwater systems. This reduced pressure increases the adaptive capacity of human and natural systems against climate change.	X	X	X	X	X	X	X
2019	GCF Pre-Accreditation Gap Assessment of the Environmental Management Authority. ^[109]	Through the Readiness and Preparatory Support Programme, the EMA identified its institutional gaps that prevent it from becoming a Direct Access Entity for Trinidad and Tobago. Becoming a DAE enables funding access for this NAP.	X	X	X	X	X	X	X
2019	Establishment of Couva Hospital and Multi-Training Facility. ^[110]	Led by the Ministry of Health this facility increases national capacity to cope with the ill and infirmed, including those whose ailments are caused or exacerbated because of climate change impacts.				X			

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PAST ADAPTATION STRATEGY/ ACTIONS	DESCRIPTION OF PAST ADAPTATION ACTION LED OR SUPPORTED BY THE GORTT	SECTORAL BENEFICIARIES FROM INTERVENTION							
		CZ	AG	WR	HH	BIO	IHS	FS	TGO
2019 Toco Health Centre Retrofit Project. ^[111]	Led by the Ministry of Planning and Development with financial support from the EU, this pilot project sought to create the country's first climate-resilient health centre through adaptation and efficiency upgrades. This included upgrades to the sewer system, installation of solar power and a rainwater harvesting system. This supports adaptation by ensuring that the vulnerable, rural communities of north east Trinidad have access to medical services despite climate-exacerbated disasters.	X		X	X		X		
2020 Establishment of Point Fortin Hospital. ^[112]	Led by the Ministry of Health this facility increases national capacity to cope with the ill and infirmed, including those whose ailments are caused or exacerbated because of climate change impacts.				X				
2020 Establishment of Arima General Hospital. ^[113]	Led by the Ministry of Health this facility increases national capacity to cope with the ill and infirmed, including those whose ailments are caused or exacerbated because of climate change impacts.				X				
2021 Establishment of Roxborough Hospital. ^[114]	Led by the Ministry of Health this facility increases national capacity to cope with the ill and infirmed, including those whose ailments are caused or exacerbated because of climate change impacts.				X				X

7.2 Barriers, Challenges and Gaps related to Further Adaptation Action

THE GORTT acknowledges that there will be challenges and gaps that limit effective adaptation action, or that place limits on adaptation. Through a robust consultative process with the various TWGs the barriers to effective adaptation action were identified and analysed. The key findings are presented in Table 14 below.

Table 14 - Identification and analysis of key challenges to adaptation action.

GAPS IDENTIFIED	IMPORTANCE TO CLIMATE CHANGE MANAGEMENT	ROOT CAUSE OF BARRIER/ CHALLENGE	TWC RECOMMENDATION
Information Quality and Access	<ul style="list-style-type: none"> • Scenario planning • Community risk profiling • Developing early warning systems • Preparing emergency preparedness and response plans 	Lack of communication, participation and partnerships.	Implementation of a singular data management entity through point Ministry.
Regulatory and Institutional Frameworks	<ul style="list-style-type: none"> • Coordinating Actions • Mandating compliance • Mainstreaming CCA • Securing financial resources 	Lack of specific Climate Change legislation and limited enforcement of existing legislation.	Climate Change Act with enforceable frameworks.
Financial Resources	<ul style="list-style-type: none"> • Supporting adaptation actions. • Securing human resources for CCA 	Budgetary constraints and limited access to international financing.	Budgetary allocations and strict monitoring; enhancing capacity to access international funds.
Technical Capacity	<ul style="list-style-type: none"> • Ensuring high quality analysis and knowledge products. • Empowering stakeholders. 	Lack of use of local capacity and shortage of training opportunities	Managing body to stock take local experts and those with capacity as well as build capacity through training programmes
Social Awareness	<ul style="list-style-type: none"> • Driving community-based action. • Supporting difficult 'trade-offs' • Maintaining a responsible social footprint. 	Lack of unified government approach to sensitization. Limited NGO/CBO inclusion in CCA mainstreaming.	"Whole of government" approach to alignment and mainstreaming. Participatory engagement with the public and stakeholders.

To address these challenges, GORTT is committed to targeting their root causes and putting measures in place to ensure the barriers to climate change adaptation are reduced as far as practicably possible through its enabling strategies.

7.3 Overview of Present and Future Strategies





The priority adaptation strategies for Trinidad and Tobago moving forward are shown in Table 15. Strategies demarcated with a “” represents a strategy identified by the sectoral TWGs and technical experts as being “NoRegret- High Impact”.

Table 15 – Listing of Trinidad and Tobago’s Priority Adaptation Strategies




#	REF CODE	PRESENT AND FUTURE CLIMATE CHANGE ADAPTATION STRATEGIES
ENABLING		
Adaptation Financing		
01	EADF-001	Establish a “Climate Change Window” under the Trinidad and Tobago Green Fund (TTGF)
02	EADF-002	Strengthen partnerships with multilateral agencies and donors for adaptation financing.
03	EADF-003	Obtain direct access to the Green Climate Fund (GCF)
Monitoring and Evaluation		
04	EMOE-001	Develop a participatory Monitoring & Evaluation (M&E) framework.
05	EMOE-002	Establish framework for capturing climate change adaptation efforts in the national climate change knowledge management system (KMS)
Mainstreaming into National Planning		
06	EMNP-001	Establish multiparty working groups across government, private sector and civil society to integrate climate change adaptation into budgets and decision making.
07	EMNP-002	Establish national climate change legislation to give legal authority to a governmental body to mainstream adaptation into planning and development.
08	EMNP-003	Make legislative amendments to incorporate adaptation considerations into permitting requirements.
09	EMNP-004	 Enhancing the human and technical capacities of key stakeholders to understand and manage climate risks towards informed decision making.
SECTORAL		
Coastal Zone Resources		
10	SCZN-001	 Evidence-based coastal vulnerability and risk assessment information made available to stakeholders.
11	SCZN-002	Give the responsibility of conservation, restoration and management of coastal ecosystems in T&T to civil society organizations.

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#	REF CODE	PRESENT AND FUTURE CLIMATE CHANGE ADAPTATION STRATEGIES
12	SCZN-003	Improve public education through the incorporation of climate change, storm planning/disaster management into the national curriculum.
13	SCZN-004	Implement Integrated Coastal Zone Management (ICZM) adaptive strategies and encourage protection and maintenance of dynamic coastal buffer features.
14	SCZN-005	Establish engineering-based solutions where appropriate to protect critical infrastructure.
15	SCZN-006	Establish a Coastal Information Management System.
<i>Agriculture and Food Security</i>		
16	SAFS-001	 Increase the availability and awareness of technology to improve water management.
17	SAFS-002	Promote protected agriculture.
18	SAFS-003	Promote climate-sensitive farming.
18	SAFS-004	Improve land distribution and management to secure areas for agricultural production.
20	SAFS-005	Improve research and development considerably by learning from the examples of several climate and crop studies carried out in the Caribbean.
21	SAFS-006	Streamline climate change issues into agricultural planning and management.
22	SAFS-007	Re-orient agricultural support policies.
23	SAFS-008	Improve climate monitoring systems for the agricultural sector.
<i>Water Resources – Integrated Water Resources Management</i>		
24	SWRA-001	Improve and enforce the water resources master plan which embodies the principles of Integrated Water Resources Management (IWRM).
25	SWRA-002	Conduct a national water resources quantification study for surface water, coastal/marine waters, and groundwater.
26	SWRA-003	Implement a national water quality monitoring programme for surface, coastal/marine, and groundwater.
27	SWRA-004	Improve and enforce the water resources master plan which embodies the principles of Integrated Water Resources Management (IWRM).
<i>Water Resources – Improved Agro-hydro-meteorological Monitoring</i>		
28	SWRB-001	Deploy and install a catchment-based network of surface water flow gauges
28	SWRB-002	Deploy and install a catchment-based tipping bucket rain gauge network on a national scale in support of IWRM.
30	SWRB-003	Implement a groundwater flow, salinity and quality testing programme at the national scale.
31	SWRB-004	Deploy and install a network of tidal gauges at the national scale.

#	REF CODE	PRESENT AND FUTURE CLIMATE CHANGE ADAPTATION STRATEGIES
32	SWRB-005	Develop a data management framework for hydro-meteorological data across public sector bodies.
<i>Water Resources – Flood Mitigation and Flood Risk Management</i>		
33	SWRC-001	✦ Inclusion of flood risk reduction measures as part of the national development process.
34	SWRC-002	Implement a national flood modelling, flood risk assessment and flood hazard mapping programme.
35	SWRC-003	Development of flood response and recovery plans for flood-prone areas.
36	SWRC-004	Systematic collection of rainfall, surface flow, and tidal data, and the development of a national database to house said data.
37	SWRC-005	Carry out a national assessment of socio-economic vulnerability to flooding.
<i>Water Resources- Drought Mitigation and Drought Risk Management</i>		
38	SWRD-001	✦ Inclusion of projections from the Caribbean Drought and Precipitation Monitoring Network (CDPMN) in the decision-making process for drought mitigation and drought risk management.
39	SWRD-002	The exploration of storm water, rainwater and greywater harvesting and reuse as an alternative means of potable and non-potable water supply augmentation.
40	SWRD-003	Systematic collection of rainfall, surface flow, and groundwater data, and conduct a groundwater study.
41	SWRD-004	The exploration of groundwater extraction points at higher elevations.
<i>Water Resources- Water Supply and Demand Management</i>		
42	SWRE-001	✦ Implementation of a national education-centred water demand management programme.
43	SWRE-002	✦ Incentivizing the use of water-efficient fixtures.
44	SWRE-003	Installation of ‘smart’ water meters as a means of ‘demand management’ for water for high-volume users of water resources.
45	SWRE-004	Installation of ‘smart’ water meters at the individual customer level, along distribution lines, and on storage infrastructure.
46	SWRE-005	Execution of a national fresh water demand forecasting project, disaggregated by metering district and industry.
<i>Water Resources- Infrastructure, Development and Planning</i>		
47	SWRF-001	✦ Strategic construction of stormwater retention and detention structures and reservoirs.
48	SWRF-002	Revision of building standards to require the storage of a certain percentage of surface runoff on-site for new and existing development as part of the development of a new climate-resilient National Building code.
49	SWRF-003	Drafting and enforcement of legislation
<i>Water Resources- Education and Capacity Building</i>		
50	SWRG-001	✦ Execution of a national training programme for farmers, focused on IWRM.
51	SWRG-002	✦ The updating of job descriptions across the water management-related fields within the public sector.

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#	REF CODE	PRESENT AND FUTURE CLIMATE CHANGE ADAPTATION STRATEGIES
52	SWRG-003	Execution of a national public education and awareness-building programme to reduce water wastage and overall water usage.
53	SWRG-004	Execution of a national public education programme to build public awareness of the projected effects of climate change on water resources, including fresh water availability, water quality, and flood risk.
54	SWRG-005	Execution of a national training programme on IWRM for technical professionals in the construction, engineering, architecture, planning, and water resource management fields.
Water Resources- Legislation and Regulation		
55	SWRH-001	 The drafting and enforcement of legislation requiring the sharing of environmental data across public sector agencies.
56	SWRH-002	 Draft and enforce legislation pertaining to the utilization of land in flood-prone areas.
57	SWRH-003	The drafting and enforcement of legislation requiring the execution of a national flood modelling, flood risk assessment and flood hazard mapping programme every ten years.
58	SWRH-004	The drafting and enforcement of legislation defining the standards for drinking and recreational/bathing water quality.
59	SWRH-005	The drafting and enforcement of legislation defining standards for wastewater and industrial effluent quality.
60	SWRH-006	The drafting and enforcement of legislation requiring the development of a water resources master plan every ten years.
61	SWRH-007	The drafting and enforcement of legislation requiring the execution of a national water resources quantification study every ten years.
Human Health		
62	SHUH-001	 Hazard mapping to identify country-wide and site-specific risks to the health sector.
63	SHUH-002	Development and implementation climate change preparedness planning and a Public Health Education programme.
64	SHUH-003	Undertake an inter-agency and utilities climate change risk assessment with the focus on health service delivery and health infrastructure.
65	SHUH-004	Upgrading of drainage infrastructure.
66	SHUH-005	Improve climate change risk management within health service delivery including built-in redundancy
Biodiversity		
67	SBDV-001	Improve the practice of biodiversity management through the participatory development of a National Protected Area System Plan
68	SBDV-002	Rationalize and coordinate the policy, legal and legislative framework for the management of biodiversity
69	SBDV-003	Raise awareness of policy makers and the public to biodiversity conservation and climate change and the link to quality of life

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#	REF CODE		PRESENT AND FUTURE CLIMATE CHANGE ADAPTATION STRATEGIES
Infrastructure and Human Settlements			
70	SIHS-001	❖	Public awareness concerning climate change risks to critical infrastructure and settlements, including informal settlements
71	SIHS-002	❖	Expansion and improved efficiency of community-based early warning systems, evacuation and egress
72	SIHS-003		Collection geo-references data and information on hazard and climate change risks
73	SIHS-004		Review of building standards being used; and development of a climate-resilient National Building Code
74	SIHS-005		Production of a risk assessment of sea level rise, storm surge and intense precipitation on infrastructure and settlements, including informal settlements, by key agencies
75	SIHS-006		Compilation an inventory of critical, commercial, and industrial infrastructure and develop anational-level risk management plan for critical infrastructure and settlements
76	SIHS-007		Installation of green areas on the roofs of buildings.
77	SIHS-008		Standardization of emergency protocols under a common framework so that they are easy tounderstand and accessible to the public.
78	SIHS-009		Implementation of training programmes to educate and inform public officials on climate change and itseffects
Financial Services			
79	SFIS-001		Develop on and improve the current insurance instruments for disaster risk insurance.
80	SFIS-002		Establishment of a framework for consistent re-evaluation of climate change adaptations to develop innovative insurance instruments that properly account for the dynamics of climate change.
81	SFIS-003		Establishment of a framework to ensure relevancy of climate change and insurance data and information, and to make this data accessible and easily disseminated to the population and the government.
82	SFIS-004		Design of a method via which insurance agencies can emphasize risk reduction strategiesand risk management to their policyholders.
Tobago			
83	STGO-001	❖	Development and adoption of climate resilient land use policy and supporting legislation to ensurethat all design and construction in Tobago is climate resilient.
84	STGO-002		Increase focus on building capacity at the community level to build climate resilience.
85	STGO-003		Improve the capacity for the management of influxes of Sargassum seaweed; and enhance the ability to capitalize on its resource value.
86	STGO-004		Improve research to define climate change triggers for Sargassum outbreaks.

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#	REF CODE	PRESENT AND FUTURE CLIMATE CHANGE ADAPTATION STRATEGIES
87	STGO-005	Undertake fish stock inventory and climate risk management programme.
88	STGO-006	Provide technical and financial resources and training of fisher folk.
89	STGO-007	Undertake vulnerability and risk assessment at the household and building level
90	STGO-008	Legal establishment and enforcement of a national hurricane resilient building code

7.4 Enabling Strategies: Implementation Status

Table 16 – Strategies for enabling nation adaptation action and their implementation status.

REF CODE	DESCRIPTION	IMPLEMENTATION STATUS/DETAILS
Adaptation Financing		
EADF-001	Establish a “Climate Change Window” under the Trinidad and Tobago Green Fund (TTGF)	<i>Not yet commenced.</i> Provisions for this have been included in a draft climate change legislation developed under the NDC Implementation project.
EADF-002	Strengthen partnerships with multilateral agencies and donors for adaptation financing.	<i>Ongoing.</i> Relationships are constantly fostered and supported by the MEAU and other government agencies.
EADF-003	Obtain direct access to the Green Climate Fund (GCF)	<i>Ongoing.</i> The Ministry of Planning and Development, as the National Designated Authority (NDA) of Trinidad and Tobago has nominated the Environmental Management Authority (EMA) to become a Direct Access Entity (DAE) to the GCF. The EMA is currently in the process of closing institutional gaps so that it can become accredited.
Monitoring and Evaluation		
EMOE-001	Develop a participatory Monitoring & Evaluation (M&E) framework.	<i>Not yet commenced.</i> Recognizing that adaptation efforts are best led at the local/community level, a participatory M&E framework needs to be developed to ensure consistency in adaptation evaluation, reporting and improvement. This will be critical input for subsequent NAPs and adaptation pathways.
EMOE-002	Establish framework for capturing climate change adaptation efforts in the national climate change knowledge management system (KMS) as part of an enhanced National Climate Change Transparency System.	<i>Not yet commenced.</i> The KMS is the central repository of climate change information in Trinidad and Tobago and is at the heart of Trinidad and Tobago’s climate change Monitoring Review and Verification (MRV) system. The MRV system focuses primarily on GHG inventories, mitigation and support. The system was piloted under the Initiative for Climate Action Transparency (ICAT and NDC Support Programme). However, given the potential synergies between mitigation and adaptation options and the


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REF CODE	DESCRIPTION	IMPLEMENTATION STATUS/DETAILS
		<p>role of the KMS as the core database of climate change information, it is envisioned that a framework for adaptation be established in which adaptation M&E is kept within the KMS. Both MRV and M&E systems will provide the KMS with data as part of a single enhanced National Climate Change Transparency System.</p>
Mainstreaming into National Planning		
EMNP-001	<p>Establish multiparty working groups across government, private sector and civil society to integrate climate change adaptation into budgets and decision making.</p>	<p><i>Not yet Commenced.</i></p> <p>There are currently two institutional mechanisms through which this action can be undertaken. Firstly, the Multilateral Environmental Agreements Unit (MEAU) as the coordinating entity for climate change established under the National Climate Change Policy (NCCP) may use its Climate Change Focal Point Network (CCFPN) to establish working groups towards mainstreaming adaptation into organizational level and national budgeting and planning. Similarly, the National Council for Sustainable Development (NCSDD) appointed under the National Environmental Policy (NEP) may establish a working group to address adaptation mainstreaming.</p>
EMNP-002	<p>Establishment of national climate change legislation to give legal authority to a governmental body to mainstream adaptation into planning and development.</p>	<p><i>Ongoing.</i></p> <p>Under the NDC Support Programme a draft legislation has been developed but requires further review and comment before submission to Parliament for consideration.</p>
EMNP-003	<p>Legislative amendments to incorporate adaptation considerations into permitting requirements.</p>	<p><i>Not yet Commenced.</i></p> <p>The Environmental Management Act Chap. 35:05 and its Certificate of Environmental Clearance (CEC) Rules, 2001 guide development by requiring listed development activities to first attain CEC, or sometimes conduct an EIA, prior to establishment. This legislative process can be amended to support climate change adaptation mainstreaming into national planning and development.</p>
EMNP-004	<p>Enhancement of the human and technical capacities of key stakeholders to understand and manage climate risks towards informed decision making.</p>	<p> <i>Not yet Commenced.</i></p> <p>The Technical Working Groups (TWGs) behind the national Capacity and Vulnerability Assessment (CVA) identified 12 organizations that need to have their human resource and technical capacity enhanced to enhance the government's collaborative climate risk management approach and climate resilient development pathway approach to adaptation. This enabling activity was described as central to the "strategic framework and programme for climate risk management", and was considered to be "no-regret, high-impact" by the TWGs.</p>

7.5 Sectoral Strategies: Implementation Status

7.5.1 Coastal Zone Resources

Table 17 – Strategies for Coastal Zone adaptation action and their implementation status.


REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
SCZN-001	Evidence-based coastal vulnerability and risk assessment information made available to stakeholders.	<p> <i>Not yet commenced.</i> This adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Creating a network for dissemination of information, either via physical copy or through an online database.
SCZN-002	Assignment of responsibility of conservation, restoration and management of coastal ecosystems in T&T to civil society organizations.	<p><i>Not yet commenced.</i> This adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Developing a policy that recognizes the role that civil society organizations play in coastal resource management. • Build capacity amongst civil society organizations, community-based organizations (CBO's), and government departments in coastal resource management through a 3-day training course.
SCZN-003	Improvement of public education through the incorporation of climate change, storm planning/disaster management into the national curriculum.	<p><i>Not yet commenced.</i> This adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Developing the curriculum to include climate change and disaster risk management. • Build capacity amongst teachers through a 3-day training course. • Developing and printing resource packs for teachers.
SCZN-004	Implementation Integrated Coastal Zone Management (ICZM) adaptive strategies and encourage protection and maintenance of dynamic coastal buffer features.	<p><i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Make amendments to the Certificate of Environmental Clearance (CEC) process to better consider the impacts on development on the future environment influenced by climate change. • Carry out mangrove restoration projects.

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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
		<ul style="list-style-type: none"> • Performing coral restoration projects. • Establish Marine Protected Area's (MPA's).
SCZN-005	Establishment of engineering-based solutions where appropriate to protect critical infrastructure.	<i>Ongoing.</i> The CPU is actively undertaking shoreline stabilization works at the following areas: San Souci, Matelot, Cocos Bay, South Cocos Bay, Cap-de-Ville.
SCZN-006	Establishment of a Coastal Information Management System.	<i>Ongoing.</i> Since 2019 the CPU has been in the process of establishing a Comprehensive National Coastal Monitoring Programme (CNCMP) which includes a Coastal Information Management System.

7.5.2 Agriculture and Food Security

Table 18 – Strategies for Agriculture and Food Security adaptation action and their implementation status.

REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
SAFS-001	Increased availability and awareness of technology to improve water management.	 <i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes: <ul style="list-style-type: none"> • Encourage water-saving irrigation and water management systems. • Encourage building on-farm water storage facilities. • Promote rain water harvesting and conservation strategies.
SAFS-002	Promotion of protected agriculture.	<i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes: <ul style="list-style-type: none"> • Promote greenhouse facilities. • Amend cultural practices to reflect awareness of climate change. • Introduce windbreaks on farms.
SAFS-003	Promotion of climate-sensitive farming systems.	<i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes: <ul style="list-style-type: none"> • Create programmes to increase awareness and communication amongst those in the sector. • Relocate agricultural production to less sensitive locations. • Adjust planting calendars and cycles based on changing rainfall patterns.

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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
		<ul style="list-style-type: none"> • Facilitate the development/introduction of salt tolerant/resistant crop varieties. • Adopt a more integrated and intensive form of livestock farming. • Establish food storage systems. • Improve irrigation and agricultural drainage systems. • Facilitate the design of better livestock housing facilities. • Establish early warning systems. • Increase warehousing to increase food security as climatic conditions change.
SAFS-004	Improved land distribution and management to secure areas for agricultural production.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Develop a system that allocates lands with good agricultural capability for farms. • Adopt improved soil conservation technologies. • Develop and implement land policy to preserve high quality agricultural lands. • Promote integrated watershed management.
SAFS-005	Improved research and development considerably by learning from the examples of several climate and crop studies carried out in the Caribbean.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Establish germplasm banks of indigenous, drought-tolerant varieties. • Investigate the feasibility of altering the crop calendar for short-term crops. • Develop methods of controlling invasive species. • Adopt cultural/biological control measures. • Develop and implement a responsive extension system that allows for easy information flow amongst those in the sector.
SAFS-006	Streamlining climate change issues into agricultural planning and management.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Diversify agricultural products. • Introduce more drought-resistant/tolerant species. • Establish wildfire eradication schemes at the national and farm levels.

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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
		<ul style="list-style-type: none"> • Prepare and adopt disaster management plans for farmers and farming communities.
SAFS-007	Re-orientation of agricultural support policies	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Diversify agricultural exports through niche and organic productions. • Expand non-traditional produce for export, especially if preferential agreements already exist for them. • Assess and reduce inadequacies in agricultural support systems. • Incentivize environmentally friendly practices. • Perform continuous assessment and monitoring of farming practices. • Establish crop and livestock insurance and credit schemes.
SAFS-008	Improved climate monitoring systems for the agricultural sector.	<p><i>Ongoing.</i></p> <p>The GORTT with readiness support from the GCF has embarked on a project titled “Improving the monitoring system for climate change impacts on the agriculture sector” in 2020. The US\$260,000 project aims to gather critical hydrometeorological, economic and gender data from the sector and build the capacity of stakeholders to enhance their resilience through mobile phone applications.</p>

7.5.3 Water Resources

Table 19 – Strategies for Water Resources adaptation action and their implementation status.

REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
SWRA-001	Improvement and enforcement of the water resources master plan which embodies the principles of Integrated Water Resources Management (IWRM).	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Review and update the existing water resources management plans and reports. • Incorporate the projected effects of climate change, population, the national economy and industry into the plan. • Engage in consultations with relevant stakeholders.


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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
SWRA-002	Implementation of a national water resources quantification study for surface water, coastal/marine waters, and groundwater.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Assess rainfall and surface and groundwater flow data, water quality data, and current and projected freshwater supply and demand. • Assess how the quantity of water resources is expected to change over time with respect to climate change. • Assess the economic value of the country's water resources.
SWRA-003	Implementation of a national water quality monitoring programme for surface, coastal/marine, and groundwater.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Collect and analyse water quality samples. • Perform monitoring of surface water quality. • Produce reports on water quality for surface, coastal/marine, and groundwater resources, and make these reports accessible to the public.
SWRA-004	Improvement and enforcement the water resources master plan which embodies the principles of Integrated Water Resources Management (IWRM).	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Identify ministries, agencies, and organizations that have responsibilities for managing watersheds and/or managing activities. • Produce documents to facilitate training and capacity building in line with IWRM principles. • Utilize these documents to aid in incorporating IWRM policies into the day-to-day operations of the identified stakeholders.
SWRB-001	Deployment and installation of a catchment-based network of surface water flow gauges	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Identify environments within which to install: Rivers, gullies, and streams Constructed and natural channels Lagoons and detention ponds and basins. • Develop a deployment plan for the surface water flow gauging network in conjunction with plans for rain and groundwater gauging networks.


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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
		<ul style="list-style-type: none"> • Develop a data management plan for the surface water flow gauging network in conjunction with those for rain and groundwater gauge networks. • Procure flow gauges with telemetry capability. • Deploy flow gauges and collect data in real time and store it.
SWRB-002	Deployment and installation of a catchment-based tipping bucket rain gauge network on a national scale in support of IWRM.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Develop a deployment plan for the rain gauging network in conjunction with plans for surface water flow and groundwater gauging networks. • Develop a data management plan for the rain gauging network in conjunction with those for surface water flow and groundwater gauge networks. • Procure rain gauges with telemetry capability. • Deploy rain gauges and collect data in real time and store it.
SWRB-003	Implementation of a groundwater flow, salinity and quality testing programme at the national scale.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Develop a testing plan for a groundwater gauging network. • Develop a data management plan for the groundwater gauging network in conjunction with those for surface water flow and rain gauge networks. • Procure groundwater gauges. • Deploy groundwater gauges and collect and store data.
SWRB-004	Deployment and installation of a network of tidal gauges at the national scale.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Develop a testing plan for a tidal gauging network. • Develop a data management plan for the tidal gauging network in conjunction with those for surface water flow and rain gauge networks. • Procure tidal gauges with telemetry capability. • Deploy tidal gauges and collect data in real time and store it.
SWRB-005	Development of a data management framework for hydro-meteorological data across public sector bodies.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p>

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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
		<ul style="list-style-type: none"> Engage GIS/data management consultant. Engage in consultation with relevant public sector bodies. Create a draft data management framework. Solicit feedback from relevant public sector bodies and test framework as part of a participatory workshop. Implement data management framework.
<p>SWRC-001</p>	<p>Inclusion of a flood risk reduction measures as part of the national development process.</p>	<p> <i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Engage relevant consultants. Assess the results of national flood modelling, flood risk assessment, and flood hazard mapping programme. Prepare draft legislation. Finalize legislation through a consultative process. Facilitate training for enforcement officers. Enforce legislation.
<p>SWRC-002</p>	<p>Implementation of a national flood modelling, flood risk assessment and flood hazard mapping programme.</p>	<p><i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Engage relevant consultants. Assess current hydrometeorological data availability that is relevant to flood modelling and management. Assess current climate models, and collect additional data as required. Build and test urban, fluvial, and coastal models. Validate models against measured data in the field. Produce flood hazard maps. Produce reports on national flood modelling, flood risk assessment, and flood hazard mapping, and make these reports accessible to the public and other relevant stakeholders.
<p>SWRC-003</p>	<p>Development of flood response and recovery plans for flood-prone areas.</p>	<p><i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Assess the results of national flood modelling, flood risk assessment and flood hazard mapping programme. Determine flood evacuation routes.



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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
		<ul style="list-style-type: none"> • Develop plans for removal of flood waters after extreme events. • Develop clean-up plans for severe flooding. • Finalize comprehensive flood response and recovery plans.
SWRC-004	Systematic collection of rainfall, surface flow, and tidal data, and the development of a national database to house said data.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Develop a testing plan for rainfall, surface flow, and tidal gauging network. • Develop a data management plan for these gauging networks in conjunction with a national database to store said data. • Procure gauges with telemetry capability. • Deploy gauges and collect data in real time and store it in the database.
SWRC-005	Implementation of a national assessment of socio-economic vulnerability to flooding.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Engage relevant consultant. • Carry out assessment via GIS data review, survey questionnaires and public consultations. • Produce report on socio-economic vulnerability to flooding and make this report accessible to the public and relevant stakeholders.
SWRD-001	Inclusion of projections from the Caribbean Drought and Precipitation Monitoring Network (CDPMN) in the decision-making process for drought mitigation and drought risk management.	<p> <i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Engage CIMH. • Facilitate the training of technical staff in the interpretation of data and the translation of information into effective drought management actions. • Include projections in drought mitigation and drought risk management on a systematic basis.
SWRD-002	Exploration of storm water, rainwater and greywater harvesting and reuse as an alternative means of potable and non-potable water supply augmentation.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Engage relevant consultant.


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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
		<ul style="list-style-type: none"> • Assess the potential of storm water, rainwater, and greywater harvesting and reuse for water supply augmentation, including for potable and non-potable use. • Assess the potential yield of these approaches. • Engage in consultations with potential users, with particular attention to the public, and the hospitality, tourism, and food sectors. • Incorporate circumstances and concerns of potential users into the overall strategy. • Develop appropriate water quality standards and quality control measures. • Produce report on the potential exploitation of storm water and wastewater harvesting reuse for water supply augmentation and make the report accessible to the public and relevant stakeholders.
<p>SWRD-003</p>	<p>Systematic collection of rainfall, surface flow, and groundwater data, and conduct a groundwater study.</p>	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Engage relevant consultant. • Assess current hydrometeorological data availability relevant to the groundwater study. • Assess current climate models. • Collect additional data as required. • Build and test groundwater model/s. • Validate model/s against measured data in the field. • Produce diagrammatic outputs, including groundwater contours, saltwater-freshwater interface maps, maps of the potentiometric surface of both saline and fresh water, etc. • Produce report on national groundwater study and make the report accessible to the public and relevant stakeholders.
<p>SWRD-004</p>	<p>Exploration of groundwater extraction points at higher elevations.</p>	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Engage relevant consultant. • Procure groundwater gauges. • Deploy gauges and collect and store groundwater data. • Assess and prioritize new extraction points.



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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
		<ul style="list-style-type: none"> Develop a plan for the exploitation of new groundwater extraction points.
SWRE-001	Implementation of a national education-centred water demand management programme.	<p> <i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Assess water demand based on district and sector. Utilize this data to develop a report on water demand and make this report available to the public and relevant stakeholders. Utilize the information in this report to develop an education-centred water demand management programme.
SWRE-002	Incentivizing the use of water-efficient fixtures.	<p> <i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Ensure that water-efficient fixtures are available for the average citizen to purchase and install in their homes. Develop awareness-raising programmes to educate the public about the importance of saving water. Develop incentives to encourage the purchase and use of water-efficient fixtures.
SWRE-003	Installation of ‘smart’ water meters as a means of ‘demand management’ for water for high-volume users of water resources.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Publish tender notice for meters. Engage relevant tenderers/suppliers. Produce and install meters. Collect and store data. Perform this in conjunction with a national public education and awareness-building programme aimed at reducing water wastage and overall water usage (SWRG-004).
SWRE-004	Installation of ‘smart’ water meters at the individual customer level, along distribution lines, and on storage infrastructure.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Publish tender notice for meters. Engage relevant tenderers/suppliers. Produce and install meters. Collect and store data.


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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
		<ul style="list-style-type: none"> • Perform this in conjunction with a national public education and awareness-building programme aimed at reducing water wastage and overall water usage (SWRG-004).
SWRE-005	Execution of a national fresh water demand forecasting project, disaggregated by metering district and industry.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Engage relevant consultant. • Assess the results of national water resources quantification study. • Estimate future water supply under a range of climate and economic scenarios. • Assess projection trends for population growth and economic activity. • Estimate future water usage under a range of population growth and economic scenarios. • Produce report on future national fresh water demand and make this report accessible to the public and to relevant stakeholders.
SWRF-001	Strategic construction of stormwater retention and detention structures and reservoirs.	<p> <i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Engage relevant consultant. • Assess the results of national flood modelling, flood risk assessment, and flood hazard mapping programme. • Strategically locate stormwater retention, reservoir, and detention structure. • Carry out preliminary designs of structures. • Carry out environmental impact assessment for the proposed works. • Carry out detailed structure designs. • Publish tender for the construction of structures. • Construct structures. • Perform routine monitoring of water levels, flow, and water quality at structures.
SWRF-002	Revision of building standards to require the storage of a certain percentage of surface runoff on-site for new and existing development as part of	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p>


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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
	the development of a new climate-resilient National Building code.	<ul style="list-style-type: none"> Engage relevant consultant. Review existing building standards relative to drainage and flood management. Assess the results of national flood modelling, flood risk assessment, and flood hazard mapping programme. Determine the percentage surface runoff to be retained on-site for new and existing development, based on the relative flood risk within reach catchment area. Develop new climate-resilient National Building Code.
SWRF-003	Drafting and enforcement of legislation.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Draft and enforce legislation restricting development in flood-prone areas. Draft and enforce legislation requiring the preservation of drainage reserves. Draft and enforce legislation limiting the percentage of impermeable area created during new development.
SWRG-001	Execution of a national training programme for farmers, focused on IWRM.	<p> <i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Engage in consultations with farmers. Determine the existing perception/knowledge of IWRM and ascertain gaps in knowledge. Develop and execute training programme. Perform routine assessments of the impact of the programme through follow-up consultations.
SWRG-002	The updating of job descriptions across the water management-related fields within the public sector.	<p> <i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Carry out a situational analysis of current water resources management human resources within the public sector. Assess the capacity of these professionals to address current and projected challenges in water resources management. Identify areas of duplication of effort.

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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
		<ul style="list-style-type: none"> Combine and/or separate roles as appropriate to improve efficacy and efficiency.
SWRG-003	Execution of a national public education and awareness-building programme to reduce water wastage and overall water usage.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Select a focus group and determine the existing public perception/knowledge of climate change and its projected impacts on water availability, water quality, and flood risk. Ascertain gaps in perception/knowledge. Develop and execute educational programmes. Perform routine assessments of the impact of the programme through consultations with focus groups.
SWRG-004	Execution of a national public education programme to build public awareness of the projected effects of climate change on water resources, including fresh water availability, water quality, and flood risk.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Select a focus group and determine the existing public perception/knowledge of water resources and water availability/scarcity. Ascertain gaps in perception/knowledge. Develop and execute educational programmes. Perform routine assessments of the impact of the programme through consultations with focus groups.
SWRG-005	Execution of a national training programme on IWRM for technical professionals in the construction, engineering, architecture, planning, and water resource management fields.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Engage in consultations with technical professionals. Determine the existing perception/knowledge of IWRM and ascertain gaps in perception/knowledge. Develop and execute training programmes. Perform routine assessments of the impact of the programme through follow-up consultations.
SWRH-001	Drafting and enforcement of legislation requiring the sharing of environmental data across public sector agencies.	<p> <i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p>

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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
		<ul style="list-style-type: none"> • Engage relevant consultants. • Prepare draft legislation. • Finalize legislation through a consultative process. • Facilitate training for enforcement officers. • Enforce legislation.
SWRH-002	Drafting and enforcement of legislation pertaining to the utilization of land in flood-prone areas.	<p> <i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Draft and enforce legislation restricting development in flood-prone areas. • Draft and enforce legislation requiring the preservation of drainage reserves. • Draft and enforce legislation limiting the percentage of impermeable area created during new development.
SWRH-003	Drafting and enforcement of legislation requiring the execution of a national flood modelling, flood risk assessment and flood hazard mapping programme every ten years.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Engage relevant consultants. • Assess the results of the national flood modelling, flood risk assessment and flood hazard mapping programme. • Prepare draft legislation, inclusive of the stipulation of re-development every ten years. • Finalize legislation through a consultative process. • Facilitate training for enforcement officers. • Enforce legislation.
SWRH-004	Drafting and enforcement of legislation defining the standards for drinking and recreational/bathing water quality.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Engage relevant consultants. • Assess the results of the national water quality monitoring programme. • Prepare draft legislation. • Finalize legislation through a consultative process. • Facilitate training for enforcement officers. • Enforce legislation.

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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
SWRH-005	Drafting and enforcement of legislation defining standards for wastewater and industrial effluent quality.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Engage relevant consultants. • Assess the results of the national water quality monitoring programme. • Prepare draft legislation. • Finalize legislation through a consultative process. • Facilitate training for enforcement officers. • Enforce legislation.
SWRH-006	Drafting and enforcement of legislation requiring the development of a water resources master plan every ten years.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Engage relevant consultants. • Assess the results of the overall state of the water resources sector. • Prepare draft legislation, inclusive of the stipulation of re-development every ten years. • Finalize legislation through a consultative process. • Facilitate training for enforcement officers. • Enforce legislation.
SWRH-007	Drafting and enforcement of legislation requiring the execution of a national water resources quantification study every ten years.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Engage relevant consultants. • Assess the current quantity of water resources. • Prepare draft legislation, inclusive of the stipulation of re-development every ten years. • Finalize legislation through a consultative process. • Facilitate training for enforcement officers. • Enforce legislation.

7.5.4 Human Health

Table 20 – Strategies for Human Health adaptation action and their implementation status.

REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
SHUH-001	Hazard mapping to identify country-wide and site-specific risks to the health sector.	 <i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes: <ul style="list-style-type: none"> • Collect and utilize data to identify specific risks to the health sector. • Develop geo-spatial map. • Make these maps available to key agencies.
SHUH-002	Development and implementation climate change preparedness planning and a Public Health Education programme.	<i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes: <ul style="list-style-type: none"> • Create and distribute literature on preparedness planning at the community level. • Develop the Public Health Education programme to be able to address issues at a household level.
SHUH-003	Undertaking an inter-agency and utilities climate change risk assessment with the focus on health service delivery and health infrastructure.	<i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes: <ul style="list-style-type: none"> • Identify the gaps and needs of the sector. • Propose strategies to address risks to service delivery and health infrastructure.
SHUH-004	Upgrading of drainage infrastructure.	<i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes: <ul style="list-style-type: none"> • Assess the deficiencies in the drainage systems, with particular focus on drains and river banks. • Develop and implement plans to address the identified deficiencies.
SHUH-005	Improved climate change risk management within health service delivery including built-in redundancy	<i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes:

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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
		<ul style="list-style-type: none"> • Improve the early warning system for the public health sector. • Assess the associated risks within the health service delivery system and develop plans to address them. • Assess existing measures to improve the health service delivery system to avoid redundancy in the planning process.

7.5.5 Biodiversity

Table 21 – Strategies for Biodiversity adaptation action and their implementation status.

REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
SBDV-001	Improving the practice of biodiversity management through the participatory development of a National Protected Area System Plan	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Develop and effect the plan through legislation. • Develop plans for subsequent investment into the development of site management plans by applying the National Protected Area System Plan at a site level.
SBDV-002	Rationalization and coordination of the policy, legal and legislative framework for the management of biodiversity	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Develop a system that contributes to creating synergies in climate change adaptation and mitigation with other sectors, reduce conflict among resource managers, and improve the effectiveness of the enforcement of management decisions.
SBDV-003	Sensitization of policy makers and the public to biodiversity conservation and climate change and the link to quality of life	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Develop programmes to raise awareness of policy makers, including training sessions. • Implement subsequent programmes that will raise awareness of the public, including a link to an improvement in quality of life.

7.5.6 Infrastructure and Human Settlements

Table 22 – Strategies for Infrastructure and Human Settlements adaptation action and their implementation status.

REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
SIHS-001	Public awareness concerning climate change risks to critical infrastructure and settlements, including informal settlements	<p>◆ <i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <p>Develop programmes that engage the public in raising their awareness of climate change risks to critical infrastructure and settlements.</p>
SIHS-002	Increased the use and efficiency of community-based early warning systems, evacuation and egress	<p>◆ <i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Collect data on vulnerable areas. • Evaluate and develop areas that are ideal to be used as evacuation routes. • <u>Develop early warning and egress systems for different sectors/locations.</u>
SIHS-003	Collection of geo-references data and information on hazard and climate change risks	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Invest in systems to collect geo-referenced data. • Develop training for personnel to manage geo-spatial data. • Prioritize the areas identified as most vulnerable to sea level rise and storm surge: Guayaguayare/Mayaro/Manzanilla Sangre Grande/Toco/Matelot Oropouche (Mosquito Creek) Penal Roxborough/Charlotteville Cap-De-Ville <p>And the areas identified as most vulnerable to intense precipitation:</p> <p>Penal/Debe/Barrackpore Caroni Central</p>

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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
		Port-of-Spain Mafeking/Mayaro.
SIHS-004	Review of building standards being used; and development of a climate-resilient National Building Code	<i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes: <ul style="list-style-type: none"> • Assess current building standards. • Develop legislation regarding building in climate-sensitive areas. • Incorporate climate-resilient measures and considerations in the development of a new National Building Code.
SIHS-005	Implementation of a risk assessment of sea level rise, storm surge and intense precipitation on infrastructure and settlements, including informal settlements, by key agencies	<i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes: <ul style="list-style-type: none"> • Collect data on location and status of critical infrastructure and settlements. • Develop plans that revolve around retrofitting, reconstruction, relocation, and repurposing of infrastructure.
SIHS-006	Compilation an inventory of critical, commercial, and industrial infrastructure and develop a national level risk management plan for critical infrastructure and settlements	<i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes: <ul style="list-style-type: none"> • Develop the national risk management plan with detailed budgets and identification of key stakeholders. • Define responsibilities of important stakeholders including utilities, regional corporations, Finance, Marine Affairs, WASA, T&TEC, Ministry of Energy, CDA, Ministry of Planning and Development, Ministry of Agriculture, ODPM, and TTMS.
SIHS-007	Installation of green areas on the roofs of buildings.	<i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes: <ul style="list-style-type: none"> • Develop legislation surrounding the implementation of green roofing systems. • Incentivize property owners to construct green areas on roofs. • Establish the provision of goods and services for the implementation and maintenance of green roofing systems.
SIHS-008	Standardization of emergency protocols under a common framework so that they are easy to understand and are accessible to the public.	<i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes:

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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
		<ul style="list-style-type: none"> Assess current emergency protocols to determine common standards between them. Create or adopt an emergency framework to use as a base for standardizing/remodelling emergency protocols.
SIHS-009	Training programmes to educate and inform public officials on climate change and its effects.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Create and disseminate materials for public officials to learn about climate change and its effects. Implement training sessions where officials of different sectors can learn together and integrate knowledge of their respective sectors.

7.5.7 Financial Services

Table 23 – Strategies for Financial Services adaptation action and their implementation status.


REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
SFIS-001	Further development and improvement of the current insurance instruments for disaster risk insurance	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Develop frameworks for assessing and improving the following insurance instruments as they relate to climate change and affected sectors: <ul style="list-style-type: none"> Sovereign Disaster Risk Insurance Micro-Insurance Agricultural Insurance Property Catastrophe Risk Insurance Health Insurance.
SFIS-002	Establishment of a framework for consistent re-evaluation of climate change adaptations to develop innovative insurance instruments that properly account for the dynamics of climate change	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Develop or adopt a framework for implementing climate change dynamics into insurance schemes. Establish plans for consistent re-evaluation of climate change adaptations.

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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
		<ul style="list-style-type: none"> Develop innovative insurance instruments to incorporate these adaptations.
SFIS-003	Establishment of a framework to ensure relevancy of climate change and insurance data and information, and to make this data accessible and easily disseminated to the population and the government	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Make relevant data accessible to both government officials and the public. Develop and enforce legislation relating to the consistent updating of climate change data.
SFIS-004	Design of a method via which insurance agencies can emphasize risk reduction strategies and risk management to their policyholders	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Develop awareness raising materials about risk reduction strategies for the public, and for insurance agencies to use to address their policyholders.

7.5.8 Tobago

Table 24 - Strategies for adaptation action in Tobago and their implementation status.

REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
STGO-001	Development and adoption of climate resilient land use policy and supporting legislation to ensure that all design and construction in Tobago is climate resilient.	<p> <i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Develop a framework for legislation and support measures that encourage climate-resilient building measures for Tobago's specific context.
STGO-002	Increased focus on building capacity at the community level to build climate resilience.	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> Assess relevant climate change risks facing communities in Tobago. Develop programmes to reduce risk to hurricanes and associated flooding and landslides, with a focus on including community members.

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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
STGO-003	Capacity improvement for the management of influxes of Sargassum seaweed; and enhance the ability to capitalize on its resource value.	<i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes: <ul style="list-style-type: none"> • Carry out regular clean-up and maintenance of beaches where Sargassum seaweed is known to wash up on. • Implement monitoring programmes on beaches where Sargassum seaweed is known to wash up on.
STGO-004	Improved research to define climate change triggers for Sargassum outbreaks.	<i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes: <ul style="list-style-type: none"> • Conduct research into the conditions which allow Sargassum seaweed to thrive and spread. • Develop measures to control the spread, or to reduce the impacts that Sargassum seaweed has on the marine environment. •
STGO-005	Implementation of fish stock inventory and climate risk management programme	<i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes: <ul style="list-style-type: none"> • Assess the impact of climate change on fish stocks. • Develop and implement measures to improve the capacity of research, data collection, and evaluation of the effect of sea surface temperature on fish migration patterns. • Establish programmes to increase education and awareness about fish migration patterns in relation to climate change. • Make research and information available for local fishing communities.
STGO-006	Provision of technical and financial resources and training of fisher folk	<i>Not yet commenced.</i> Adaptation has not yet been implemented. Recommended implementation includes: <ul style="list-style-type: none"> • Develop a framework that allows for capacity building and support for fishing communities. • Develop and establish financial support systems for fishing communities. • Establish support and training for developing deep sea fishery.
STGO-007	Implementation of a vulnerability and risk assessment at the household and building level	<i>Not yet commenced.</i>

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REF CODE	DESCRIPTION OF STRATEGY	IMPLEMENTATION STATUS/DETAILS
		<p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Assess vulnerability of infrastructure by district. • Use this information to supplement the development of new climate-resilient building requirements for Tobago’s specific context.
STGO-008	<p>Legal establishment and enforcement of a national hurricane resilient building code</p>	<p><i>Not yet commenced.</i></p> <p>Adaptation has not yet been implemented. Recommended implementation includes:</p> <ul style="list-style-type: none"> • Develop or adapt a climate-resilient land use policy for Tobago’s context. • Incorporate data collected via the implementation of the previous adaptation measures to develop supporting legislation for ensuring climate-resilient design and construction in Tobago.

7.6 Sectoral Adaptation Pathways

In this section, the different adaptation measures will be presented in a conceptual ‘pathways maps’. These maps will be used to show, using time as a scale, how effective each identified measure should be for both ‘Rapid Implementation’ and ‘Slow Implementation’ scenarios. A rapid implementation scenario assumes the almost unhindered implementation of the proposed measures, and a low implementation scenario assumes that proposed measures are implemented at a much slower rate. It is important to note that the barriers to implementation are not explored in the representation that these maps provide, but it can be used a plausible gauge considering the details and impacts of each proposed measure.

Proposed measures will be referred to by the codes provided in Tables 15 and 17 and will be represented by a single solid-coloured line to be interpreted as the implementation of a single measure. The solid-coloured lines will run to the assumed end point, which is based on the consideration of the priority, details, and projected impact of the measures. At this point one of two things can happen:

- i. The proposed measure can switch entirely to another measure – represented by a solid-coloured line transitioning to another solid-coloured line.

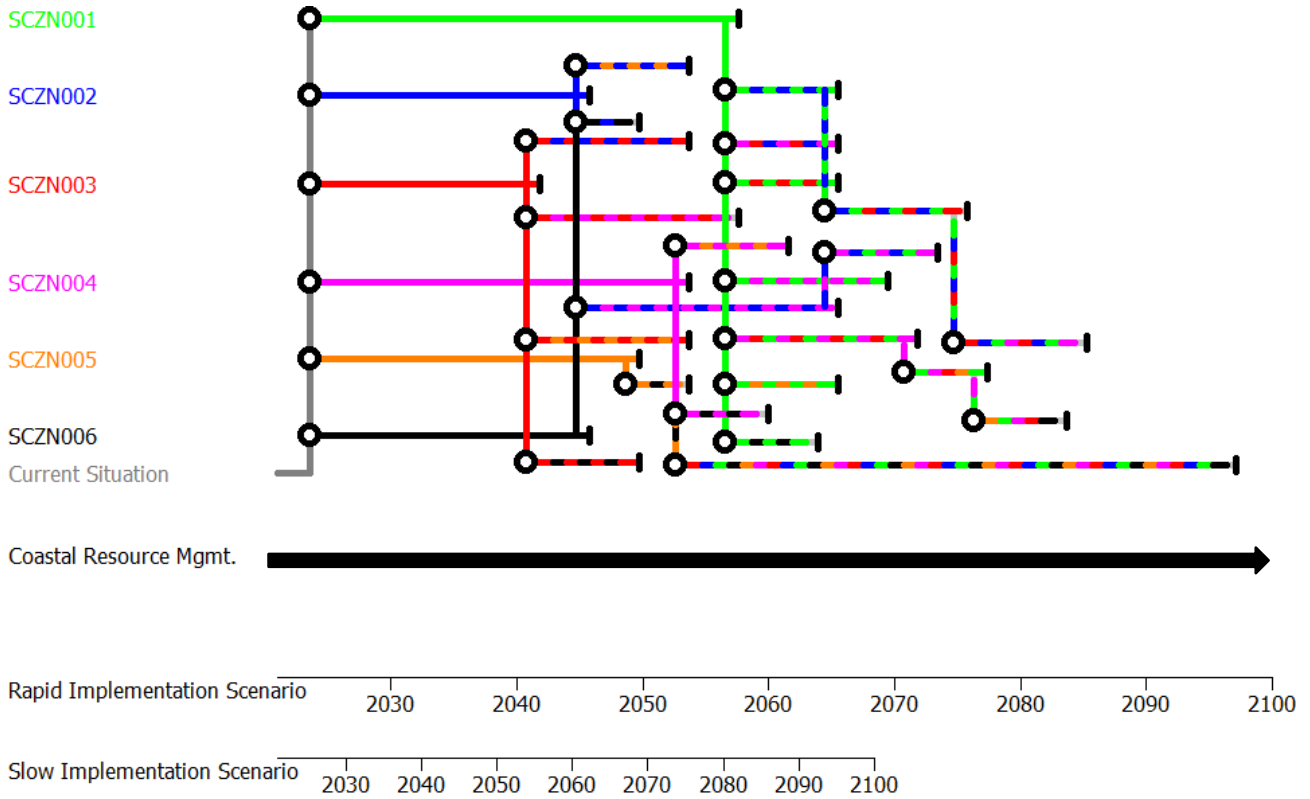
OR

- ii. The proposed measure runs simultaneously with another measure – represented by a multi-coloured line which can consist of two or more colours. The colours within these lines indicate which measures are considered for each effective time projection.

It is **important to note** that even though these multi-coloured lines start at a later point in the diagram, **all lines** are assumed to be starting from the ‘current position’ point of the time scale. This therefore means that the identified end points of each single solid or possible colour combination line are projected based on having the same starting implementation time. The map therefore does **not** account for the case that when a single measure ends that the combination measure is only then implemented. This will also mean that the more proposed measures that are implemented within a combination, the longer the effective time would be.

7.6.1 Coastal Zone Resources

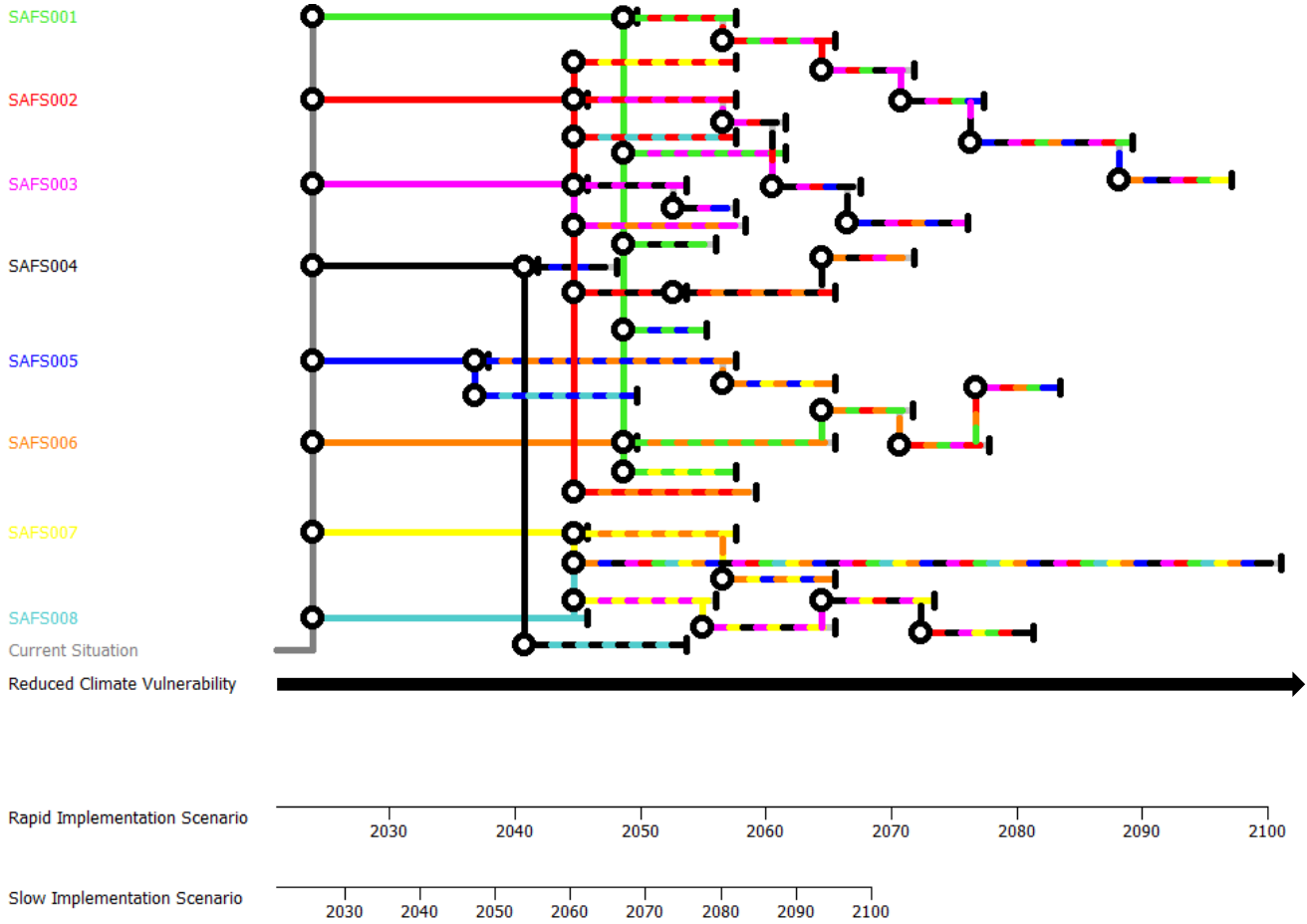
Figure 12 – Indicative Coastal Zone (SCZN) adaptation action pathways



Map generated with Pathways Generator, ©2015, Deltares, Carthago Consultancy

7.6.2 Agriculture and Food Security

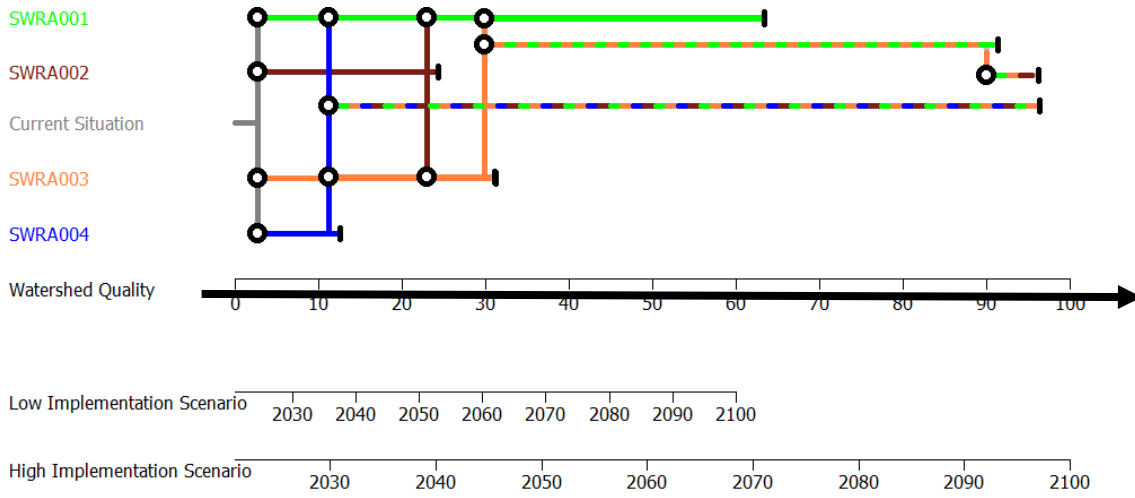
Figure 13 – Indicative Agriculture and Food Security (SAFS) adaptation action pathways



Map generated with Pathways Generator, ©2015, Deltares, Carthago Consultancy

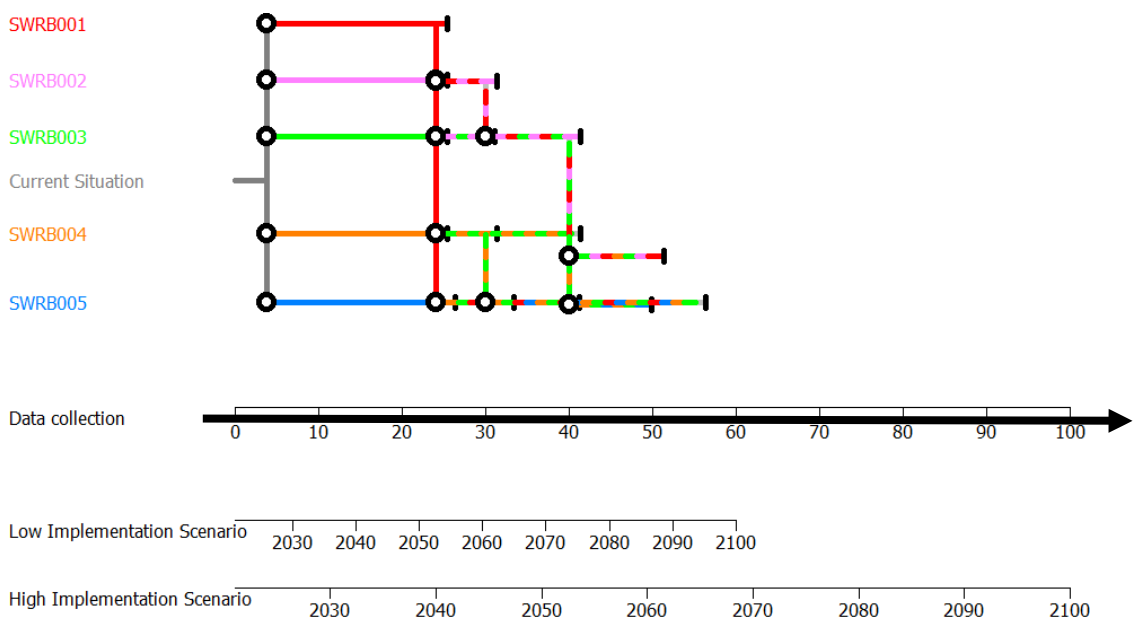
7.6.3 Water Resources

Figure 14 – Indicative Water Resources (SWRA) adaptation action pathways



Map generated with Pathways Generator, ©2015, Deltares, Carthago Consultancy

Figure 15 – Indicative Water Resources (SWRB) adaptation action pathways



Map generated with Pathways Generator, ©2015, Deltares, Carthago Consultancy

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Figure 16 – Indicative Water Resources (SWRC) adaptation action pathways

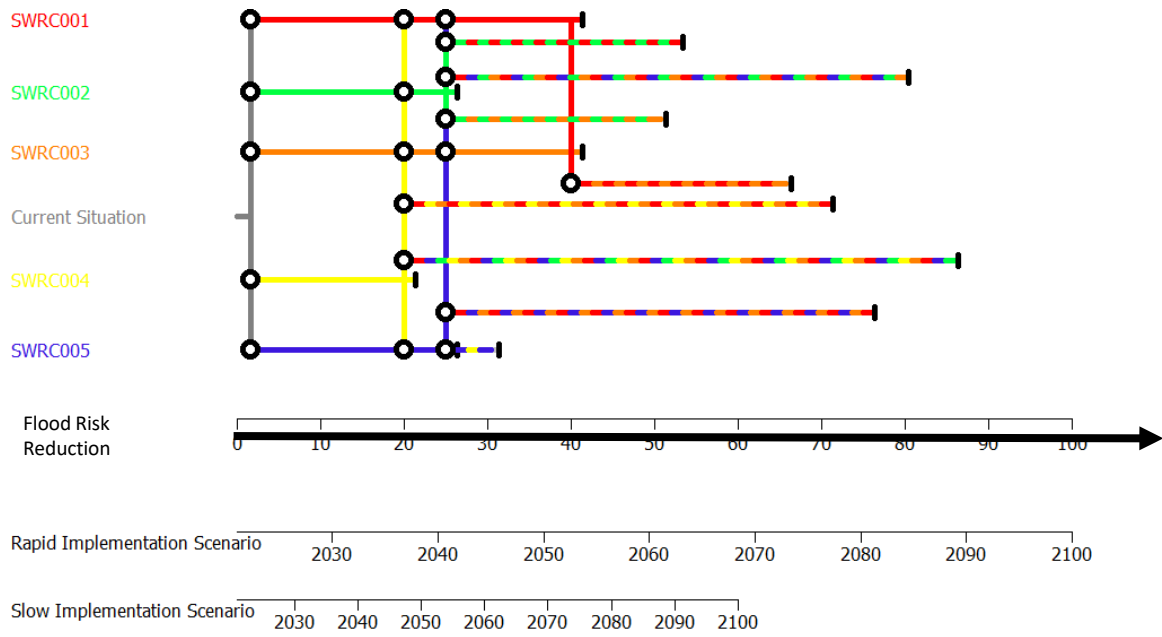
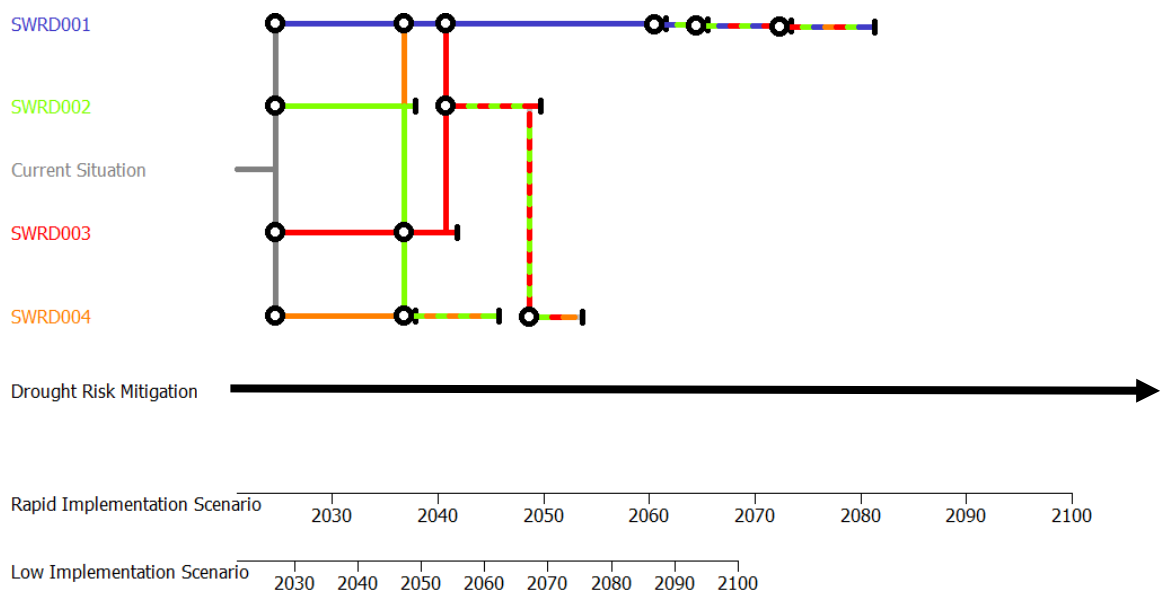
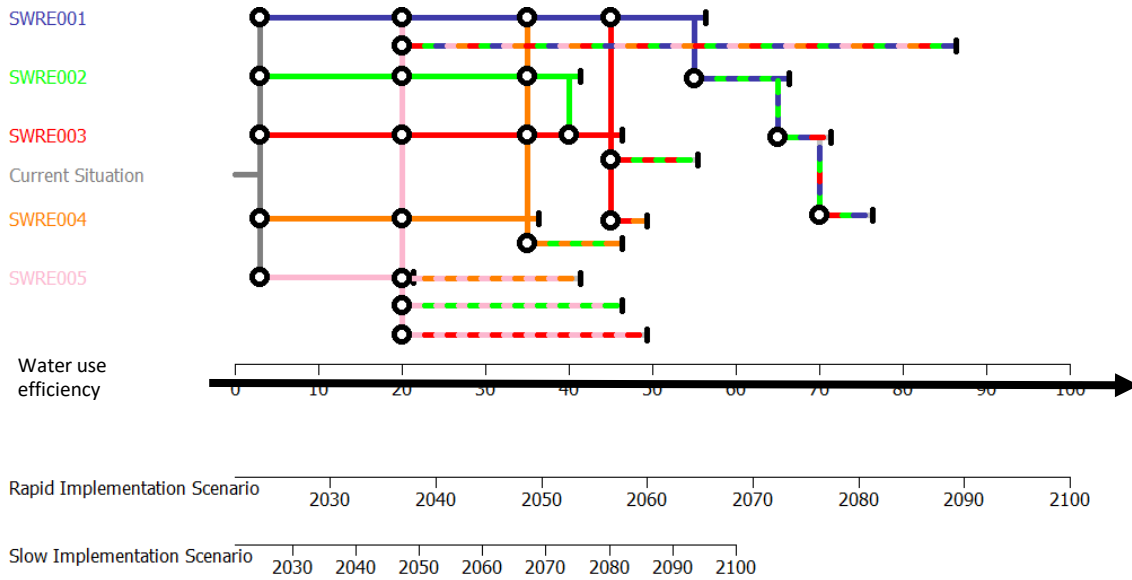


Figure 17– Indicative Water Resources (SWRD) adaptation action pathways



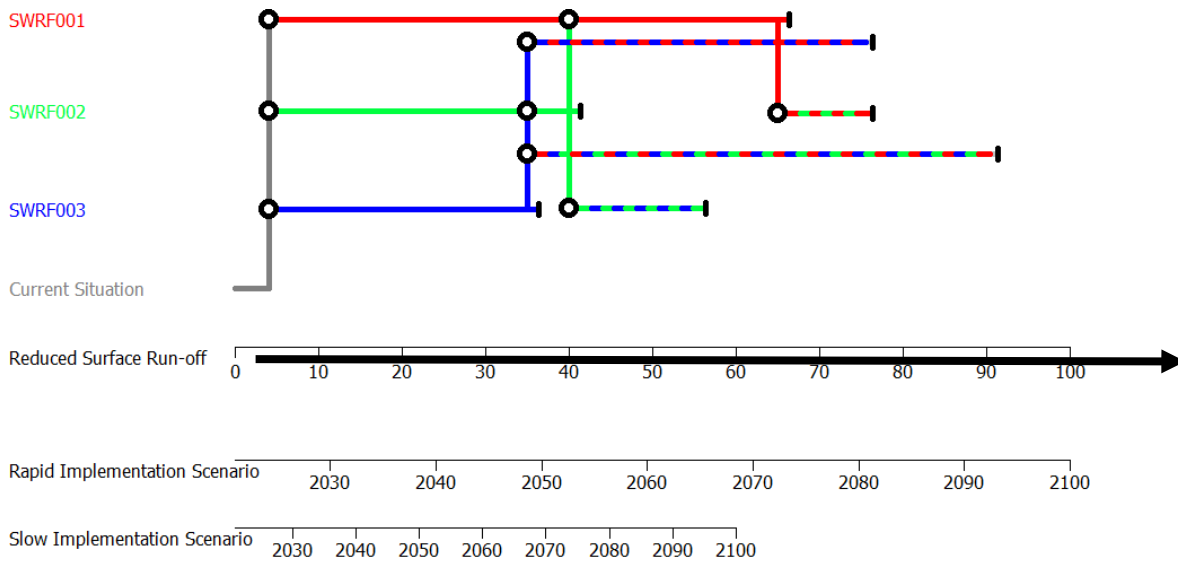
NATIONAL ADAPTATION PLAN FOR THE REPUBLIC OF TRINIDAD AND TOBAGO

Figure 18– Indicative Water Resources (SWRE) adaptation action pathways



Map generated with Pathways Generator, ©2015, Deltares, Carthago Consultancy

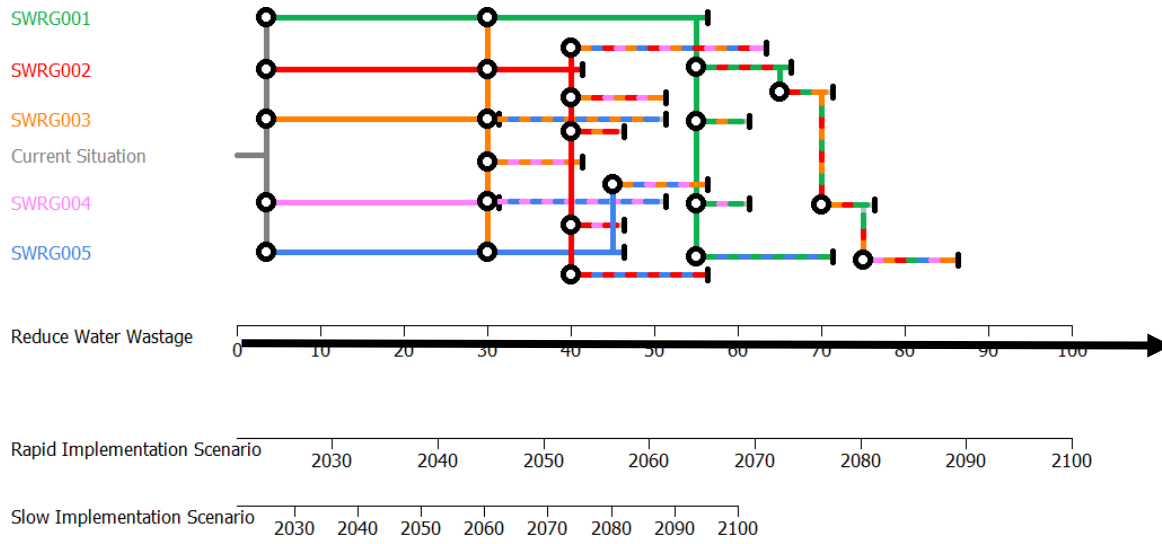
Figure 19– Indicative Water Resources (SWRF) adaptation action pathways



Map generated with Pathways Generator, ©2015, Deltares, Carthago Consultancy

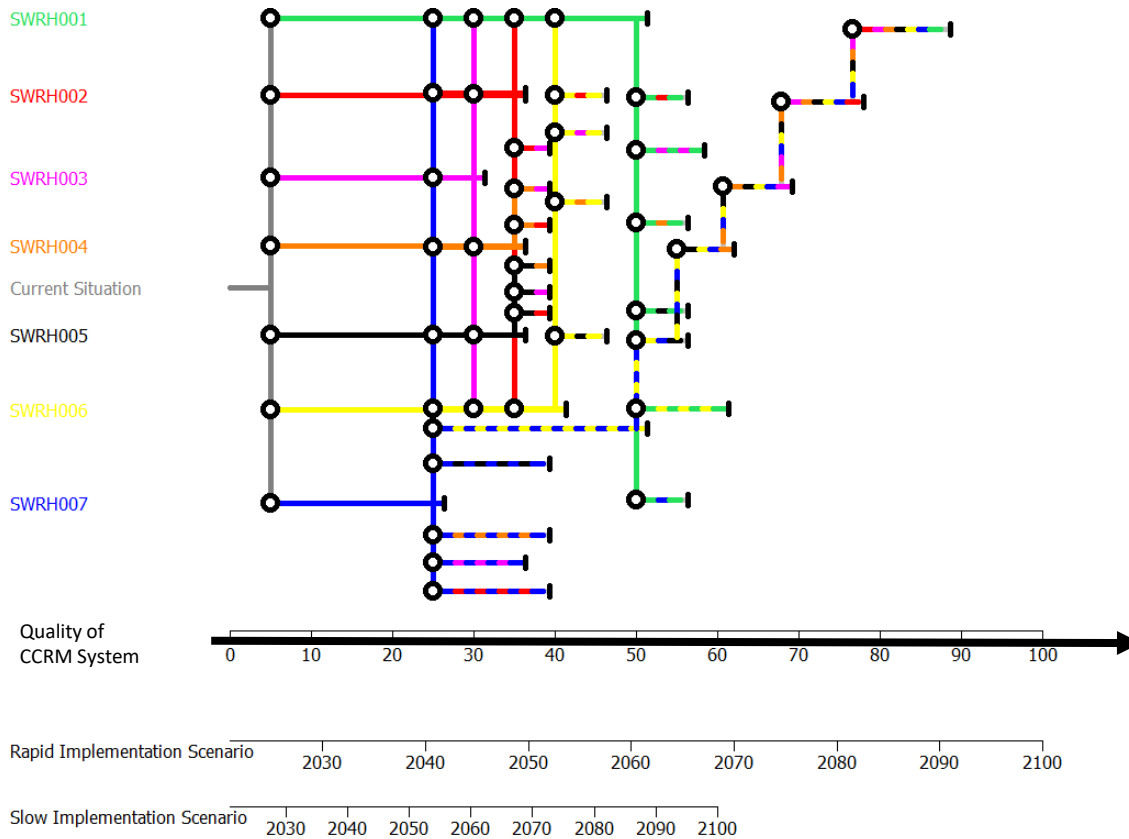
NATIONAL ADAPTATION PLAN FOR THE REPUBLIC OF TRINIDAD AND TOBAGO

Figure 20– Indicative Water Resources (SWRG) adaptation action pathways



Map generated with Pathways Generator, ©2015, Deltares, Carthago Consultancy

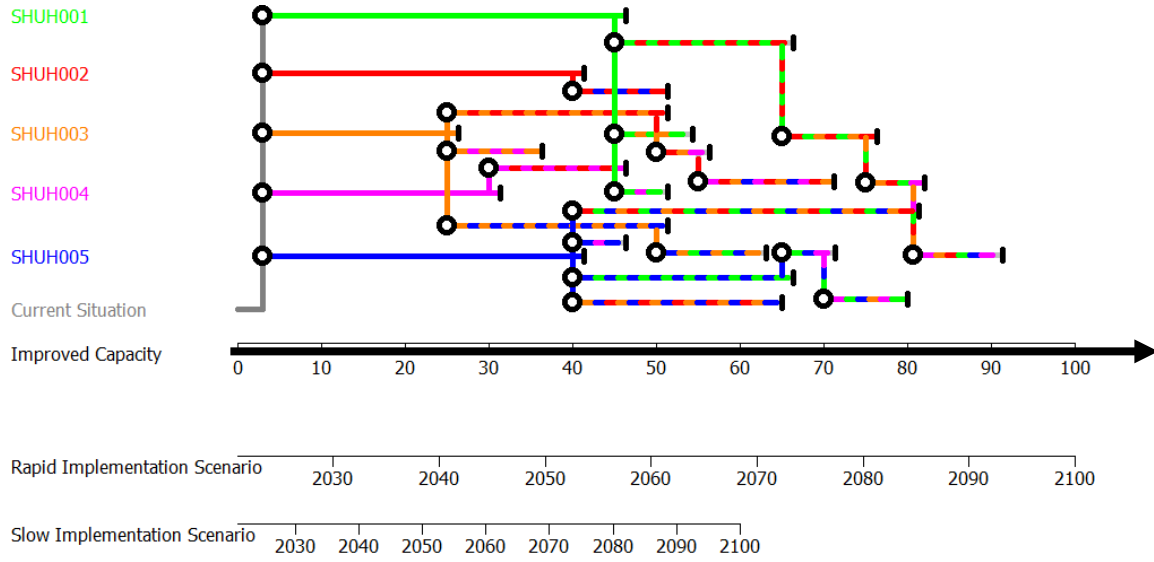
Figure 21– Indicative Water Resources (SWRH) adaptation action pathways



Map generated with Pathways Generator, ©2015, Deltares, Carthago Consultancy

7.6.4 Human Health

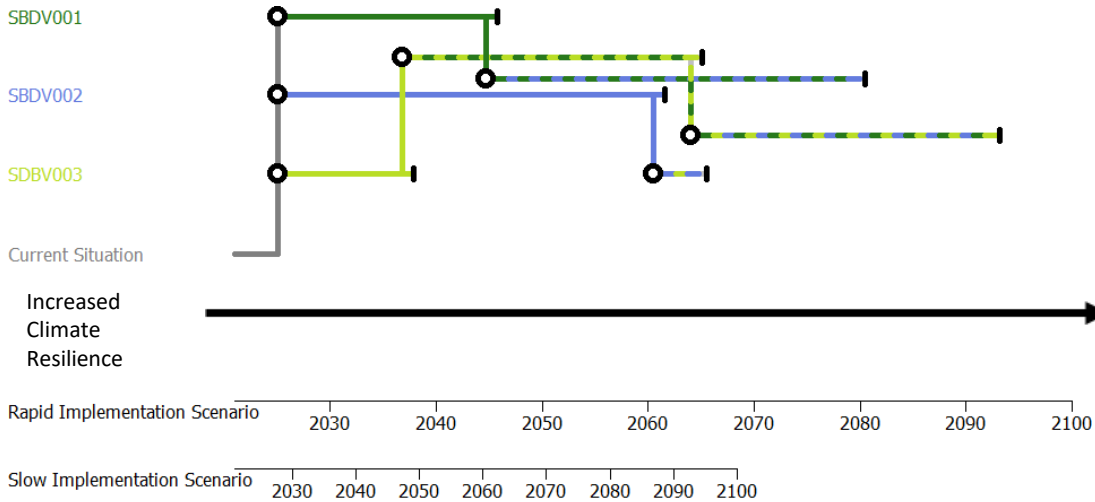
Figure 22 – Indicative Human Health (SHUH) adaptation action pathways



Map generated with Pathways Generator, ©2015, Deltares, Carthago Consultancy

7.6.5 Biodiversity

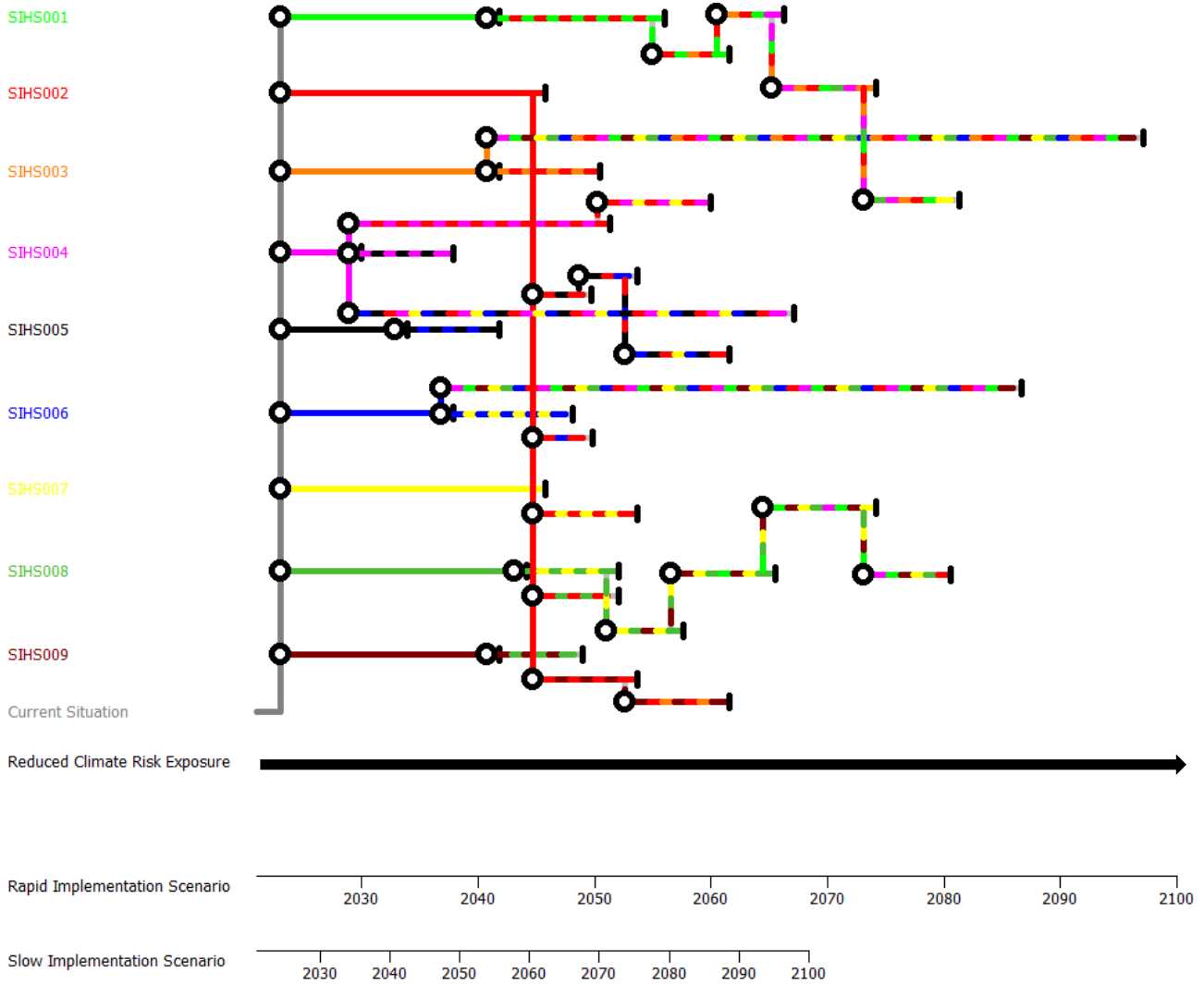
Figure 23 - Indicative Biodiversity (SBDV) adaptation action pathways



Map generated with Pathways Generator, ©2015, Deltares, Carthago Consultancy

7.6.6 Infrastructure and Human Settlements

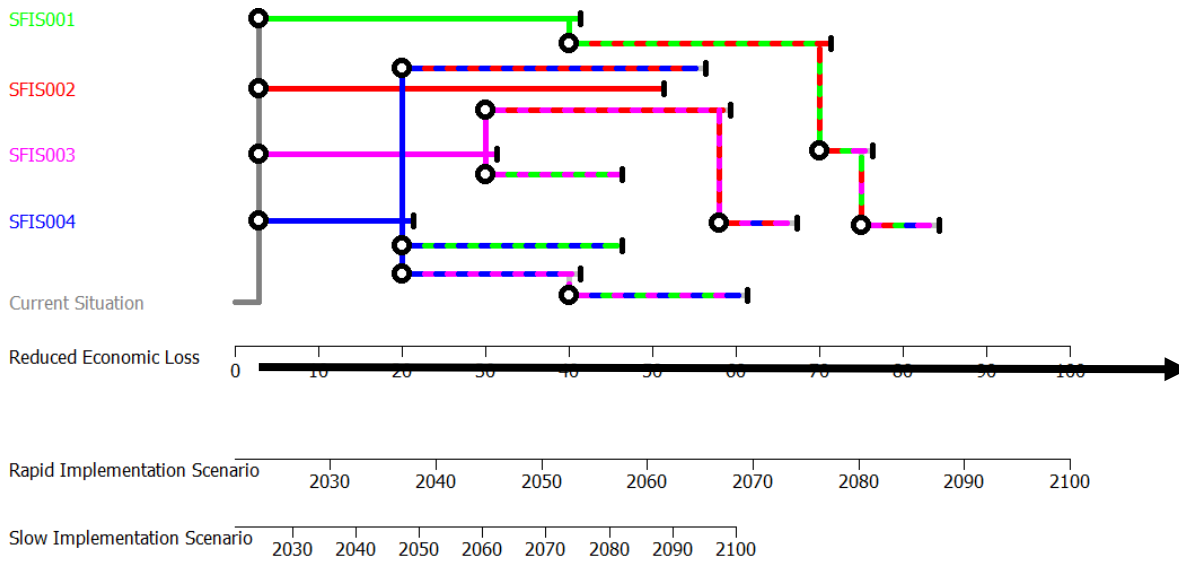
Figure 24 - Indicative Infrastructure and Human Settlements (SIHS) adaptation action pathways



Map generated with Pathways Generator, ©2015, Deltares, Carthago Consultancy

7.6.7 Financial Services.

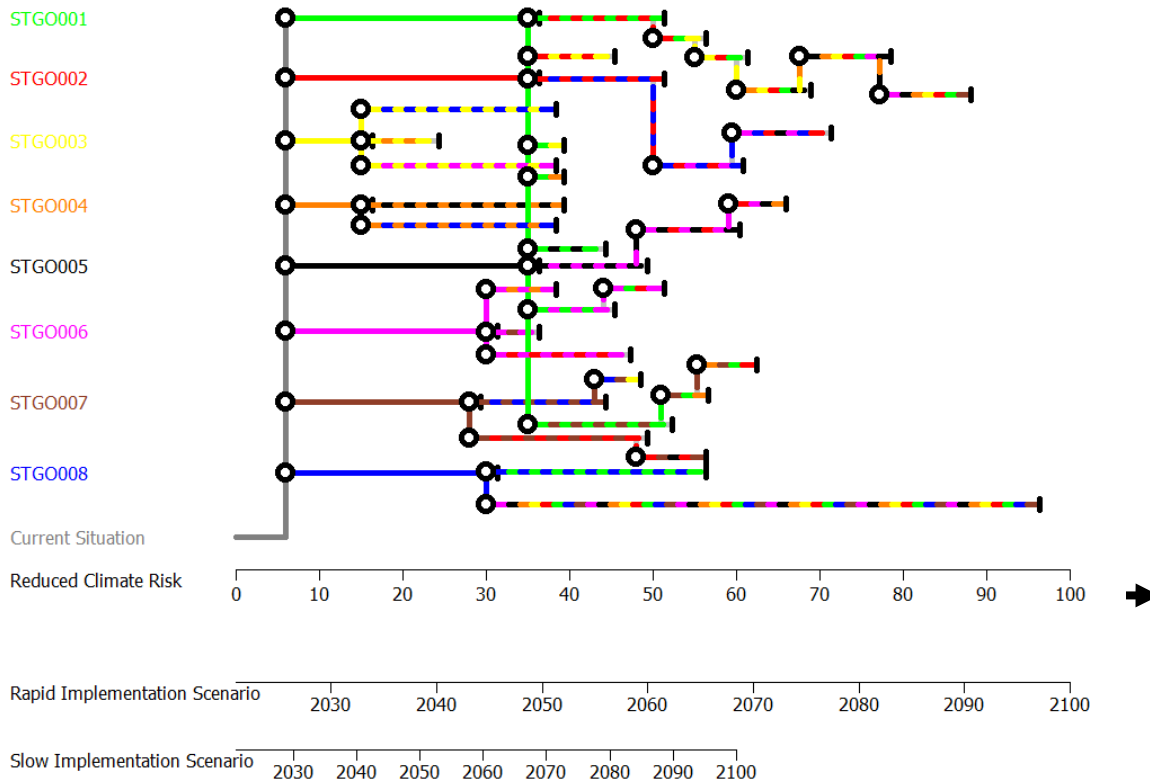
Figure 25 – Indicative Financial Services (SFIS) adaptation action pathways



Map generated with Pathways Generator, ©2015, Deltares, Carthago Consultancy

7.6.8 Tobago

Figure 26 – Indicative Tobago (STGO) adaptation action pathways



Map generated with Pathways Generator, ©2015, Deltares, Carthago Consultancy

8.0 NAP Implementation and Support Needs

The successful implementation of the enabling and sectoral strategies and actions require enhanced institutional capacities and direct financial investments into on-the-ground adaptation efforts.

First and foremost, the most critical enabling action, *EMNP-004 “Enhancing the human and technical capacities of key stakeholders to understand and manage climate risks towards informed decision making.”*, is essential for enhancing the integrity and efficiency of the national *Strategic Programme for Climate Risk Management*. Thirteen (13) public sector and non-governmental actors have been identified for having their human resource, technical and technological capacities enhanced under this measure at a cost of **US\$19,725,857.00** over five years.

Table 25 - Summary of Costs for enhancing the Strategic Programme for Climate Risk Management (EMNP-004).

INSTITUTION IDENTIFIED AS IN NEED OF URGENT CAPACITY ENHANCEMENT FOR CCA	INDICATIVE COSTS FOR HUMAN AND TECHNICAL RESOURCE CAPACITY BUILDING (USD)	
Environmental Research Institute Charlotteville (ERIC)	US\$	5 56,154.00
University of Trinidad and Tobago	US\$	230,770.00
Council of Presidents for the Environment (COPE)	US\$	226,524.00
	US\$	145,262.00
Environmental Management Authority	US\$	2,120,000.00
Environment Tobago	US\$	80,770.00
	US\$	363,231.00
Fisheries Division, Ministry of Agriculture, Land and Fisheries	US\$	558,769.00
Ministry of Health (For a Health National Adaptation Plan)	US\$	2,295,385.00
Institute of Marine Affairs	US\$	3,869,231.00
Local. Area and Regional Planning and Development Unit (LARPDU), Ministry of Rural Development and Local Government	US\$	1,440,991.00
Trinidad and Tobago Meteorological Services	US\$	451,385.00
Coastal Protection Unit, Ministry of Works and Transport	US\$	1,292,308.00
Water Resources Agency	US\$	6,065,077.00
	TOTAL	US\$ 19,725,857.00

Adapted from: Clarke, 2019b ^[115] using an exchange rate of 1 USD: 6.5TTD.


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A summary of costs across all adaptation actions by category are presented in Table 26.

Table 26 – Estimated costs of present and proposed adaptation measures segregated by category.

CATEGORY OF STRATEGY /ACTION	ESTIMATED COST (USD)		
	NO REGRET-HIGH IMPACT	OTHER PRIORITY STRATEGIES	
EADF <i>Adaptation Financing</i>	US\$ -	US\$	350,000.00
EMOE <i>Monitoring and evaluation</i>	US\$ -	US\$	70,000.00
EMNP <i>Mainstreaming into National Planning</i>	US\$ 19,725,857.00	US\$	20,000.00
SCZN <i>Coastal Zone Resources</i>	US\$ 50,000.00	US\$	2,035,000.00
SAFS <i>Agriculture and Food Security</i>	US\$ 1,920,000.00	US\$	1,460,000.00
SWRA <i>Water Resources</i>	US\$ 892,500.00	US\$	80,095,000.00
-SWRH			
SHUH <i>Human Health</i>	US\$ 200,000.00	US\$	28,100,000.00
SBDV <i>Biodiversity</i>	US\$ -	US\$	600,000.00
SIHS <i>Infrastructure and Human Settlements</i>	US\$ 95,000.00	US\$	5,230,000.00
SFIS <i>Financial Services</i>	US\$ -	US\$	450,000.00
STGO <i>Tobago</i>	US\$ 50,000.00	US\$	9,380,000.00
SUB- TOTAL	US\$ 22,933,357.00	US\$	127,790,000.00
	TOTAL	US\$	150,723,357.00

Adapted from: Clarke, 2019b ^[115]

Table 27 shows the estimated cost for each specific adaptation strategy. Strategies demarcated with a “” represents a strategy identified by the sectoral TWGs and technical experts as being “No Regret- High Impact”.

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Table 27 – Estimated cost of all listed adaptation measures.

#	REF CODE	PAST AND FUTURE CLIMATE CHANGE ADAPTATION STRATEGIES	ESTIMATED COST REQUIRED FOR IMPLEMENTATION (USD)
ENABLING			
<i>Adaptation Financing</i>			
01	EADF-001	Establish a “Climate Change Window” under the Trinidad and Tobago Green Fund (TTGF)	US\$ 0.00
02	EADF-002	Strengthen partnerships with multilateral agencies and donors for adaptation financing.	US\$ 0.00
03	EADF-003	Obtain direct access to the Green Climate Fund (GCF)	US\$ 350,000.00
<i>Monitoring and Evaluation</i>			
04	EMOE-001	Develop a participatory Monitoring and Evaluation, (M&E) framework.	US\$ 20,000.00
05	EMOE-002	Establish framework for capturing climate change adaptation efforts in the national climate change knowledge management system (KMS)	US\$ 50,000.00
<i>Mainstreaming into National Planning</i>			
06	EMNP-001	Establish multiparty working groups across government, private sector and civil society to integrate climate change adaptation into budgets and decision making.	US\$ 0.00
07	EMNP-002	Establish national climate change legislation to give legal authority to a governmental body to mainstream adaptation into planning and development.	US\$ 10,000.00
08	EMNP-003	Make legislative amendments to incorporate adaptation considerations into permitting requirements.	US\$ 10,000.00
09	EMNP-004	✦ Enhancing the human and technical capacities of key stakeholders to understand and manage climate risks towards informed decision making.	US\$ 19,725,857.00
SECTORAL			
<i>Coastal Zone Resources</i>			
10	SCZN-001	✦ Evidence-based coastal vulnerability and risk assessment information made available to stakeholders.	US\$ 50,000.00
11	SCZN-002	Give the responsibility of conservation, restoration and management of coastal ecosystems in T&T to civil society organizations.	US\$ 125,000.00

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#	REF CODE	PAST AND FUTURE CLIMATE CHANGE ADAPTATION STRATEGIES	ESTIMATED COST REQUIRED FOR IMPLEMENTATION (USD)
12	SCZN-003	Improve public education through the incorporation of climate change, storm planning/disaster management into the national curriculum.	US\$ 150,000.00
13	SCZN-004	Implement Integrated Coastal Zone Management (ICZM) adaptive strategies and encourage protection and maintenance of dynamic coastal buffer features.	US\$ 1,430,000.00
14	SCZN-005	Establish engineering-based solutions where appropriate to protect critical infrastructure.	US\$ 230,000.00
15	SCZN-006	Establish a Coastal Information Management System.	US\$ 100,000.00
<i>Agriculture and Food Security</i>			
16	SAFS-001	 Increase the availability and awareness of technology to improve water management.	US\$ 1,920,000.00
17	SAFS-002	Promote protected agriculture.	US\$ 50,000.00
18	SAFS-003	Promote climate-sensitive farming.	US\$ 200,000.00
19	SAFS-004	Improve land distribution and management to secure areas for agricultural production.	US\$ 50,000.00
20	SAFS-005	Improve research and development considerably by learning from the examples of several climate and crop studies carried out in the Caribbean.	US\$ 400,000.00
21	SAFS-006	Streamline climate change issues into agricultural planning and management.	US\$ 400,000.00
22	SAFS-007	Re-orient agricultural support policies.	US\$ 100,000.00
23	SAFS-008	Improve climate monitoring systems for the agricultural sector.	US\$ 260,000.00
<i>Water Resources – Integrated Water Resources Management</i>			
24	SWRA-001	Improve and enforce the water resources master plan which embodies the principles of Integrated Water Resources Management (IWRM).	US\$ 400,000.00
25	SWRA-002	Conduct a national water resources quantification study for surface water, coastal/marine waters, and groundwater.	US\$ 200,000.00
26	SWRA-003	Implement a national water quality monitoring programme for surface, coastal/marine, and groundwater.	US\$ 2,540,000.00



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#	REF CODE	PAST AND FUTURE CLIMATE CHANGE ADAPTATION STRATEGIES	ESTIMATED COST REQUIRED FOR IMPLEMENTATION (USD)
27	SWRA-004	Improve and enforce the water resources master plan which embodies the principles of Integrated Water Resources Management (IWRM).	US\$ 50,000.00
<i>Water Resources – Improved Agro-hydro-meteorological Monitoring</i>			
28	SWRB-001	Deploy and install a catchment-based network of surface water flow gauges	US\$ 1,500,000.00
29	SWRB-002	Deploy and install a catchment-based tipping bucket rain gauge network on a national scale in support of IWRM.	US\$ 1,500,000.00
30	SWRB-003	Implement a groundwater flow, salinity and quality testing programme at the national scale.	US\$ 1,500,000.00
31	SWRB-004	Deploy and install a network of tidal gauges at the national scale.	US\$ 2,000,000.00
32	SWRB-005	Develop a data management framework for hydro-meteorological data across public sector bodies.	US\$ 1,840,000.00
<i>Water Resources – Flood Mitigation and Flood Risk Management</i>			
33	SWRC-001	❖ Inclusion of flood risk reduction measures as part of the national development process.	US\$ 50,000.00
34	SWRC-002	Implement a national flood modelling, flood risk assessment and flood hazard mapping programme.	US\$ 400,000.00
35	SWRC-003	Development of flood response and recovery plans for flood-prone areas.	US\$ 400,000.00
36	SWRC-004	Systematic collection of rainfall, surface flow, and tidal data, and the development of a national database to house said data.	US\$ 8,340,000.00
37	SWRC-005	Carry out a national assessment of socio-economic vulnerability to flooding.	US\$ 75,000.00
<i>Water Resources- Drought Mitigation and Drought Risk Management</i>			
38	SWRD-001	❖ Inclusion of projections from the Caribbean Drought and Precipitation Monitoring Network (CDPMN) in the decision-making process for drought mitigation and drought risk management.	US\$ 37,500.00
39	SWRD-002	The exploration of storm water, rainwater and greywater harvesting and reuse as an alternative means of potable and non-potable water supply augmentation.	US\$ 280,000.00
40	SWRD-003	Systematic collection of rainfall, surface flow, and groundwater data, and conduct a groundwater study.	US\$ 6,340,000.00
41	SWRD-004	The exploration of groundwater extraction points at higher elevations.	US\$ 200,000.00
<i>Water Resources- Water Supply and Demand Management</i>			
42	SWRE-001	❖ Implementation of a national education-centred water demand management programme.	US\$ 200,000.00

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#	REF CODE	PAST AND FUTURE CLIMATE CHANGE ADAPTATION STRATEGIES	ESTIMATED COST REQUIRED FOR IMPLEMENTATION (USD)
43	SWRE-002	❖ Incentivizing the use of water-efficient fixtures.	US\$ 50,000.00
44	SWRE-003	Installation of 'smart' water meters as a means of 'demand management' for water for high-volume users of water resources.	US\$ 7,800,000.00
45	SWRE-004	Installation of 'smart' water meters at the individual customer level, along distribution lines, and on storage infrastructure.	US\$ 39,000,000.00
46	SWRE-005	Execution of a national fresh water demand forecasting project, disaggregated by metering district and industry.	US\$ 500,000.00
Water Resources- Infrastructure, Development and Planning			
47	SWRF-001	❖ Strategic construction of stormwater retention and detention structures and reservoirs.	US\$ 280,000.00
48	SWRF-002	Revision of building standards to require the storage of a certain percentage of surface runoff on-site for new and existing development as part of the development of a new climate-resilient National Building code.	US\$ 4,530,000.00
49	SWRF-003	Draft and enforce legislation pertaining to the utilization of land in flood-prone area.	US\$ 50,000.00
Water Resources- Education and Capacity Building			
50	SWRG-001	❖ Execution of a national training programme for farmers, focused on IWRM.	US\$ 150,000.00
51	SWRG-002	❖ The updating of job descriptions across the water management-related fields within the public sector.	US\$ 25,000.00
52	SWRG-003	Execution of a national public education and awareness-building programme to reduce water wastage and overall water usage.	US\$ 200,000.00
53	SWRG-004	Execution of a national public education programme to build public awareness of the projected effects of climate change on water resources, including fresh water availability, water quality, and flood risk.	US\$ 50,000.00
54	SWRG-005	Execution of a national training programme on IWRM for technical professionals in the construction, engineering, architecture, planning, and water resource management fields.	US\$ 150,000.00
Water Resources- Legislation and Regulation			
55	SWRH-001	❖ Drafting and enforcement of legislation requiring the sharing of environmental data across public sector agencies.	US\$ 50,000.00
56	SWRH-002	❖ Drafting and enforcement of legislation pertaining to the utilization of land in flood-prone area.	US\$ 50,000.00
57	SWRH-003	Drafting and enforcement of legislation requiring the execution of a national flood modelling, flood risk	US\$ 50,000.00

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#	REF CODE	PAST AND FUTURE CLIMATE CHANGE ADAPTATION STRATEGIES	ESTIMATED COST REQUIRED FOR IMPLEMENTATION (USD)
		assessment and flood hazard mapping programme every ten years.	
58	SWRH-004	Drafting and enforcement of legislation defining the standards for drinking and recreational/bathing water quality.	US\$ 50,000.00
59	SWRH-005	Drafting and enforcement of legislation defining standards for wastewater and industrial effluent quality.	US\$ 50,000.00
60	SWRH-006	Drafting and enforcement of legislation requiring the development of a water resources master plan every ten years.	US\$ 50,000.00
61	SWRH-007	Drafting and enforcement of legislation requiring the execution of a national water resources quantification study every ten years.	US\$ 50,000.00
Human Health			
62	SHUH-001	 Hazard mapping to identify country-wide and site-specific risks to the health sector.	US\$ 200,000.00
63	SHUH-002	Develop and implement climate change preparedness planning and a Public Health Education programme.	US\$ 400,000.00
64	SHUH-003	Undertake an inter-agency and utilities climate change risk assessment with the focus on health service delivery and health infrastructure.	US\$ 200,000.00
65	SHUH-004	Upgrade of drainage infrastructure.	US\$ 25,000,000.00
66	SHUH-005	Improve climate change risk management within health service delivery including built-in redundancy	US\$ 2,500,000.00
Biodiversity			
67	SBDV-001	Improve the practice of biodiversity management through the participatory development of a National Protected Area System Plan	US\$ 400,000.00
68	SBDV-002	Rationalize and coordinate the policy, legal and legislative framework for the management of biodiversity	US\$ 100,000.00
69	SBDV-003	Raise awareness of policy makers and the public to biodiversity conservation and climate change and the link to quality of life	US\$ 100,000.00
Infrastructure and Human Settlements			
70	SIHS-001	 Public awareness concerning climate change risks to critical infrastructure and settlements, including informal settlements	US\$ 50,000.00

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#	REF CODE	PAST AND FUTURE CLIMATE CHANGE ADAPTATION STRATEGIES	ESTIMATED COST REQUIRED FOR IMPLEMENTATION (USD)
71	SIHS-002	❖ Increase the use and efficiency of community-based early warning systems, evacuation and egress	US\$ 45,000.00
72	SIHS-003	Collect geo-references data and information on hazard and climate change risks	US\$ 100,000.00
73	SIHS-004	Review of building standards being used; and development of a climate-resilient National Building Code	US\$ 4,530,000.00
74	SIHS-005	A risk assessment of sea level rise, storm surge and intense precipitation on infrastructure and settlements, including informal settlements, by key agencies	US\$ 200,000.00
75	SIHS-006	Compile an inventory of critical, commercial, and industrial infrastructure and develop a national level risk management plan for critical infrastructure and settlements	US\$ 400,000.00
76	SIHS-007	Installation of green areas on the roofs of buildings.	US\$ 250,000.00
77	SIHS-008	Standardise emergency protocols under a common framework so that they are easy to understand and accessible to the public.	US\$ 0.00
78	SIHS-009	Training programmes to educate and inform public officials on climate change and its effects	US\$ 200,000.00
Financial Services			
79	SFIS-001	Develop on and improve the current insurance instruments for disaster risk insurance.	US\$ 150,000.00
80	SFIS-002	Establishment of a framework for consistent re-evaluation of climate change adaptations to develop innovative insurance instruments that properly account for the dynamics of climate change.	US\$ 100,000.00
81	SFIS-003	Establishment of a framework to ensure relevancy of climate change and insurance data and information, and to make this data accessible and easily disseminated to the population and the government.	US\$ 100,000.00
82	SFIS-004	Create a method via which insurance agencies can emphasize risk reduction strategies and risk management to their policyholders.	US\$ 100,000.00

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#	REF CODE	PAST AND FUTURE CLIMATE CHANGE ADAPTATION STRATEGIES	ESTIMATED COST REQUIRED FOR IMPLEMENTATION (USD)
<i>Tobago</i>			
83	STGO-001	❖ Develop and adopt climate resilient land use policy and supporting legislation to ensure that all design and construction in Tobago is climate resilient.	US\$ 50,000.00
84	STGO-002	Increase focus on building capacity at the community level to build climate resilience.	US\$ 300,000.00
85	STGO-003	Improve the capacity for the management of influxes of Sargassum seaweed; and enhance the ability to capitalize on its resource value.	US\$ 100,000.00
86	STGO-004	Improve research to define climate change triggers for Sargassum outbreaks.	US\$ 50,000.00
87	STGO-005	Undertake fish stock inventory and climate risk management programme.	US\$ 200,000.00
88	STGO-006	Provide technical and financial resources and training of fisher folk.	US\$ 4,000,000.00
89	STGO-007	Undertake vulnerability and risk assessment at the household and building level	US\$ 200,000.00
90	STGO-008	Legal establishment and enforcement of a national hurricane resilient building code	US\$ 4,530,000.00

Adapted from: de Berdt Romilly, 2019 ^[66] and Clarke, 2019b ^[115]

9.0 NAP Communication

The GORTT acknowledges the critical importance of all members of society understanding climate risks and their role in CCA. Essential to the success of any strategy – and this NAP in entirety – is the meaningful participation and involvement of individuals, communities, interest groups, stakeholders, private sector, academia, international partners and decision-makers. It is imperative that this NAP be communicated clearly and efficiently to these groups, with special emphasis given to under-represented, marginalized or vulnerable groups.

In the preparation of this NAP, the GORTT has begun establishing an enabling environment for this work by providing media sensitization sessions on climate change reporting to the benefit of 54 persons across 29 media organizations. However, communication of the NAP and its contents must go beyond reporting. It must be promoted across sectors by multiple actors through various channels making use of targeted communication strategies. It is the shared responsibility of all stakeholders that comprise the *Strategic Programme for Climate Risk Management*. However, it is hoped that stakeholders with the longest track record of environmental education and sensitization play a pivotal leadership role in this regard.

The development of national and sectoral communication strategies and campaigns should follow international best practice, refined by learning-by-doing in our unique national context. Campaigns should be designed after considering the needs and interests of the target audience, their media consumption preferences, and sharing habits. Messages should be tailored to connect CCA to the values of the audience.

The communication of this NAP and subsequent updates to the UNFCCC shall be the responsibility of the UNFCCC National Focal Point which is currently the Ministry with the responsibility for planning.

NAP communication should be explicitly monitored by the coordinating bodies of the NAP, and data captured through the M&E system described in Chapter 11. This would ensure cost-effective, impactful communication.

10.0 NAP Alignment with Existing Strategic, Legal and Regulatory Frameworks

Sustainable development, climate change adaptation and disaster risk reduction are closely interconnected concepts which are distinguished politically by different multilateral environmental agreements (MEAs).^[116] These include the United Nations 2030 Agenda for Sustainable Development (“UN SDGs”), the United Nations Framework Convention on Climate Change (UNFCCC), and the Sendai Framework for Disaster Risk Reduction (DRR), to name a few. The GORTT has established a suite of policy instruments to operationalize these international commitments. However, it recognizes that planning, implementing and monitoring these processes independently of each other can lead to conflicts and added costs among sub-national actors. Thus, the GORTT has made a conscientious decision to ensure that there is alignment between existing strategic, legal and regulatory frameworks and new policy tools, such as this NAP.

Alignment is defined as “a process of identifying synergies among policy processes with common objectives to increase coherence, efficiency and effectiveness for improved outcomes”.^[117] It differs from “mainstreaming” in that it does not seek to integrate topical considerations into planning, budgets, implementation or monitoring. Rather, it is the comparison of the text and themes of different policy instruments that share a common objective to discover synergies and possible conflicts.^[117] Policy alignment exists on a spectrum based on the similarity and differences in their preparation, stakeholders, operating mechanisms, coordination, vision and policy statements.

There is a clear convergence between sustainable development, climate change, and disaster risk reduction. The GORTT has used the alignment categories presented by Daze et al. (2018) for assessing the degree of alignment between this NAP and national, regional and international frameworks for these three domains^[117].

Figure 27 – Spectrum of Alignment



Source: Daze et al, 2018^[39].

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Table 28 – NAP alignment with International Conventions

#	GOVERNING BODY	NAME	DESCRIPTION OF INTERNATIONAL POLICY INSTRUMENT	LEVEL/ DESCRIPTION OF ALIGNMENT
1	UNFCCC	Paris Agreement	An agreement on the global response to climate change with emphasis on adaptation, mitigation, loss and damage, and finance. The global goal on adaptation focuses on enhancing adaptive capacity, increasing resilience and limiting vulnerability.	<i>High. Systematic alignment.</i> This NAP was crafted specifically to satisfy the provisions of the UNFCCC and the Paris Agreement with regards to enhanced adaptation, adaptation communication, and global stocktake. There is high synergy in its vision. The NAP has a clear coordinating entity and takes actions across sectors and levels of government.
2	UN General Assembly	The 2030 Agenda for Sustainable Development	A voluntary global commitment to eradicate poverty and achieve sustainable development by 2030, ensuring no one is left behind. SDG 13 is dedicated to taking urgent action to combat climate change and its impacts. Action on climate change resilience is relevant to most SDGs, including poverty eradication, economic growth, health and well-being, clean water supply and sanitation, sustainable cities, environmental protection and land use.	<i>Moderate. Strategic alignment.</i> This NAP differs in vision and objective with the 2030 Agenda, however; the vision of the NAP supports sustainable development. The strategies and actions contained within this NAP yield co-benefits across other SDGs apart from SDG 13. A resilient nation can weather the shocks of climate change and its adverse effects on development. The NAP therefore supports the goals of the 2030 Agenda by protecting, among others, the least vulnerable.
3	UNDRR	The Sendai Framework for Disaster Risk Reduction	An international framework on disaster risk reduction with four priorities for action: understanding disaster risk; strengthening disaster risk governance to manage disaster risk; investing in disaster risk reduction for resilience; enhancing disaster preparedness for effective response and to “build back better”.	<i>Moderate. Strategic alignment.</i> This NAP differs in vision and objective; however, the vision of the NAP supports resilience building. Overlaps between the NAP and the Sendai Framework regarding resilience building and risk management.

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#	GOVERNING BODY	NAME	DESCRIPTION OF INTERNATIONAL POLICY INSTRUMENT	LEVEL/ DESCRIPTION OF ALIGNMENT
4	UN General Assembly	Barbados Programme of Action (BPOA), The Mauritius Strategy for Implementation (MSI) and the SIDS Accelerated Modalities of Action (SAMOA) Pathway (2014-2024).	A series of policy frameworks that recognizes the unique vulnerabilities of SIDS and provides recommendations and mechanisms for advancing sustainable development, climate action and disaster risk reduction.	<i>Moderate. Strategic alignment.</i> Meaningful overlap and synergies exist between both documents specifically in relation to recognizing the vulnerabilities of SIDS and commitments to addressing climate change, sustainable development and disaster risk reduction.
5	UN DESA	Addis Ababa Action Agenda	A global framework that seeks to align financing flows and policies with economic, social and environmental priorities in developing countries. The Agenda recognizes the role of public and private business and finance, as well as the role of international trade, debt and debt sustainability for international development. It further acknowledges the importance of addressing systemic issues, including science, technology, innovation and capacity building.	<i>Low. Informal alignment.</i> Enabling strategies proposed in the NAP support national ownership of adaptation efforts through public finance. The NAP also speaks to leveraging international finance towards sustainable development and adaptation action.
6	CBD	Strategic Plan for Biodiversity 2011 -2020 and the Aichi Biodiversity Targets	Strategic Plan for Biodiversity 2011–2020 aims to halt biodiversity loss and enhance the benefits it provides to people, highlight climate change as a major pressure on biodiversity, while recognising its role in supporting adaptation to climate change. Twenty Aichi Biodiversity Targets are organized under five Strategic Goals. The Post-2020 Global Biodiversity Framework is expected to be agreed on in 2021.	<i>Low. Informal alignment.</i> The NAP advocates for ecosystem-based approaches to adaptation and other measures to protect biodiversity from the impacts of climate change.
7	UN Habitat III	New Urban Agenda	A new global standard for sustainable urban development, whose focus includes strengthening resilience in cities to reduce the risk and the impact of disasters, as well as action	<i>Low. Informal alignment.</i> Stakeholders in the urban planning, infrastructure and development sectors were included in the development of the NAP, and recommendations

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#	GOVERNING BODY	NAME	DESCRIPTION OF INTERNATIONAL POLICY INSTRUMENT	LEVEL/ DESCRIPTION OF ALIGNMENT
			to address climate change by reducing their greenhouse gas emissions.	follow that support adaptation for infrastructure and human settlements.

Table 29 – NAP alignment with Regional Conventions

#	GOVERNING BODY	NAME	DESCRIPTION OF REGIONAL POLICY INSTRUMENT	LEVEL/ DESCRIPTION OF ALIGNMENT
1	CARICOM	The Caribbean Regional Framework for Achieving Development Resilient to Climate Change (2009 – 2015) and the Implementation Plan for the CARICOM Regional Framework for Achieving Development Resilient to Climate Change (2011 – 2021)	A regional framework specifically geared to increasing climate resilience and mainstreaming adaptation into the social, economic and environmental systems of CARICOM Member States. Explicitly calls for adaptation mainstreaming, implementation of adaptation action, vulnerability reduction, and sustainable development.	<i>High. Systematic alignment.</i> The vision and objectives of both documents are harmonious. The adaptation actions contained within the NAP align with those of the CARICOM Implementation Plan.
2	CARICOM	Liliendaal Declaration on Climate Change and Development (2009)	Regional agreement that calls for <i>inter alia</i> , collaborative effort towards realizing the goals of the UNFCCC, climate change adaptation and capacity building, improved access to mitigation technologies, streamlined climate finance, institutional capacity building at the national level, and more effective preparedness for natural disasters.	<i>Moderate. Strategic alignment.</i> The vision and objectives of both policy instruments are closely aligned.
3	CARICOM	CARICOM Comprehensive Disaster Management Framework	This regional framework establishes the need and mechanisms for integrating disaster management considerations into the development, planning and decision-making process of CDEMA Participating States (PSs).	<i>Moderate. Strategic alignment.</i> Both documents have an aim to increase resilience however the NAP differs in its lack of emphasis on CDRM.

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#	GOVERNING BODY	NAME	DESCRIPTION OF REGIONAL POLICY INSTRUMENT	LEVEL/ DESCRIPTION OF ALIGNMENT
			SVG, as a PS, is committed to building a safer and more resilient country through comprehensive disaster management.	

Table 30 – NAP alignment with select National Policies, Laws and Plans

#	GOVERNING BODY	NAME	DESCRIPTION OF DOMESTIC POLICY INSTRUMENT	LEVEL/ DESCRIPTION OF ALIGNMENT
1	GORTT	National Climate Change Policy (2011)	Overarching national policy on climate change that aims to satisfy the UNFCCC’s requirements and offers guidance on transitioning to a low-carbon economy through reduced GHG emissions, enhanced carbon sinks, resilience building and capacity building. Establishes the climate change focal point network and the national focal point for climate change coordination.	<i>High. Systematic alignment.</i> Vision of the NAP influenced by the vision of the NCCP. High synergies regarding policy statements and coordination mechanisms.
2	GORTT	Carbon Reduction Strategies (2015)	A comprehensive plan for reducing GHG emissions in Trinidad and Tobago until 2040 with specific focus on the country’s top emitting sectors: power generation, transport and heavy industry.	<i>Low. Informal alignment.</i> Thematically linked. Some proposed measures in the NAP may support the objective of reducing carbon emissions, albeit not necessarily from the emitting sectors focused on in the CRS.
3	GORTT	Nationally Determined Contributions (2015)	A submission to the Paris Agreement that expresses a national, unconditional commitment to reduce its emissions in the public transportation sector by 30% by 2030, equivalent to 1.7 MtCO ₂ e relative to 2013 levels. In addition, T&T commits to reduce cumulative	<i>Low. Informal alignment.</i> Thematically linked. Although the NDC reaffirms commitment to adaptation, it does not provide additional connectivity to this NAP.

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#	GOVERNING BODY	NAME	DESCRIPTION OF DOMESTIC POLICY INSTRUMENT	LEVEL/ DESCRIPTION OF ALIGNMENT
			emissions by 15% by 2030 from business as usual (BAU) in three key sectors: Energy, transport, and industrial processes, equivalent to 103 MtCO ₂ e and conditional upon international financing.	
4	GORTT	NDC Implementation Plan (2017)	A comprehensive plan aimed at achieving the country's NDC goals through sectoral plans and the mainstreaming of climate change issues into the legislative framework. Contains a capacity building plan, a MRV system, and a climate finance plan. Requires an estimated US\$2 billion to implement.	<i>Low. Informal alignment.</i> Thematically linked. The Implementation Plan contains measures that provide co-benefits to adaptation. However, no direct linkage. The KMS which forms part of the NDC MRV framework can be used to support Adaptation M&E.
5	GORTT	National Environmental Policy (2018)	The overarching policy for guiding the environmental dimension of sustainable development. Establishing national principles for development and identifies six priority areas for achieving environmental sustainability. Climate Change adaptation is explicitly included as a sub-thematic area.	<i>High. Systematic alignment.</i> The vision of the NEP does not mention resilience or adaptation and thus represents a point of departure. However, the governing principles are harmonized with the NAP. Additionally, the policy statements on climate change adaptation are aligned with priority actions in the NAP.
6	GORTT	ICZM Policy Framework (2020)	A heavily consulted policy framework that defines the coastal zone and facilitates an integrated approach to coastal zone management aimed at enhancing the functional integrity of the coastal resource systems while enabling sustainable economic development.	<i>High. Systematic alignment.</i> The NAP is heavily influenced by the ICZM policy framework, with particular emphasis on the coastal zone. The NAP promotes significant action aligned with the ICZM Policy Framework.
7	GORTT	IWRM Policy (2017)	The overarching national policy aimed at the improvement of the water sector through a	<i>Moderate. Strategic alignment.</i> Several aspects of the NAP overlap with the IWRM policy statements. This NAP promotes

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#	GOVERNING BODY	NAME	DESCRIPTION OF DOMESTIC POLICY INSTRUMENT	LEVEL/ DESCRIPTION OF ALIGNMENT
			comprehensive, integrated water resource management framework.	significant action towards the water resource sector.
8	GORTT	National Development Strategy (2015)	The key development strategy for Trinidad and Tobago through to 2030. Aligned with the Sustainable Development Goals it sets out broad development strategies and measures for monitoring and evaluating national progress.	<i>Moderate. Strategic alignment.</i> The vision and implementation structure of both documents differ. However, the NAP is a direct product of Theme V-Goal 3 of the national development strategy, i.e., to identify vulnerable sectors and to design and implement adaptation actions.
9	GORTT	National Gender Policy – a Green Paper (2018)	A policy that provides the framework for including gender perspectives in all activities and fostering gender equality within the context of national development.	<i>Low. Informal alignment.</i> Thematically aligned. The National Gender Policy – Green Paper refers to gender and climate change in specific regard to emissions reductions, and a brief nod to “risk mitigation”. This NAP was developed using a gender-sensitive approach with equal opportunities provided to both men and women. The NAP advocates for gender inclusivity and balance in all actions arising from it.
10	GORTT	National Cooling Strategy	A ten-year policy that sets the various initiatives to be undertaken nationally to address sustainable and environment friendly refrigeration and cooling in alignment with the Montreal Protocol and Kigali Amend	<i>Low. Informal alignment.</i> Thematically aligned. Indirectly supports adaptation by reducing emissions from the RAC sector which contributed to long term climate risks. Adds to long-term resilience by providing for low-polluting, high efficiency cooling that supports growing demand for

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#	GOVERNING BODY	NAME	DESCRIPTION OF DOMESTIC POLICY INSTRUMENT	LEVEL/ DESCRIPTION OF ALIGNMENT
				cooling as an adaptation measure.
11	GORTT	Environmental Management Act. Chap 35:05	Primary legislation that governs the management of the environment towards sustainable development. Establishes the EMA, Environmental Commission, and Environmental Trust Fund. Explicitly deals with environmental conservation, pollution regulation, and education.	<i>Low. Informal alignment.</i> No explicit connection. "climate" is considered in the definition of "environment" over which the EMA has the responsibility to manage, regulate and educate on. May be used to support adaptation action.
12	GORTT	CEC Rules, 2001	Subsidiary legislation to the Environmental Management Act Chap 35:05. Regulates the process of attaining a CEC for development projects.	<i>Low. Informal alignment.</i> No explicit connection. EIA and conditions may support adaptation.
13	GORTT	Disaster Measures Act 16:50	Primary legislation that governs response to disasters and establishes the Office of Disaster Preparedness and Management.	<i>Low. Informal alignment.</i> Limited in its scope to emergency response and preparedness. Does not include comprehensive risk management or adaptation explicitly. Thematically aligned with the NAP.
14	GORTT	CDRM Policy Framework (2014)	A draft Policy Framework used to guide a comprehensive approach to DRM, led by the Office of Disaster Preparedness and Management (ODPM). Currently under review.	<i>Low. Informal alignment.</i> Informally adopted by the ODPM, the CDRM Policy framework speaks to comprehensive disaster risk management and resilience building. Thematically aligned to the NAP. Although this NAP and the review of the CDRM Policy framework occurred at the same time, they were developed independently from one another.

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#	GOVERNING BODY	NAME	DESCRIPTION OF DOMESTIC POLICY INSTRUMENT	LEVEL/ DESCRIPTION OF ALIGNMENT
15	GORTT	National Spatial Development Strategy (2013) and Planning and Facilitation of Development Act (2014)	A planning framework to govern physical development aligned with the partially proclaimed Planning and Facilitation of Development Act (2014).	<i>Low. Informal alignment.</i> No explicit connection to adaptation or climate change however, both documents are complementary towards resilient spatial development.
16	GORTT	Town and Country Planning Act, Chapter 35:01	Primary legislation to guide the orderly and progressive development of land in both urban and rural areas and to preserve and improve the amenities thereof.	<i>Low. Informal alignment.</i> No explicit connection to adaptation or climate change, however this act can contribute to resilient spatial development.
17	GORTT	Forests Act, Chapter 66:01	Primary legislation designed to allow for protection and preservation of forested areas.	<i>Low. Informal alignment.</i> No explicit statement of climate change or adaptation, however the protection of forested areas aids in natural carbon offsetting and biodiversity retention.
18	GORTT	Marine Areas (Preservation and Enhancement) Act, Chapter 37:02	Primary legislation designed to allow for protection, preservation, and enhancement of marine areas.	<i>Low. Informal alignment.</i> No explicit statement of climate change or adaptation. However, the protection of marine areas aids in natural carbon offsetting, coastal protection, and biodiversity retention.
19	GORTT	State Lands Act, Chapter 57:01	Primary legislation that governs the management of all land that is not held privately under freehold title.	<i>Low. Informal alignment.</i> No explicit connection to adaptation or climate change, however this act can contribute to resilient spatial development.
20	GORTT	Archipelagic Waters and Exclusive Economic Zone, Chapter 51:06	Primary legislation that declares the Republic of Trinidad and Tobago an archipelagic state, and defines the new areas of marine space appertaining to Trinidad and Tobago in the exclusive economic zone.	<i>Low. Informal alignment.</i> No explicit statement of climate change or adaptation, but the clear definition of Trinidad and Tobago's EEZ aids in determining the scope of natural resources and the efforts required to manage them.

11.0 NAP Review and Assessment

11.1 Monitoring and Evaluation

In the context of CCA, the GORTT sees monitoring and evaluation as a continuous, evolving system that measures the process of adaptation with a goal of improving and learning. It is committed to a Monitoring, & Evaluation system that will augment the National Climate Change Transparency System (NCCTS). This M&E system is comprised of two complementary but distinct activities:

- *Monitoring:* The continuous process of tracking and reviewing activities, results and their surrounding context, viz., challenges and resource needs, by collecting data on defined indicators and the views of those intimately involved in the implementation of the adaptation intervention. Monitoring in the context of the M&E system will occur at the national level and at the project level.
- *Evaluation:* Periodic assessment of information collected from monitoring to determine the degree of success achieved by the adaptation intervention and why; identifying success factors, critical pitfalls, and areas of improvement.

Adaptation must be flexible and responsive to changes in the wider context. To this end, the M&E system will also entail complementary activities:

- *Reporting:* The process of documenting and summarizing key insights from the monitoring and evaluation phases of M&E. Equally important in preparing reports is the storage and dissemination of these reports to decision-makers of the CCA, key stakeholders and the public.
- *Improvement:* The continuous process of adjusting elements of the adaptation action, and/or the M&E system based on information received from monitoring and evaluation. Improvements are made throughout the lifetime of the adaptation action to ensure that efforts do not become maladaptive; efforts remain on track with their intended goals; the interest of stakeholders, especially women, youth, elderly socially displaced and other underrepresented or vulnerable groups, are considered and accounted for; and that the right quantity and quality of data is collected to ensure project/programme success.
- *Learning:* The product of periodic or terminal evaluations, learning refers to the process of identifying the strengths and weaknesses of techniques and actions based on experience and translating those lessons into the design and/or implementation of future adaptation actions. Learning institutionalizes knowledge and builds the long-term capacity of organizations.

The M&E approach juxtaposes the MRV system for mitigation which tracks outputs against a predefined target with an aim of accountability. The divergence is considered necessary given the enormous uncertainty regarding the degree of future change ahead and shifting targets that may arise through the progressive adaptation pathways approach adopted by Trinidad and Tobago. The M&E system will be guided by the following goals and objectives.

Goal: “To provide the GORTT and all stakeholders involved in CCA with timely and credible information regarding the process of adaptation and success of adaptation actions so that further actions can be made more efficient and effective”.

Objectives:

1. To measure the adaptive capacity of individuals, institutions and systems within sectors addressed in this NAP.
2. To continuously review the process of adaptation and status of specific interventions so that timely interventions can be made as needed.
3. To provide credible, well-structured, and timely reports on adaptation actions to stakeholders and the UNFCCC.
4. To ‘learn-by-doing’ and continuously improve the national adaptation process to ensure increasingly efficient and successful adaptation action.

Initial indicators to be monitored at the programmatic level are shown in the following table.

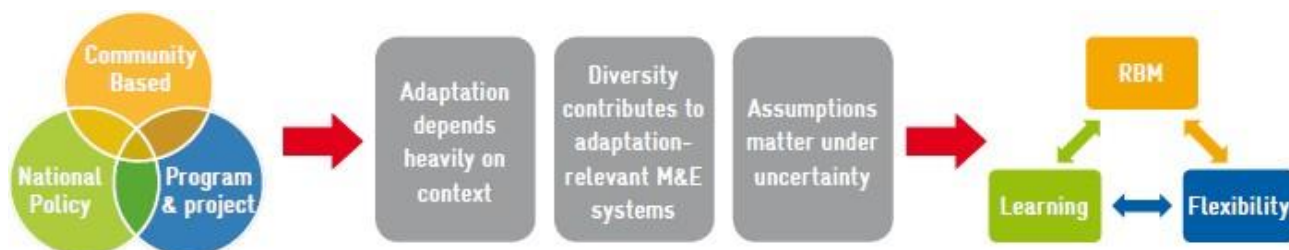
Table 31 – Summary table of initial indicators to be adopted at programmatic level of M&E.

Individual Capacity Indicators	• Inventory of trained and certified experts
	• Inventory of training programmes
	• Inventory of national focal points on outreach and awareness on adaptation
	• Inventory of research and modelling facilities
Institutional Capacity Indicators	• Funding
	• Inventory of national reports on adaptation
	• Inventory of critical milestones
Systematic Capacity Indicators	• National adaptation framework(s), project(s), and programme(s)
	• Policies and legislation created or reviewed
	• Inventory of national outreach and awareness programmes

UNFCCC 2012. ^[29]

The M&E system thrives on diversity. The GORTT shall make a concerted effort to ensure that gender considerations are made in assigning responsibilities at the programmatic and project levels. CBOs and NGOs will be meaningfully engaged to support the M&E activities.

Figure 28 – Schematic diagram illustrating the philosophical components of M&E



Source: GIZ, 2011. ^[118]

The GORTT envisions that the climate change KMS will be modified to include the adaptation M&E system through strengthening the Strategic Programme for Climate Risk Management (See EMNP-004). The MEAU, as the primary coordinator of the NAP, shall be responsible for programmatic M&E.

The GORTT shall establish a more detailed and robust M&E framework as part of its enabling actions towards building capacity in climate change transparency.

11.2 Review of the NAP

The frequency for an update of the NAP will be a full review on a five (5) year basis. The triggers for an update of the NAP outside of this will be significant scientific breakthroughs in climate science and changes to national systems, capacities or situations at the discretion of the coordinating institution.

The review process will take on the same method as the preparation of the NAP to ensure all aspects of the plan are taken into consideration.

12.0 Next Steps

This initial NAP serves as the GORTT's policy commitment to meaningfully addressing climate risk through adaptation across all economic sectors. Still, there are areas to be improved. Recognizing that the NAP process is dynamic and reiterative, and that Trinidad and Tobago's adopted CRDP approach is equally dynamic to suit the uncertainties around our common future, the GORTT has identified the following as next critical steps:

1. Build capacity in transparency for climate change by enhancing the National Climate Change Transparency System to include adaptation Monitoring and Evaluation in keeping with the Enhanced Transparency Framework of the Paris Agreement.
2. Utilize participatory methods to further enhance the indicative adaptation pathways so that:
 - a. Indicators and metrics for progress can be defined.
 - b. Scenarios can be refined.
 - c. The costs, benefits and co-benefits of each pathway can be assessed.
3. Leverage the support of international partnerships to execute the enabling strategies listed in this NAP.
4. Treat with topmost priority the strengthening of the strategic programme for climate risk management.

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