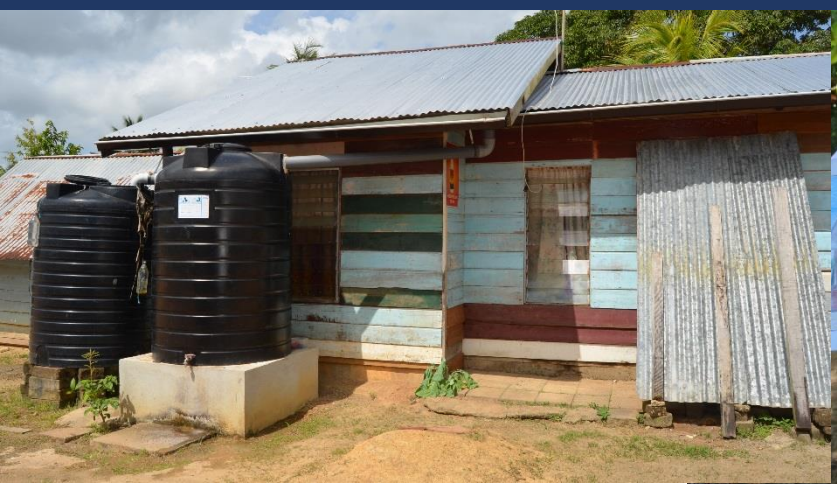
REPUBLIEK SURINAME

Suriname National Adaptation Plan (NAP)



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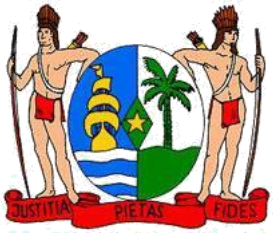

Suriname National Adaptation Plan (NAP) 2019-2029

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FOREWORD

The Republic of Suriname is recognized as the most forested country in the world and contributes significantly to mitigating the adverse effects of climate change. Suriname, however, is forced to take urgent adaptive measures to cope with the impacts of global warming. Mindful of the Sustainable Development Goals, the National Adaptation Plan (NAP) for Suriname is a national initiative designed to effectively address climate-related challenges in the pursuit of sustainable development. The NAP received support from the United Nations Development Programme's Japan-Caribbean Climate Change Partnership (J-CCCP).

The NAP applies a flexible methodological approach which helps Suriname conduct comprehensive medium and long-term climate adaptation planning, which is integrated into legislative, regulatory and planning frameworks and supports the ongoing adaptation initiatives, relevant to achieving national objectives within resource boundaries and a practical timeframe. The NAP caters to adaptation needs at the strategic national level and the economic sectors that are prioritized for adaptation-based climate risk and vulnerability. The strategic national level priorities considered in the NAP include strengthening of institutional arrangements; improving data and information collection systems; further integration of climate change into economic development policies, plans and programmes; enhancing technical capacity; including gender inequalities into Climate Change adaptation initiatives; identifying and increasing access to financing and investment geared towards climate change adaptation. The prioritised economic sectors under the NAP include productive sectors such as Water Resources, Sustainable Forestry, Energy and Agriculture, Livestock and Fisheries. The NAP is designed for a period of ten years, which will be further subdivided into consecutive phases based on different priority sectors and different time frames. These phases include, Phase 1, Near Term (year 1-3, priority sectors: water, forestry, energy and agriculture); Phase 2, Medium Term (year 3-6, priority sectors: infrastructure, housing, tourism and mining) and Phase 3 Long-term (year 7-10, priority sectors: maintain resilience built on priority sectors in Phase 1 and 2).

The NAP requires the intensification of efforts and multi-level action among cross-cutting sectors such as environment, disaster risk reduction and spatial planning. The successful implementation of these strategic and multi-sector objectives is dependent on precursor actions and activities. The NAP does not adopt a radical framework nor is it a repeat of what has transpired in the past but can serve as an umbrella initiative for the Government of Suriname, while simultaneously filling the gaps required in sector specific programming. The Government of Suriname through the implementation of the NAP will facilitate a coordinated and logic based national effort towards upholding its commitment to reducing climate change impact and resiliency building.

The Government of Suriname would like to take this opportunity to extend its thanks to everyone that contributed to the NAP process.

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Acronyms

ABS	General Bureau for Statistics (Stichting Algemeen Bureau voor de Statistiek)
AdeKUS	Anton de Kom University of Suriname
BIS	Bauxite Institute of Suriname (*Bauxiet Instituut Suriname*)
CARICOM	Caribbean Community
CCCCC	Caribbean Community Climate Change Centre
CCD	Compulsory Convertible Debenture
CCCD	Cross Cutting Capacity Development Project
CCDU	Climate Compatible Development Unit
CELOS	Centre for Agricultural Research in Suriname
CI	Conservation International Suriname (NGO)
CM	Coordination of Environment under the Cabinet of the President
CZM	Coastal Zone Management
EBS	Energy Company Suriname (*NV Energie Bedrijven Suriname*)
EPI	Environmental Planning and Information Unit
EWS	Early Warning System
FNC	First National Communication to the UNFCCC
FOB	Development Fund for the Interior
GCF	Green Climate Fund
GIS	Geographical Information System
GLIS	Land registration and Land Information System
GoS	Government of Suriname
HBO	Institute for Higher Education (*Hoger Beroep Onderwijs*)
HI&T	Ministry of Trade, Industry and Tourism (*Ministerie van Handel, Industrie en Toerisme*)
ICZM	Integrated Coastal Zone Management
IGSR	Institute of Graduate Studies and Research
IOL	Institute for Training Teachers
IPCC	Inter-Governmental Panel on Climate Change
ITCZ	Inter-Tropical Convergence Zone
J-CCCP	Japan-Caribbean Climate Change Partnership
JusPol	Ministry of Justice and Police (*Ministerie van Justitie en Politie*)
KAP	Climate Action Plan 2008 – 2013 (*Klimaat Actie Plan 2008-2013*)
KKF	Chamber of Commerce and Industry
LDC	Least Developed Country
LVV	Ministry of Agriculture, Animal Husbandry and Fisheries (*Ministerie van Landbouw, Veeteelt en Visserij*)

MAS	Maritime Authority in Suriname (*Maritieme Autoriteit van Suriname*)
MDS	Meteorological Service Suriname (*Meteorologische Dienst van Suriname*)
MinOW	Ministry of Education, Science and Culture (*Ministerie van Onderwijs, Wetenschap en Cultuur*)
MinFin	Ministry of Finance (*Ministerie van Financiën*)
MZ	Medical Mission for the Interior of Suriname (*Medische Zending Suriname*)
NAMA	Nationally Appropriate Mitigation Action
NCAP I /NCAP II	Netherlands Climate Assistance Programme, Phase I and II
NCCPSAP	National Climate Change Policy Strategy and Action Plan
NCCR	National Coordination Center for Disaster Management (*Nationaal Coördinatie Centrum voor Rampenbeheersing*)
NCSA	National Capacity Self-Assessment
NH	Ministry of Natural Resources (*Ministerie van Natuurlijke Hulpbronnen*)
NIMOS	National Institute for Environment and Development in Suriname (*Nationaal Instituut voor Milieu en Ontwikkeling in Suriname*)
NMR	National Council for the Environment (*Nationale Milieu Raad*)
OGS	Planning Commission Gold Sector (*Ordening Goudsector*)
OP	National Development Plan (*Nationaal Ontwikkelingsplan*)
OWT&C	Ministry of Public Works, Transport and Communication (*Ministerie van Openbare Werken, Transport en Communicatie*)
PRECIS	Providing Regional Climates for Impact Studies
REDD+	Reduced Emissions from Deforestation and Forest Degradation
RGD	Regional Health Service (*Regionale Gezondheidsdienst*)
RO	Ministry of Regional Development (*Ministerie van Regionale Ontwikkeling*)
ROGB	Ministry of Physical Planning, Land and Forest Management (Ministerie van Ruimtelijke Ordening, Grond en Bosbeheer)
RVM	Council of Ministers (*Raad van Ministers*)
SBB	Foundation for Forest Management and Production Control
SBF	Suriname Business Forum
SCF	Suriname Conservation Foundation
SER	State of the Environment Report
SIDS	Small Island Developing States
SLR	Sea Level Rise
SMIN	Suriname National Environmental Information Network
SMNR	Sustainable Management of Natural Resources
SNC	Second National Communication to the UNFCCC
SoZaVo	Ministry of Social Affairs and Housing (*Ministerie van Sociale Zaken en Volkshuisvesting*)

SSB	Suriname Bureau of Standards (*Suriname Standaarden Bureau*)
SWM	Suriname Water Company (*Surinaamsche Waterleiding Maatschappij*)
UNASUR	Union of South American Nations (*Union de Naciones Suramericanas*)
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WLA	Hydraulic Research Division (*Afdeling Waterloopkundige Dienst OWT&C*)

Executive Summary

The impacts of Climate change can be observed over every conceivable level; global, regional, national and local that calls for multi-level action. Suriname, a tropical nation, is highly vulnerable to adverse impacts of climate change. National level actions must play a critical role while international cooperation is also important. Recognizing this responsibility, the Government of Suriname has launched a national initiative to face the impacts of climate change.

Coordination Environment, as the Policy Unit of the Office of the President, plays an important role in coordination and implementation of climate related policies. Some key national initiatives of the Government of Suriname are the First National Communication (FNC) to the UNFCCC, The National Climate Change Policy, Strategy and Action Plan (NCCPSAP) for Suriname prepared in 2015 and the second National Communication (2014). The National Adaptation Plan (NAP) for Climate Change in Suriname is the next logical step of the national initiatives for meeting the adverse effects of climate change.

The objective of the National Adaptation Plan is to enable Suriname to conduct comprehensive medium and long-term climate adaptation planning. It is a flexible approach that builds on the country's existing adaptation activities and mainstreams climate change into national decision-making, development planning, policies and programs. The goals are twofold: (1) impact reduction through adaptation and resiliency building and (2) integration and mainstreaming in a coherent manner, into relevant new and existing policies, programs, activities and development planning processes and strategies, across multiple sectors and levels as appropriate. The National Adaptation Plan for Climate Change in Suriname was prepared in line with the broad set of guidelines set forth by the UNFCCC for the development of national adaptation plans. The NAP process of UNFCCC is a generalized process consisting of four stages that could be customized according to specific situations in respective countries.

The NAP process in Suriname started from the stage of preparatory elements, which is the real planning stage of the process, and a country-specific NAP methodology was developed and adopted based on the broader guidelines of the UNFCCC. The importance of adaptation as a major strategy for facing the threat of climate change has been recognized by all parties to Paris Agreement and called for national actions for adaptation under Intended Nationally Determined Contributions (INDCs). The necessity of adaptive strategies has also been highlighted by the Sustainable Development Goals (SDGs) adopted by the United Nations in 2015.

The NAP covers adaptation needs at two levels (figure 1 below). First are the adaptation priorities at the strategic national level that will strengthen efforts across the board, now and in the future. The strategic level priorities covered under the NAP are: (1) Institutional arrangements, policies and capacities able to lead and coordinate national and sub-national climate change adaptation; (2) Data and information collection systems to fully support national and sub-national climate change impacts, vulnerability and adaptation decision-making; (3) The integration and institutionalization of climate change adaptation in broader Surinamese economic development policies, plans and programs; (4) National technical capacity that is fully trained and skilled at leading and implementing Suriname's climate change adaptation actions; (5) Climate change adaptation that respects Surinamese society and culture and reduces gender and social inequities and; (6) Identify and access financing and investment especially for innovation driven climate change adaptation technologies. Further strategic objectives, adaptation measures and outcomes for each priority are noted.

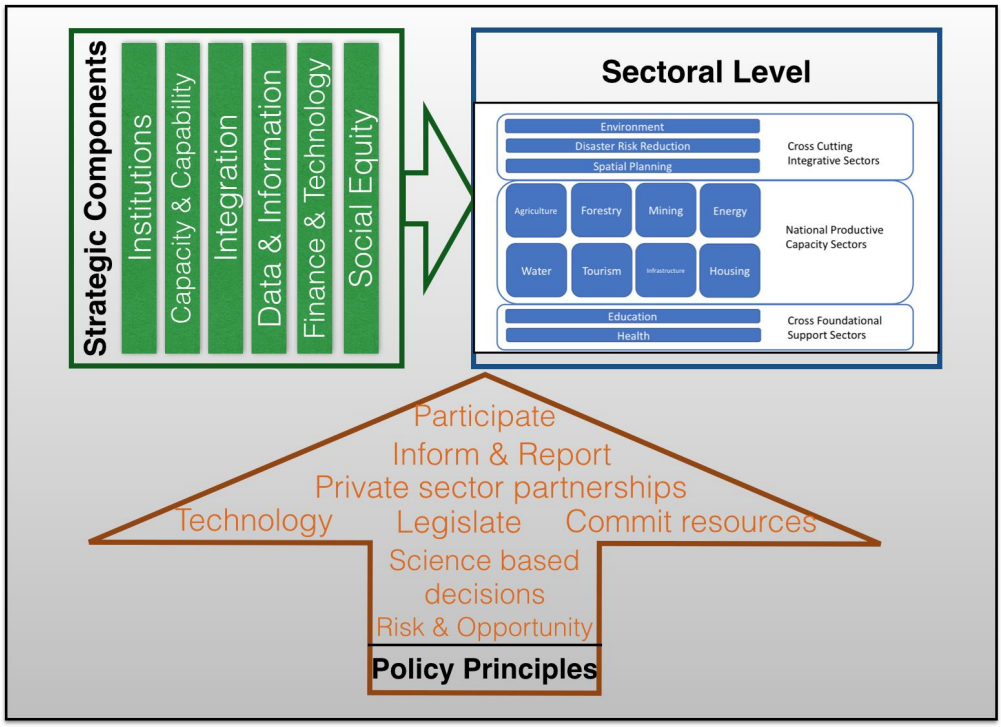


Figure 1: Schematic Diagram of the NAP design elements

The second level refers to the economic sectors that are prioritized for adaptation based on climate risk and vulnerability. This innovative 'triple stream model' is developed for Suriname, whereby adaptation will occur across sectors especially those most vulnerable to climate impacts and where such impacts are more likely to hamper the sustainable development of Suriname. In this model, Suriname acts in those 'Productive sectors' that are the main economic drivers at the core of national development, starting with the priority sectors of Water Resources, Sustainable

Forestry, Agriculture, Livestock and Fisheries and Energy in the immediate term and proceeding to other sectors by priority later on.

The National Adaptation Plan positions Suriname's priorities for action in the discourse with the multilateral and donor communities. It provides a basis for exploring various climate finance modalities suitable for the priority actions that need to be taken. Such modalities include blended finance, climate bonds, debt-for-swap, risk insurance and private sector funding.

At the same time, the NAP calls for intensive ramping up of efforts in cross-cutting sectors of environment, disaster risk reduction and spatial planning in the immediate term, but having built that foundation early, will require less emphasis in the longer run. The third stream or foundation supports sectors of education and health, which will have sustained climate adaptation efforts throughout.

This NAP also emphasizes attention to the reality that implementation of these strategic and sectoral objectives are dependent on precursors of (1) a new focal point for leadership of NAP implementation; (2) strengthening the capacity in ministries with existing mandates relevant to climate adaptation; and (3) effective systems of collaboration among (1) and (2) with resources to produce results. The NAP also therefore discusses the new and evolving inter and intra ministerial structures relevant to achieving national objectives within resource boundaries and a practical timeframe. The objectives and actions laid out in the NAP will be implemented according to an estimated timeframe and roadmap (see illustration below).

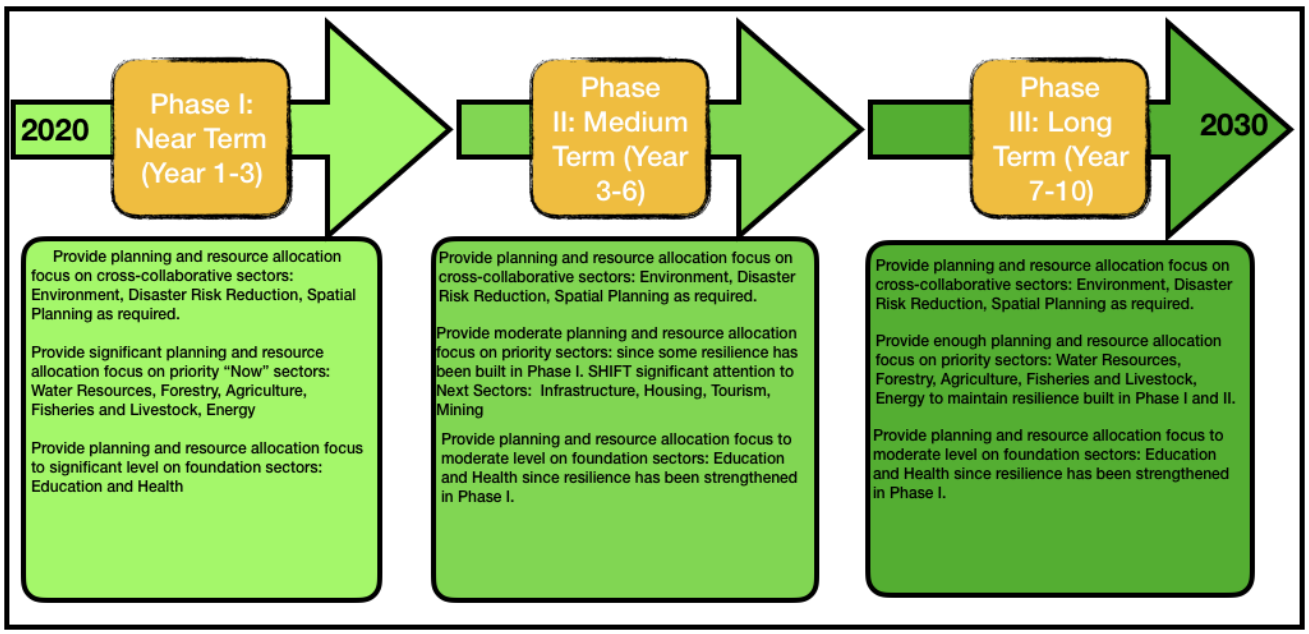


Figure 2: Summary of the NAP Roadmap 2020- 2030

1.0 Introduction

Suriname's National Adaptation Plan will align the country's future efforts with the broad objectives of the United Nations Framework Convention on Climate Change (UNFCCC) and outline actionable groundwork for the integration of climate change considerations into national strategic and sectoral planning and budgeting processes. It becomes the definitive guide for management and reduction of long-term climate change risks in Suriname. As consideration is given to tapping into the different climate financing modalities that are emerging, the NAP provides guidance for prioritizing actions across sectors.

Climate change has risen to the top of the development agenda across the wider Caribbean as mounting evidence confirms it to be a critical challenge that also compounds existing socio-economic and ecological vulnerabilities faced by countries. Climate change can significantly increase the risk of hurricanes and storms and threaten the region's development. Increasing coastal erosion and severe coral reef bleaching events in 2005 and 2010 bear witness to this. Tourism and agriculture will be among the sectors most negatively impacted by these climatic changes. The Intergovernmental Panel on Climate Change (IPCC) confirms that small islands and economies are highly vulnerable to climatic and non-climatic stressors, with sea level rise and temperature rise among the most apparent threats for coastal flooding and erosion, ecosystem degradation and loss of livelihoods.[1] Further, inadequate awareness, information, technical and policy capacity, and limited funding availability for informing and formulating a low-emissions development strategy are among the reasons for the difficulty with directing and guiding climate change mitigation investments in the Caribbean. Climate change therefore threatens to undermine decades of development progress and stymie future efforts. As a result, climate change is a focal area for the Sustainable Development Goals (SDGs), being explicitly identified in Goal 13 but also strongly relevant to other goals.

Extreme weather events, saltwater intrusion along the coast, droughts and crop loss, loss of biodiversity and flooding and landslides in the interior, among others, are all recognized impacts that Suriname faces due to climate change[2]. Figure 3 below, provides further examples of climate change impacts across the regions of Suriname. Recognizing that persistent climate-related liabilities will continue to undermine their potential for sustainable development, Suriname, like other developing countries, intends on focusing its long-term sustainable development strategies

[1] IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland, 151 pp.
[2] NCCPSAP, 2015

on the principles of climate risk management and resilience building – understood as market transformations based on *"adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts[3]."* The evidence base suggests that cost-effective adaptation and risk mitigation solutions can help to avoid most of the expected losses.

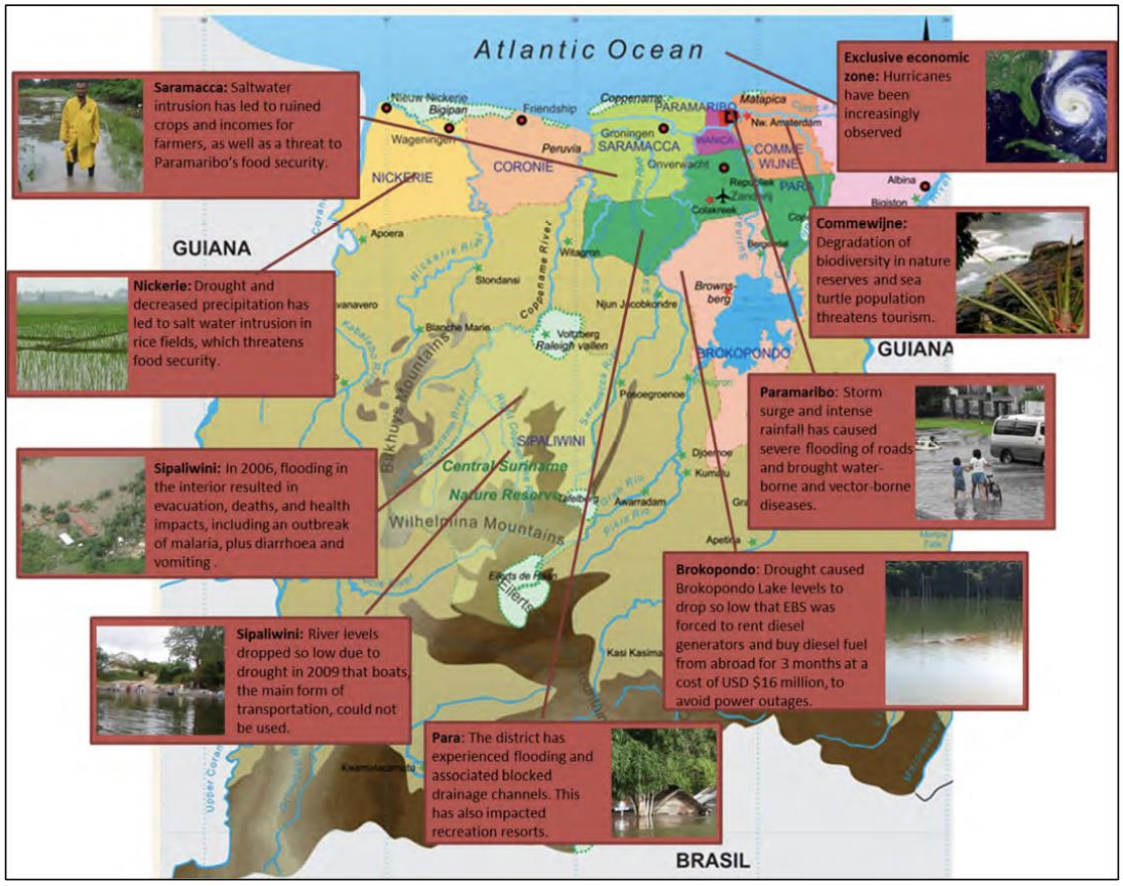


Figure 3: Examples of climate change impacts by district in Suriname (NCCPSAP, 2015)

This National Adaptation Plan will provide the overarching guidance for Suriname's climate change adaptation efforts. Its basis is the National Climate Change Policy, Strategy and Action Plan for Suriname 2014-2021 (NCCPSAP), but also expands to include other sectoral and other government and stakeholder plans. These are also considered in order to align the many piecemeal efforts occurring. As presented here, the NAP brings together the intent and aspirations of policy makers, experts, communities, industry and civil society, with the support of the United Nations Development Programme's (UNDP) Japan-Caribbean Climate Change Partnership (J-CCCP) Project to commit to implementing an overarching and comprehensive

[3] IPCC Executive Summary of Working Group II: Impacts, Risk and Vulnerability. Fifth Assessment Report, November 2014. http://www.ipcc.ch/ipccreports/tar/wg2/index.php?idp=642

framework for climate action. It encourages policy innovation, prioritizes adaptation measures, seeks technological solutions and recognizes the value of local knowledge in a participatory and efficient manner. As a result, the NAP will help improve the ability to respond to climate risks and opportunities in the long-term, by guiding adaptation approaches that will be implemented on the ground and which are aligned with Suriname's broader, long-term development strategies.

Lastly, it is important to note that the NAP ideally does not represent a radical new way of thinking or acting upon climate action. Nor is it a *redux* of past national efforts. As illustrated in Figure 4, the NAP does in fact take into consideration, all of the national efforts, lessons learned and progress that has occurred in Suriname to date. It rationalizes this information and plans forward specifically for adaptation, while becoming an umbrella under which other ongoing and new sector or policy specific programming can fit as 'part of the puzzle'. This is envisioned to facilitate a coordinated and logic based national effort that maximizes resources available for implementation, while at the same time assisting Suriname with meeting its international responsibilities in the climate change arena.

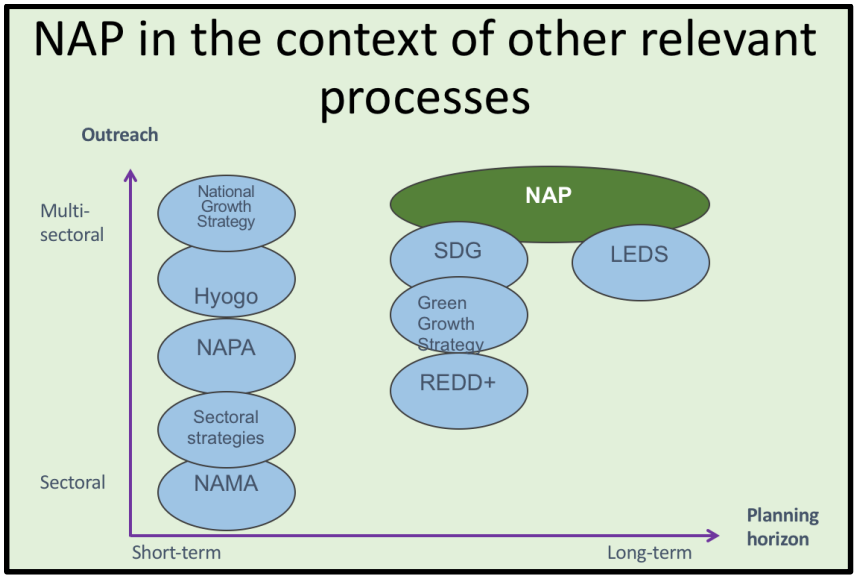


Figure 4: NAP in the context of other national processes

1.1 Strategic and Sectoral Adaptation

The NAP covers adaptation needs at two levels. First are the adaptation priorities at the strategic national level that will strengthen efforts across the board, now and in the future. The strategic level priorities covered under the NAP are:

(1) Institutional arrangements, policies and capacities able to lead and coordinate national and sub-national climate change adaptation;
(2) Data and information collection systems to fully support national and sub-national climate change impacts, vulnerability and adaptation decision-making;
(3) The integration and institutionalization of climate change adaptation in broader Surinamese economic development policies, plans and programs;
(4) National technical capacity that is fully trained and skilled at leading and implementing Suriname's climate change adaptation actions;
(5) Climate change adaptation that respects Surinamese society and culture and reduces gender and social inequities; and
(6) Identifying and accessing financing and investment especially for innovation driven climate change adaptation technologies.

The second level regards the economic sectors that are prioritized for adaptation based on climate risk and vulnerability assessments done. An innovative *'triple stream model'* is developed for Suriname, whereby adaptation will occur across three types of sectors especially those most vulnerable to climate impacts and where such impacts are more likely to hamper the sustainable development of Suriname. In this model, Suriname first acts in those **'Productive sectors'** that are the main economic drivers at the core of national development, starting with the priority sectors of Water Resources, Sustainable Forestry, Energy, Agriculture, Livestock and Fisheries, in the immediate term and proceeding to other sectors by priority later on. A second stream of sectors is referred to as the **'Cross-Sectoral or Supportive sectors'** that contribute to, and impact on the functions of the Productive sectors including their climate change adaptation and mitigation activities. These include the Disaster Risk Reduction, Spatial Planning and Environmental sectors. The third stream referred to in this model is **'Foundational'**. These are the Education and Health sectors which must be resilient foundations that are essential for resilience building in all other sectors.

The National Adaptation Plan document next lays out the scope and objectives for Suriname, then provides details on how it will be managed and implemented. This is supported by a monitoring and evaluation framework for the strategic level and the sectoral action plans. Sections 6 and 7 present the full strategic adaptation plan and the sectoral action plans respectively.

2.0 Climate Change Context of Suriname

Suriname's climate is characterized as a tropical climate with a high humidity, which is generally controlled by the bi-annual passage of the Inter –Tropical Convergence Zone (ITCZ); once during the period December to February (known as the short-wet season), and the second time, during the months of May – mid August (long wet season). The periods in between are the short dry season (February to the end of April) and the long dry season (middle of August to the beginning of December)[4]. According to the Köppen classification (a recognized system of ecosystem classification mainly based on vegetation types), Suriname has three climate types, namely monsoon climate, tropical rainforest climate and a humid and dry climate. Another major condition determining the country's climate encompasses the surface conditions, such as the abundance of rivers and swamps and the presence of well-developed vegetation cover that produces large amounts of water vapour, which together with the local convection and orographic lifting along the hills and mountainous regions, also contribute to the relatively high precipitation in the country[4].

In general, climatic conditions have remained almost the same throughout the year for decades, the variation of annual temperature is only 2-3^{0}C[4]. At the same time there is an insignificant change in rainfall as well, when excluding the extremely dry and wet years. This leads to the conclusion that the climate of Suriname is relatively stable. An example of an exceptionally wet year is 2006, when due to large amounts of rainfall significant areas along the upstream of rivers were inundated. However, it was also noted that such an event seems to re-occur every 25-75 years[4,5].

2.1 Applying IPCC Scenarios to Surinamese Conditions

There have been some efforts at scenario modelling of climate change vulnerability at the national level in Suriname. Through developing predictive climate change scenarios according to IPCC guidelines, there is some relevant information for understanding sector level vulnerability assessment in Suriname. Annex 3 summarizes the key risk and vulnerability assessment findings available, largely based on work completed in preparation of the Second National Communication to the United Nations Framework Convention on Climate Change (2013)[5].

[4, 5] As reported in the Suriname SNC (2013) and subsequently utilized and referred to in the NCCPSAP (2015)

The critical issues emphasized included water resources which are mainly used for agriculture, energy generation in the form of hydro-electricity and human consumption. Emphasis was also placed on urban areas, which are susceptible to flooding as a result of the combination of abundant rainfall, poor drainage, and rising sea and river levels. Additional attention was paid to excessive rainfall in the interior, which caused severe flooding annually.

At the sectoral level, for the agriculture sector, emphasis was placed on food security and food safety; and in health, emphasis was placed on monitoring occurrences of dengue and malaria. Not all sectors as identified in the NCCPSAP, were expounded upon within the Second National Communication (SNC) scenarios. The scenarios also pay attention to coastal geomorphology and the coastline with respect to sea level rise and climate change as well as socio-economic analysis primarily on existing vulnerabilities among certain groups in society, such as farming communities and women in the interior.

Scenario models described the baseline conditions relevant to understanding vulnerability in Suriname. This included discussion of climate characterized as tropical wet and hot and generally controlled by the biannual passage of the Inter-Tropical Convergence Zone (ITCZ).

One of the principal parameters of climatology is rainfall. For Suriname, this is essential, since rainfall is the basis for the distribution of the four seasons. Due to incomplete data, rainfall trend analyses are difficult to do well in scenario modelling currently. Based on the available data, the SNC stated that the highest amount of rainfall (about 3,000 mm/yr.) is observed in the center, and the lowest amount in the north-western part of the country (less than 1,750 mm). In Paramaribo and Wanica, rainfall varies widely, from 1,400 mm/yr. in the north to 2,100 mm/yr. in the south (Suriname Second National Communication to the IPCC, 2013). To the south of this zone (except for the central part of the country) yearly rainfall varies on average from 2,000 to 2,350 mm/yr. An example of an exceptionally wet year was 2006, when large amounts of rainfall caused significant areas along rivers upstream to be inundated. However, it has been noted that this type of event seems to reoccur every 25-75 years.

Winds are generally light, with annual averages of about 1.3-1.6 on the scale of Beaufort (or 1-5 m/s). The daily wind-speed variation is higher, up to 3-4 Beaufort (3-8 m/s). High winds in Suriname correspond with the occurrence of heavy thunder showers at the end of the rainy season, called *sibi busi*, reaching speeds of up to 20-30 m/s.
Extreme weather conditions often occur related to El Niño and La Niña events. There may be a connection between extremely dry conditions and strong El Niño events, as well as between extremely wet conditions in the country with strong La Niña events. Extreme weather conditions

are also observed during *sibi busi* events, when wind speeds of up to 58 knots occur. Such winds can cause significant damage in urban areas.

Based on data in hand and scenarios put forth to date, it is unclear how global climatic circulations affect extreme weather patterns in Suriname. Moreover, according to predictions, the Walker current is weakening and may drop by 1% in force by the year 2100. This will impact the hydrological cycle and hence rainfall and other climatologic conditions. A clear description of the current climate is unavailable due to a lack of data and poor observation and monitoring networks. Events such as *sibi busis* and strong variations in rainfall have not been consistently observed, and therefore no analyses have been produced. Still, the Second National Communication recommends the following best possible assumptions for use in vulnerability assessment for Suriname: - sea-level rise of 1m; - rainfall decrease of 10%; - temperature increase (unknown value); and - possible changes in wind speeds.

The projected sea-level rise in Suriname has been calculated according to the A2 and B2 IPCC scenarios[6]. Elements from both of these scenarios have been used, since one specific scenario is difficult to apply to the national circumstances of Suriname. The adapted IPCC scenario includes country-specific data for expected rise in average temperature and sea-level and possible changes in total rainfall. Other data, such as occurrences of extreme events and variations in the amounts of seasonal rainfall, including periods between dry and wet seasons, are also considered in the adapted scenarios.

[6] The A2 marker scenario (A2-ASF) was developed using an integrated set of modeling tools that was also used to generate the first and the second sets of IPCC emission scenarios (SA90 and IS92). Overall, the A2-ASF quantification is based on the following assumptions:

- Relatively slow demographic transition and relatively slow convergence in regional fertility patterns.
- Relatively slow convergence in inter-regional GDP per capita differences.
- Relatively slow end-use and supply-side energy efficiency improvements (compared to other storylines).
- Delayed development of renewable energy.
- No barriers to the use of nuclear energy.

The B2 world is one of increased concern for environmental and social sustainability compared to the A2 storyline. Increasingly, government policies and business strategies at the national and local levels are influenced by environmentally aware citizens, with a trend toward local self-reliance and stronger communities. International institutions decline in importance, with a shift toward local and regional decision-making structures and institutions. Human welfare, equality, and environmental protection all have high priority, and they are addressed through community-based social solutions in addition to technical solutions, although implementation rates vary across regions.

According to these scenarios, economic growth will vary from low to intermediate[7]. Suriname has a number of natural resources that could be utilized to contribute to intermediate economic growth. However, if these natural resources were to be depleted, a drop in economic growth would be expected. Scenarios A2 and B2 show technological change as fragmented and relatively slow-paced, depending on the level of expertise in the country. Suriname is currently investing the improvement of education at various levels, so that more Surinamese people can receive quality education, have better access to higher education and thereby become more involved in the various sectors of the country's economy.

Taking into consideration the intermediate economic growth within these scenarios, the Surinamese population is expected to undergo some growth as well. Current demographic diversity will be largely maintained, and this will remain reflected in the social, cultural, and political structure of Suriname[7]. Simultaneous cultural integration will continue to take place. Suriname's membership to both the Caribbean Common Market (CARICOM) and the Union of South American Nations (UNASUR) demonstrates the country's continuing efforts to maintain and be open to the process of regional integration. These efforts are in line with the adapted scenarios, according to which the ambient temperature is expected to rise approximately 2-3 degrees Celsius by 2100[8]. Changes in severity and frequency of extreme weather events could therefore have great impacts on many sectors in Suriname.

Projections resulting from these scenarios also reveal that the sea level is expected to rise by 20–51 cm by 2100. The main factors contributing to this rise are expansion of sea water and melting/sliding of land-based ice sheets and glaciers. Yet there are many uncertainties regarding carbon cycle feedbacks, ice-flow processes, the amount of heat uptake by the oceans and recently observed ice-discharge rates. Since such factors are insufficiently understood, their contributions to sea-level rise are oftentimes neglected.

Sea-level rise is expected to range from the IPCC projection of 59 cm to 190 cm[9]. An average of sea-level projections from these five studies exceeds 100 cm. Further analyses of these studies reveal that the lowest value of the maximum projected sea level rise is +80 cm. These high projection values are based on complex, on-going processes and the vulnerability of the Greenland and West Antarctic ice sheets. Depletion there could result in a continuation of sea-level rise, regardless of predicted changes in global temperatures. According to the same studies, sea-level rise in the Caribbean could be more pronounced than in some other regions.

A 1m sea level rise projection has been adopted for Suriname. This is based on:

- analysis of five major projections of sea-level rise;
- exclusion of the IPCC projection (AR4) sea level rise projection, because new evidence is available that results in higher predictions than those found there;
- a lack of reliable data on sea-level rise in Suriname. In addition, local factors such as storm surge and subsidence should also be considered as important contributors to sea-level rise in Suriname[8].

[7, 8, 9] National Development Plan of 2017-2021: http://www.planningofficesuriname.com/2017-2021-development-p

Table 1:Broadly expected climate change impacts and potential adaptation measures

Expected Impacts	Potential Adaptations
Decrease of freshwater availability in aquifers and surface water bodies.	- Increase the capacity of the existing water resources through technological improvements and institutional strengthening - Encourage the use of alternative freshwater resources such as the utilization of rainwater and surface water when possible - Increase efficient water use through water management and recycling - Increase public awareness on the need for water conservation - Import freshwater from the Southern region of the country where freshwater is available
Saltwater intrusion in rivers and aquifers	- Enhance management, monitoring and research - Set up appropriate structures to prevent saltwater intrusion in rivers - Enhance recharge capacity of aquifers
Increased frequency of flooding and drought	- Upgrade, modernize and expand existing climatologic observation networks - Set up new water-boards and activate existing ones, and set up a water authority - Update existing draft water-law and approval by the Parliament and implementation by the GoS - Enhance collaboration of authorities and relevant institutions - Adapt to changing conditions - Enhance capacity in utilizing present and future water resources
Pollution of surface water resources	- Improve wastewater and drainage infrastructure - Protect available water resources against pollution through the establishment, implementation enforcement of rules and regulations
Coastal retreat	- Incorporate engineering measures to increase the sedimentation rates along severely encroached

Expected Impacts	Potential Adaptations
	coastal stretches - Conservation, protection and expansion of mangrove forests - Enhance monitoring of the coastline
Damages to coastal infrastructure	- Stop the issuance of land in the estuarine zone - Use of sea protection and mud bank nourishment techniques
The development of hyper-saline conditions in areas along the coast	- Research, monitoring and mapping of species vulnerable to climate change impacts - Provide incentives to protect the existing mangroves
Decrease in turtle-nesting sites	- Implementation of conservation strategies to protect marine turtles

Source: Suriname Second National Communication, pg. 161-163

3.0 Scope and Objective of Suriname's NAP

The NAP is broad in scope. It is intended to support current and emerging national policy and direction and guide initiatives by both government and non-government actors to implement actions for management and reduction of long-term climate risks in the country at the national and sectoral level. The NAP addresses adaptation needs within realistic resource limitations and timeframes in a multi-level implementation approach at the strategic and sectoral levels.

The NAP development process was conducted in order to provide Suriname with a comprehensive medium- and long-term climate adaptation plan. It is a flexible process that builds on Suriname's existing adaptation activities and helps integrate climate change into national decision-making. Guiding the scope of the NAP were: (1) an integrated approach that places climate risk in national development planning, policies, and programs; (2) Suriname- specific solutions with outputs tailored to the specific needs of the country at this time and for the future; (3) continuity so that medium- and long-term adaptation planning is an iterative, ongoing process, not a one-time activity.

The **Goals** are twofold: (1) impact reduction through adaptation and resilience building and (2) integration and mainstreaming in a coherent manner, into relevant new and existing policies, programs, activities and development planning processes and strategies, across multiple sectors and levels as appropriate.

The primary audience for the uptake of the NAP are those policy makers, technical officers and managers in all ministries and agencies responsible for implementation. More broadly, the NAP audience will also include non-state actors that will be partnering and collaborating with respective government ministries and agencies on climate action. This includes but is not limited to civil society, the private sector, academic institutions, media, and donors- nationally, regionally and globally.

The NAP offers specific guidance to government personnel responsible for sectoral implementation. However, it is expected and highly recommended that during the NAP's execution, efforts are made to coordinate and collaborate in climate change and development-related actions which directly or indirectly involve other sectors, other organizations and across different scales. This will allow for identifying and building on synergies, increasing cross-sectoral adaptation benefits and accelerating adaptation. It will also permit identifying and reducing potential detrimental effects that development or adaptation activities undertaken in one sector could have on the adaptation or development efforts of others.

3.1 Operationalize Policy

The NAP operationalizes Suriname's emerging climate change related policies and commitments. The Government of Suriname commits to integrate climate change considerations into national development planning and budget setting, recognizing the challenges the country will face. Integrating climate compatible development as a core deliverable of future National Development Plans cascading down into Ministerial and Departmental planning is essential. The challenges and opportunities arising from a changing climate and global action on emissions can only be realized if there is a complete understanding that climate change is a cross-cutting and shared responsibility. Placing climate compatible development as a core national planning deliverable will begin the process of institutionalizing climate change.

The 2017-2021 National Development Plan describes four 'pillars' upon which Suriname's growth and sustainability will depend. The 4th Pillar is 'Utilization and Protection of the Environment' and clearly acknowledges that climate change is to be an integral part of the country's future developmental pathway.

"*The provisions for sea level rise have been made (detailing of the threat and timeline, consensus strategy and long-term investments): a) challenges as a result of climate change receive the necessary attention and measures are taken to address and to minimize the consequences, if any, (natural disasters); b) threats as a result of human acts or disasters caused by nature are prevented as far as possible (CO2-emission, Mercury and cyanide pollution, pesticides, herbicides and other agriculture- and stock breeding-related environmental threats and c) the economic value of the forest is used in a sustainable manner based on the Environmental Act*[10]*, the national environmental strategy related thereto and the Development Plan 2017-2021, and all in accordance with the national and international obligations of Suriname.*" (2017-2021 National Development Plan).

Underlying Suriname's climate related policy positions are eight guiding principles. These guiding principles can be summarized as in Table 2 below. All actions detailed in the NAP whether at the national level or sectoral levels, align directly with these policy principles.

[10] Not yet approved by government.

Table 2: Summary of Policy Principles overarching national climate planning

Policy Principles	Approach
Principle 1	
Manage risk, build resilience and explore opportunities	Suriname will take a pragmatic and positive position towards climate resilience and mitigation recognizing that further changes to the climate are unavoidable. The government will explore the opportunities a changing climate may present, in addition to managing the risks and building resilience.
Principle 2	
Legislate	Suriname shall enact effective legislation reflecting the climate compatible development context. Legislation as an instrument has both a regulating and guiding function binding the State to implement policy.
Principle 3	
Equitable participation	Promote and facilitate public participation and encourage actions they can take to address climate change and its effects. The government will create a framework through which early stakeholder involvement and participation can be guided. Through this framework the legitimacy of policy will consider the interests of stakeholders and affected parties.
Principle 4	
Educate and train	The government has a positive role to play in the training of government staff and environmental specialists through the development of educational programmes and curricula in order to stimulate the effective implementation of the policy.
Principle 5	
Inform and report	Through the establishment of rules and regulations the government will provide the framework for proper dissemination of information in order to provide stakeholders with correct and useful information to respond to and /comply with the Climate Change Policy.
Principle 6	
Commit resources to goals	The government will take steps to ensure a long-term commitment to technical, financial and institutional

Policy Principles	Approach
	support in order to better anticipate and respond to complex issues regarding climate change.
Principle 7	
Partner with private sector and prioritize technology	Suriname, through government policies, strategies and actions, and in dialogue with the private sector will seek out adaptation co-benefits derived from energy generation, transmission and supply, and energy efficiency investments take advantage of the best available or best practicable technology.
Principle 8	
Science and research-based decision making	The government will ensure the elevation of monitoring and scientific research to a level required for effective planning and decision-making. The government will act to ensure that Suriname is provided with a scientifically robust evidence base on which to base decisions.

Source: Developed through National Workshop Consultations.

3.2 Gender and Climate Change

The Inter American Commission on Human Rights has recognized the efforts of Suriname to incorporate gender equality as a guiding principle of all policies and laws concerning the rights of women in Suriname[11]. Figure 5 shows the gender gap index in Suriname from 2014 to 2017. In 2017, Suriname scored 0.69, which shows a gender gap of approximately 31% (women are 31% less likely than men to have equal opportunities). That same year, the gender gap in the area of political empowerment in Suriname amounted to 82%. This suggests that further improvements are needed overall.

Evidence continues to point to relatively higher vulnerability of women in developing countries such as Suriname, and even more so in rural areas since they may be highly dependent on local natural resources and/ or agriculture for their livelihood[12]. It is thus important for risk and

[11] , HR Concludes Its Working Visit to Suriname". February 12, 2013. The Inter-American Commission on Human Rights. oas.org. Additional data on gender can be found at: www.statistics-suriname.org

[12] Dulal, H. B., Shah, K. U., & Ahmad, N. (2009). Social equity considerations in the implementation of Caribbean climate change adaptation policies. *Sustainability*, *1*(3), 363-383.

vulnerability assessment to identify gender-sensitive strategies that respond to these crises for women.

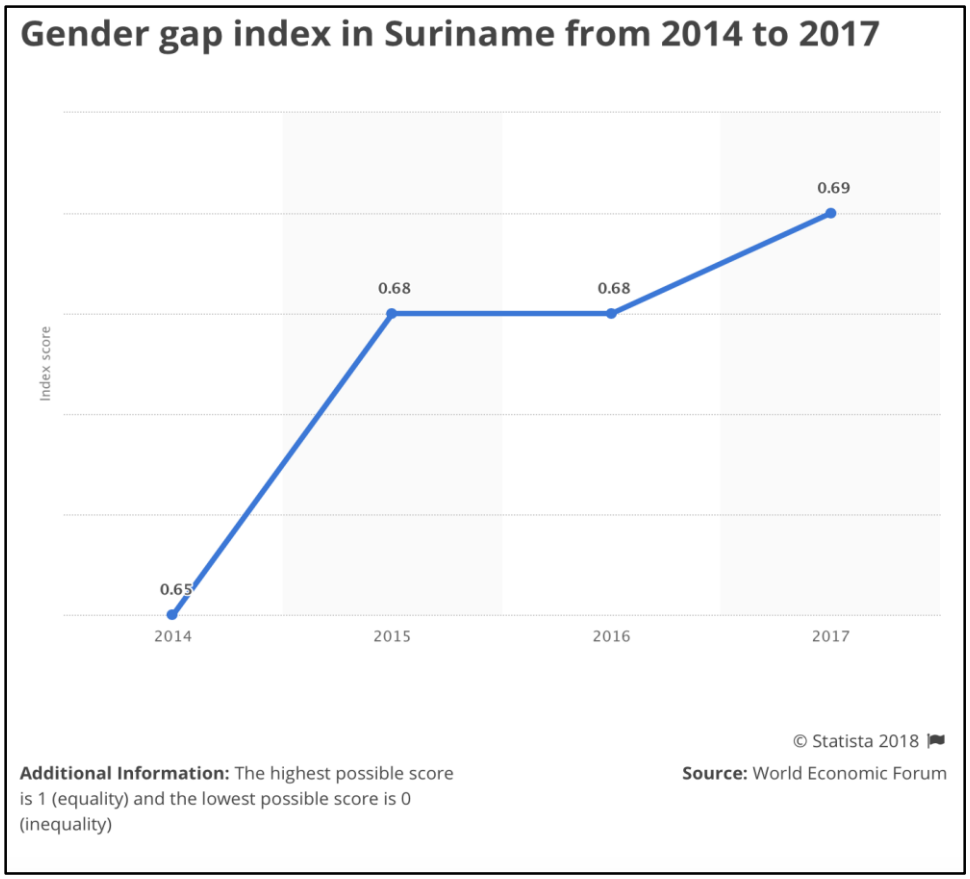


Figure 5: Gender gap in Suriname from 20142017

Factors that can be considered here, regarding gender differences, include differences in time use, access to assets and credit and treatment by markets and formal institutions. As a result, there is a global gender gap in earnings and productivity—women make between 30-80% of what men earn annually. In Suriname, women make up at least half of the agricultural labor force. The cumulative effects of poverty and social, economic and political barriers indicate that women will often be disadvantaged in coping with the adverse impacts of the changing climate. Socio-cultural norms could also limit women from acquiring the information and skills necessary to escape or avoid hazards. An example is that women have responsibility for small children who cannot swim or outrun disasters, who are further negatively affected by climate change.

In Suriname, women play a pivotal role in natural resources management and in other productive and reproductive activities at the household and community levels. This puts them in a position to contribute to livelihood strategies adapted to changing environmental realities. Their

extensive knowledge and expertise—that can also be used in climate change mitigation, disaster reduction and adaptation strategies—make them effective actors and agents of change.

Suriname is party to the Convention on Elimination of all Forms of Discrimination Against Women (CEDAW), the responsibility for which lies with the National Gender Policy Bureau in the Ministry of Home Affairs. The Bureau's Integrated Gender Plan of Action (2006-2010) requires updates to include climate change and environmental considerations. The focus of the Bureau is to mainstream gender policies into the policies and programs of the government through each ministry. Focal Points on Gender were created in all Ministries under the Action Plan.

Critically, gender disaggregated data has not been collected routinely at the sector level. In Suriname, outside of some periodic data on farmers and in post-disaster situations, the lack of gender disaggregated data weakens the evidence base[13] from which to generate policy level and strategic decisions to close gender gaps in risk and vulnerability. As the national agenda becomes more cognizant of gender sensitivities and strives to integrate such considerations in planning, so too, the national adaptation plan, especially the action plans, also make such considerations a priority.

In the area of disaster relief, there are several measures that can be improved regarding gender sensitivity. Because of the socio-cultural contexts, it is important that female aid workers offer help to female victims. Female heads of household or family members of households or women with reduced physical mobility may need help in accessing distribution locations or need help transported to them. This may also be the case for the elderly and people with disabilities. It is also important that information about emergency relief and how it is accessible is provided to all members of the community or to all residents of emergency camps. This may require door-to-door visits to people with mobility problems, as well as the separate consultation of men and women and the planning of community gatherings / crosses at times suitable for both men and women. Gender bias in investment policy during the reconstruction phase may also hamper the recovery of women. The establishment of relief funds for employment projects for women can support the economic recovery of women. When drawing up shelter and reception camps, the socio-cultural and economic needs and preferences of both men and women must be taken into account, as well as safety considerations. After disasters, the threat of physical and sexual violence often increases; this threat is being increased in shelter camps. One way of combatting this is to include gender awareness training for volunteers working in disaster areas including crisis management and sexual and gender-based violence.

[13] Ministry of Home Affairs (2018). National Report Situation Analysis of Women and Men in Suriname

3.3 Overview of the Country Specific NAP Model

The NAP Model developed for Suriname is illustrated in Figure 6. The Model for planning action is based on a Foundation of ***Policy Principles*** (discussed in the previous section), summarized as: (1) Participation, (2) Information and Reporting; (3) Public-Private Partnerships; (4) Technology and Innovation; (5) Legislation; (6) Commitment of Resources; (7) Science based decision making; and (8) minimize Risk and maximize Opportunity.

On this foundation, the NAP plans two levels of action. ***Nationally***, the Strategic Components for action are: (1) Institutions; (2) Capacity and Capability; (3) Integration/ Mainstreaming; (4) Data and Information; (5) Finance and Technology and (6) Social Equity. The second level of action considers these strategic components ***by Sector*** based on whether the particular sector is cross foundational, productive or cross cutting with respect to climate change.

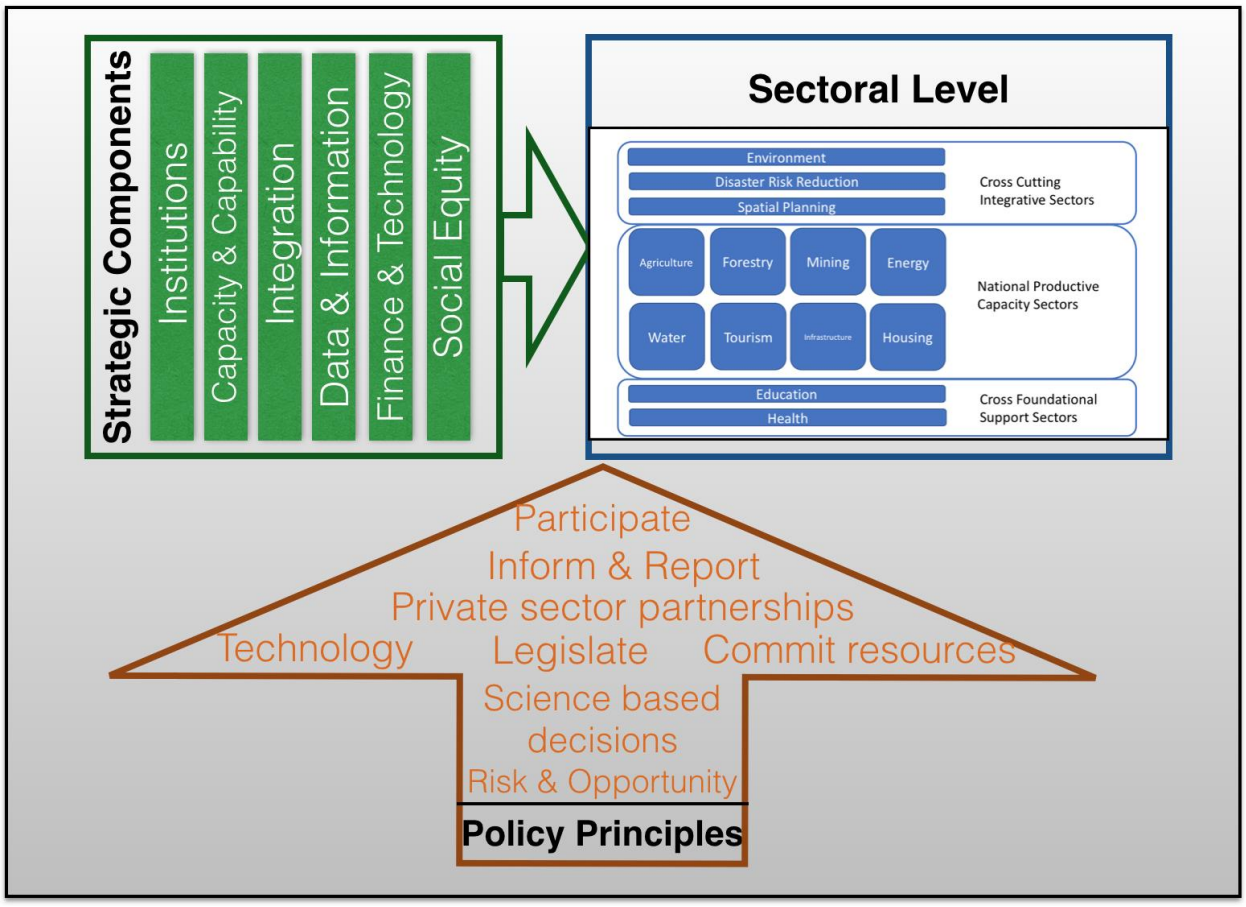


Figure 6: NAP Model for Suriname

This approach considers all thirteen national sectors as identified and segmented in the NCCPSAP. These thirteen sectors are: Environment, Disaster Risk Reduction, Spatial Planning, Agriculture, Forestry, Mining, Energy, Water, Tourism, Infrastructure, Housing, Education and Health. These sectors can be further clustered into three 'streams' as follows:

(1) **Cross- cutting integrative Sectors**: These are sectors that overarch the functioning of the productive sectors and while they each have separate risk and vulnerability profiles in and of themselves, they can also be leveraged to affect multiple productive sectors at the same time, cumulatively, in parallel and even additively. The sectors clustered here are: environment, disaster risk reduction and spatial planning.

(2) **National productive capacity sectors**: These are the main economic drivers at the core of national development. They are the main foreign exchange earners and sources of employment in Suriname. As such, they are the focus of climate change adaptation efforts. These sectors are largely natural resource based and, in some cases, for example the water and energy sectors, they also serve a public-centric focus such as potable water supply and/or electricity generation, along with the broader economic contributions. The sectors clustered here are: agriculture, forestry, mining, energy, water, tourism, infrastructure and housing.

(3) **Cross foundational support sectors**: These sectors are the foundation of long-term building of national economic wealth, sustainability, resilience and sustained development. Essentially, progression through growth, development and climate change adaptation in each of the productive and cross-cutting sectors noted above, will be handicapped without maintaining the viability and strength of these cross foundational support sectors. The sectors clustered here are: education and health. Again, while both these sectors require adaptation attention in and of themselves, their underlying foundational support for all other sectors is important.

This approach also complements findings of studies that informed the Second National Communication and enriches the general approaches outlined in the NCCPSAP. These previous studies point out the need to prioritize adaptation efforts by sector. They also forward the argument that such prioritization be founded on current national evidence on risk and vulnerability as well as additional considerations of societal equity, economic well-being, national cultural values and the realism of resources for practical implementation in the national interest.

There are several advantages to address risk and vulnerability at the sector level, using the Triple Stream Sector Model (TSSM). First, it addresses the complex interlinkages between different

sectors, which could not be effectively achieved in a conventional linear prioritization model (i.e. 1st priority sector X, 2nd priority sector Y …). The linear model is often unrealistic, leading to an oversimplification of the national adaptation planning effort and loss of vital gains that could be made through accounting for inter-sectoral interlinkages. This is unsuitable in country circumstances like Suriname where resource allocations for climate change adaptation may be scarce or uncertain coupled with the urgency with which action has to be taken. Second, by prioritizing the productive sector but coupling that with simultaneous efforts across the cross-cutting integrative sectors and monitoring the foundation sector, there is a greater probability of successful adaptation in each productive sector tackled in sequence. It is more likely that the gains made will not regress; and resiliency in the foundation and cross-cutting sectors means a progressive reduction in risk of failure to adapt in each productive sector tackled in prioritized sequence.

3.4 Roadmap for Action

The NAP Model explained above, conceptually lays out how Suriname will undertake the adaptation process. The Roadmap explained below and summarized in Figure 5 provides a scheduled, step-by-step plan on how to move the concept to reality.

Figure 7 represents a strategic implementation model at the sector level. The top arrows represent constant and consistent actions from near, medium to long term in the cross-collaborative sectors. The middle shows two triangles, one representing a high level of activities in the near term reducing gradually into the long term for 'Now' priority sectors and an opposite trajectory for action for "Next" priority sectors. Lastly at the bottom of the figure is the progress for action in the Foundation sectors with most intensive activity in the near term moving to less intense activity in the long term.

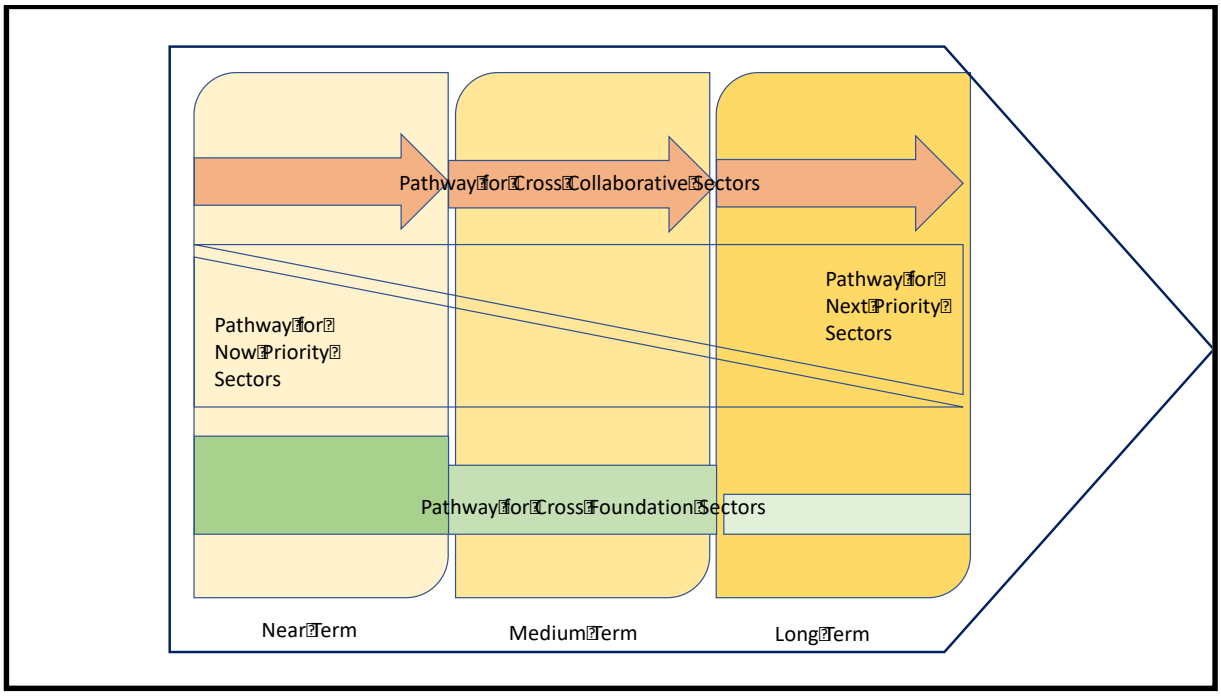


Figure 7: Strategic Implementation Model based on Sector- level Risk and Vulnerability Assessments

1. **"Pathway for 'Now' Priority Sectors":** The emphasis for national climate change adaptation starts with strong focus on those productive sectors with the most vulnerable risk profiles. These are the: water sector, energy sector, forestry sector and agriculture sector. As sectoral resilience is strengthened over the near and medium term, there can be progressively reduced focus, in order to shift attention to the "Pathway for 'Next' Priority Sectors".

2. **"Pathway for 'Next' Priority Sectors":** As national climate change planning moves into the medium term; the focus shifts to those productive sectors with somewhat less vulnerable risk profiles. These are: mining, tourism, infrastructure and housing. This shift to build resilience in these sectors occurs as the 'Now' sectors exhibit stronger resiliency and therefore require less attention and resources.

Over time, as this dual strategy across the productive sectors occurs, synergies across sectors also increase climate resilience.

3. **"Pathway for Cross-Foundation Sectors":** There are two foundation sectors upon which the productive sectors and the cross-collaborative sectors depend. These are the education and health sectors. Long term resilience cannot be confidently built without first paying substantial attention to these two sectors. In this pathway, therefore, in the immediate near term, there should be strong emphasis on building resilience in the education and health sectors. Over time

through the medium and long term, while resiliency must be maintained in these sectors, the foundation would have been sufficiently strengthened so as to shift focus from building up resilience to maintaining it.

4. **"Pathway for Cross-Collaborative Sectors":** The environment, disaster risk reduction and spatial planning sectors undertake climate change resilience building intrinsic to each respective sector but also play an undeniable and often essential role in the building of climate resilience in each of the productive sectors as well. The importance of maintaining focus on these three sectors can therefore not be minimized. Over the course of the near, medium and long term, an underlying but consistent focus on these sectors will serve to build resilience across all of the productive sectors as well.

When this comprehensive sector level strategy of (1), (2), (3) and (4) is implemented in a complimentary manner, it offers the most effective and realistic approach to addressing risk, reducing vulnerability and building national level climate resilience. A phased implementation timeline supportive of the Pathway above is represented in figure 8 below.

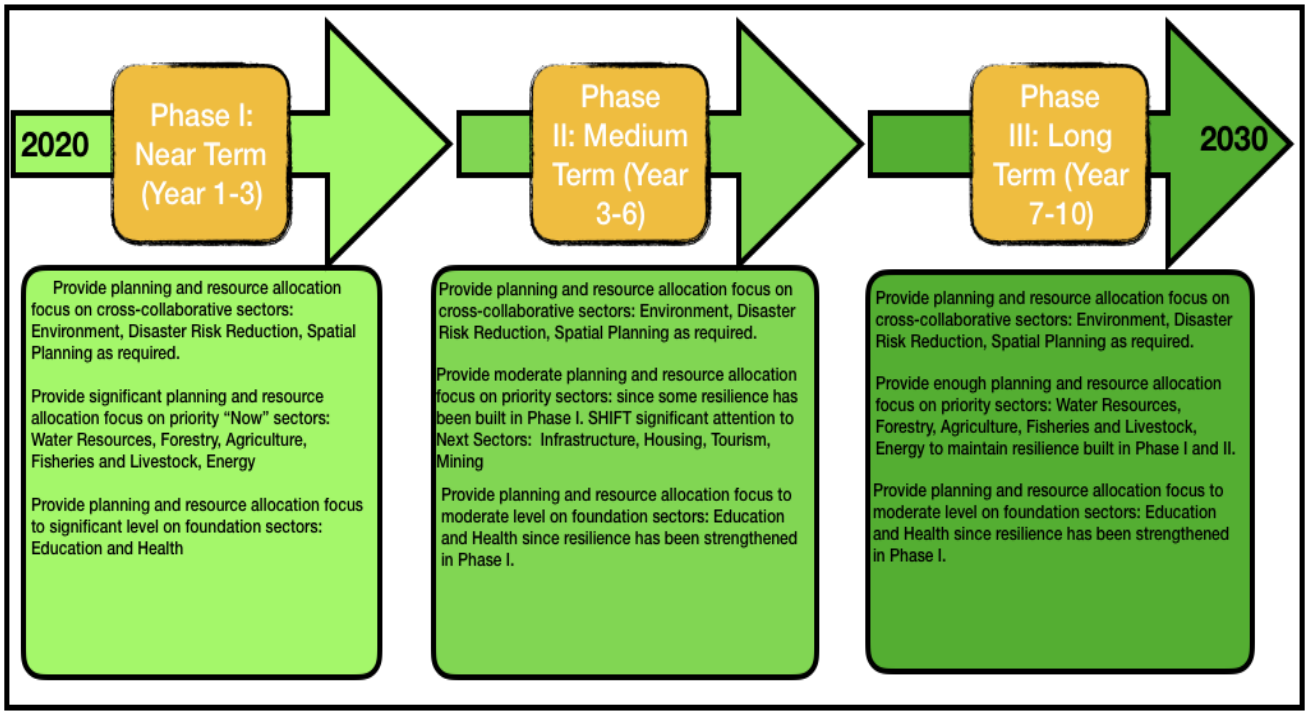


Figure 8: Phased Ten (10) Year timeline for sectoral level action plan

4.0 Management and Implementation of the NAP

Coordination Environment at the Office of the President, as the national focal point of the UNFCCC has the mandate to report and execute Suriname's responsibilities to the UNFCCC. In that regard this office is responsible for the management and overview of the implementation of the NAP. The implementation of the NAP will occur in collaboration with all relevant ministries, institutions and non-government organizations. Figure 9 depicts the national organizational structure of the implementation of the NAP.

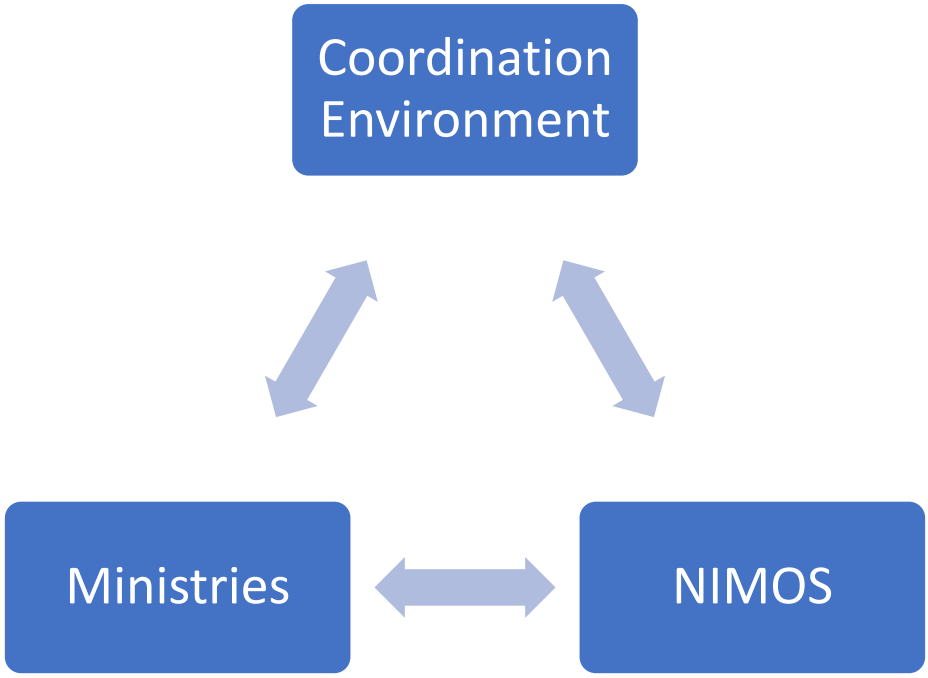


Figure 9: Organizational structure for the implementation of the NAP

Furthermore, the technical executive body linked to Coordination Environment will adapt its organizational structure in order to assist in the implementation of the NAP.

4.1 Suriname National Environmental Information Network (SMIN)

Collection of climate data in Suriname is challenging and resource intensive. In 2016, the decision was taken to bring several institutions under a consortium in in order to cluster environmental data from the several instituions.
This consortium is called the Environmental Information Network of Suriname[13].

Objectives of SMIN:

- The SMIN will produce official and formal environmental data and information for the purpose of national policy and planning whereby the policy makers can analyse the condition of the environment and follow trends to determine adjustment of policy in which they will invest in the needed capacities for a better environmental management.
- By establishing official and uniform information and data in Suriname, the government can develop a consistent reporting process. Furthermore will this help with the justification for additional investment in both national and international environmental management or planning in Suriname. This means that activities will be prioritized for the purpose of sustainable development in the national planning and budgets
- Publication of information and advice
- The Horizontal Environmental Data Network
- The horizontal network consists of the institutes, organizations and departments that can be considered as the most common and recognized sources of environmental data and information. Given that there is no uniformity in information and data presentation, it is essential to strengthen capacity for the purpose of environmental planning to come to standardization.

4.2 Capacity and Capabilities for NAP Implementation

Both NIMOS and stakeholder ministries will be involved in NAP implementation. The NAP addresses increasing capacity and capabilities through training, as a key component for adaptation success in the long run. NIMOS will (1) acquire training through the NAP process as well as have central responsibility for coordinating and delivering relevant training across stakeholder ministries; and (2) each ministry will require further technical training to assist in NAP implementation within the boundaries of their mandates. Based on the role NIMOS is likely

[13] The Consortium includes NIMOS, Planbureau, SBB, Meteorology, ABS, CELOS and Herbarium.

to play based on passage of the Environmental Act in the future, figure 10 illustrates an operational model of how NIMOS will meet its objectives.

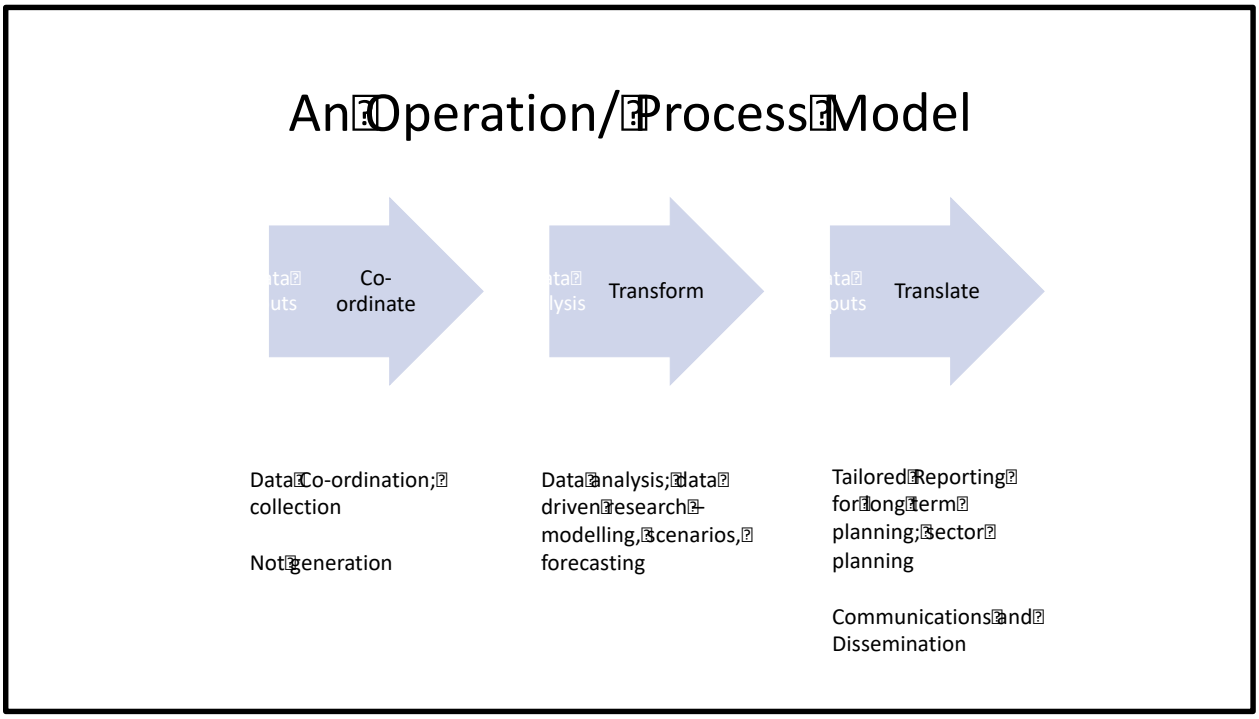


Figure 10: An OPerational/ Process Model for NIMOS

As a result of the Cross- Cutting Capacity Development (CCCD)- Project, a proposal was done to develop an office that will collect actual information and data on national and regional level. This data will be used by CM, NIMOS and other sectoral actors for the development of Environmental Policy and planning

4.3 Legal Framework on Climate Change

The Constitution of the Republic of Suriname provides the legal basis for a sustainable environmental policy in its Article 6g, which states that one of the social objectives of the state is focused on the establishment and stimulation of conditions required for the preservation of nature and the safeguarding of ecological balance[15]. Adherence to these principles has been seen through Suriname's participation in major environmental conventions. Some legislation, policy

[15] Whiting, S. (2018). Draft Environmental and Social Analysis Suriname Sustainable Agricultural Productivity Program. Prepared for the InterAmerican Development Bank and Ministry of Agriculture, Livestock and Fisheries.

documents and action programs have been developed in order to address climate-change issues in general and the UNFCCC commitments specifically.

Existing laws that form some basis for climate change related planning include:

- the National Planning Act of 1973 provides for national and regional planning on subjects such as land-use policy
- the Forest Management Act of 1992 provides a framework for forest management and sustainable utilization of forest resources
- the Nature Protection Act of 1954 and the State Decree on Nature Protection of 1998 established the Central Suriname Nature Reserve
- The Nuisance Act of 1930 is described as being 'outdated' but certain aspects are still applicable to climate change planning.

An Environmental Framework Act that will regulate pollution, waste management and environmental impact among other things, has been prepared and must be promulgated by Parliament. The government's development policy is based on an integrated approach to economic, social and environmental sustainability.

More recent legislative developments include the draft Coastal Protection Act. This gives emphasis on sustainable coastal protection and integrated water management. Conserving the estuarine coastal strip is also a high priority, as the natural vegetation contributes to the protection of the coast. The construction of natural and artificial works has started against the background of the gradual rise of the sea level. Three important Bills relevant to governance of Water Resources are submitted to Parliament in 2018. These Bills are:

- Conservation and Management of Water Aquifers (Grondwater Beschermingsgebieden)
- Groundwater Management (Grondwater);
- Control of Drinking Water Quality (Toezicht Drinkwater Kwaliteit)

4.4 The Institutional and Administrative Environment

The implementation of the NAP will require the collaboration of most Ministries and government agencies. There will be two leadership roles. One leadership role will be established within the Coordination Environment of the President's Office and will focus on multilateral environmental agreement coordination, implementation and reporting; and the other is with NIMOS which will take operational leadership at the national level. NIMOS role includes operational decision-making, coordination and collaboration with other ministries and government as well as non-

governmental parties. This leadership will be pivotal for the accomplishment of the NAPs Strategic Action Plan.

Several Sectoral Action Plans are also scheduled to be implemented. Relevant ministries/ agencies will be designated as focal points for respective sectoral plans while overall leadership and coordination will be overseen by NIMOS. For example, the Agriculture sectoral plan will have the Ministry of Agriculture as its focal point and the Water Resources sectoral action plan will have the Hydraulic Unit as its focal point. More often than not, the activities called for in the sectoral action plans are already being supported within the respective strategic plans of each Ministry/ Agency. As part of the administration process for the implementation of the NAP, NIMOS will consult with and forge memoranda of understanding with Ministries, to move forward on their respective action plans.

Table 3:Ministries and relevant climate related mandates

Ministry/Agency	Climate Adaptation relevant mandates/ activities
Coordination Environment at the Cabinet of the President	- Coordination of the preparation of environmental policy and monitoring of its implementation. -Development of cooperation mechanism(s) to effectively and efficiently implement national and international environmental tasks. -Promotion of the implementation of ratified environmental treaties. - The national focal point for multilateral environmental treaties and environmental organizations -Promotion of the use of environmentally friendly technologies. -Support the Government by advising on national environmental policy
Ministry of Physical Planning Land and Forest Management	-Land use planning. -Forest management and nature conservation.
Ministry of Natural Resources	-Management and exploitation of mineral resources, water and energy. -Regulation of domestic, public and commercial energy use.
Ministry of Agriculture, Animal Husbandry and Fisheries	-Regulation of agrarian sector and proper use of agricultural land and waters. -Management, rational exploitation and protection of fishery resources.
Ministry of Public Works, Transport and Communications	-Planning and implementation of civil engineering and infrastructural works. -Water management and drainage. -Hydrological and meteorological services. -Waste management and spatial planning. - Flood defenses.

Ministry of Regional Development	Administers Suriname's rural districts, coordinating development activities and governance in these areas.
National Institute for Environment and Development (NIMOS)	-Implementation of Environmental Policy; Environmental management/pollution control. - Environmental and Social Impact Assessment (ESIA) - Environmental compliance and control
Planning Bureau	- Preparation of national development plans.
National Coordination Centre For Disaster Relief	-Coordinator and facilitator for crisis and disaster management.
The Foundation for Forest Management and Production Control	- Enforcement of the Forest Management Act.
Meteorological Service	-Collection, analysis and distribution of meteorological information.
Hydraulic Research Division	- Hydrological, hydraulic and water quality observations and studies, including sedimentation and erosion, morphology of water courses, riverbanks and the coast.

4.5 Funding Suriname's NAP Implementation

Climate change investments are constrained by a number of challenges, particularly related to financial resources within Suriname. These include limited scope for debt finance and restricted fiscal space, and declining aid flows. Increasing debt levels have placed a drag on economic growth and development in Suriname, while constraining the allocation of resources for productive and new investments. Public debt within Suriname has been on an upward trajectory over the last decades, with a 2017 debt-to-GDP ratio of 63.2%. Advancing the climate change agenda will require investments in infrastructure, conservation, research and development, institutional and human capacity development, as well as information-sharing and knowledge-building[16]. Additional detailed information is also included in Annex 2 Financing Modalities.

[16] International Monetary Fund (2017). Cluster Report: Trade Integration in Latin America and the Caribbean. Country Report No. 17/66.

Considering the level of investment that will be needed to achieve the NAP objectives, Suriname must find new and innovative ways to finance investments in climate change. A shift is needed in the use of available financing as well as optimal use of available resources from all sources. The opportunities to leverage domestic resources by blending official concessional finance with other international resources for climate change, are promising. Opportunities also exist for increasing available public resources as well as private sector finance and investment for climate change initiatives. Increasing the resource envelope to finance climate change initiatives also requires new approaches to draw upon the existing pools of development finance. It may also require the development and piloting of new instruments.

The financing for development landscape has become more diversified and complex with new sources of finance such as South-South Cooperation, international climate funds and impact investors[17]. In parallel, a much richer and more sophisticated range of financial instruments and tools is being deployed in support of development: from blended finance arrangements to green bonds, social and development impact bonds, debt-for-nature swaps, and state contingent debt instruments. Heightened awareness of climate risks has encouraged many investors to value sound natural resource management and implies an expanding pool of investors interested in activities where development is aligned with sustainability. Climate adaptation and mitigation presents an opportunity to potentially leverage additional resources for investments and utilize a wide variety of new and innovative financing models, for which both the public and private sector can partner to pool finances and share skills, expertise and approaches.

The 'pipeline' of investment-ready activities remains limited. Commercial investors remain cautious, in part due to information asymmetries and risk perception, and the majority of investments targeted at adaptation, mitigation and resiliency to date, have relied heavily on bilateral and multilateral development banks and conservation agencies to assume the associated upfront risk. Many climate change interventions will also carry higher upfront costs and returns that will not immediately accrue to investors. This underscores the need to ensure that Suriname retains access to concessional public finance from the international community and multilateral development banks.

There are a number of financing avenues that Suriname must explore and take advantage of. Blended finance is the strategic combination of public and/or private development finance flows

[17] Entities making investments into companies, organizations, and funds with the intention to generate a measurable social and environmental impact alongside a financial return.
http://www.undp.org/content/sdfinance/en/home/solutions/impact-investment.html

(e.g. concessional finance and philanthropic resources) with other public or private capital to enhance resources for investment in key areas such as infrastructure. Climate Bond instruments have been issued by multilateral financial institutions, sovereign states and municipalities to fund investments in sustainable energy, clean transportation, and other areas. Debt-for-nature swaps leverages funds for use in national conservation efforts and are based on the model of debt-for-equity swaps where the proceeds of the swap would be invested in Suriname's conservation activities. Payment-for-results schemes can be based on a public-private partnership arrangement between government and the private and non-profit sectors to deliver projects with climate risk reduction, adaptation or mitigation objectives. Contingently recoverable grants provide resources to reduce climate risks and upfront costs associated with the exploratory phase of capital-intensive projects particularly commercial extractive-type resources. Opportunities for domestic resource mobilization are critical to supporting investments in the climate change. In Suriname, potential exists to scale up domestic resource mobilization for climate financing. Leveraging private capital can widen and deepen the pool of funding for governments to address development needs, while driving economic growth and creating jobs. Insurance pools or transfers risk in an effort to reduce the impact of climate related loss and damage. For Suriname, many of the climate change interventions that may be contemplated are relatively new and therefore carry higher investor risk.

4.5.1 Priorities for Funding based on the National Development Plan 2017-2021

Climate change is being mainstreamed into Suriname's National Development Plans. The five-year strategic plan highlights building strategic partnerships that will propel commitments required to achieve the goals of reducing greenhouse gas emissions and combating negative climate changes. One of the four pillars of development planning is protection of the natural environment within which there is the intention that "climate change receive the necessary attention and measures taken to address and to minimize the consequences, including natural disasters."[16] Infrastructure, energy, forestry, agriculture and disaster risk are the areas carded for funding priority.

Sea level rise as a result of climate change makes coastal and riverbank protection works urgent given that it is where most of the fertile agricultural land is situated, infrastructural facilities are available and where the biggest part of the population lives. Emphasis will be on sustainable coastal protection and integrated water management. Conserving the estuarine coastal strip is also a high priority, as the natural vegetation contributes to the protection of the coast. The

construction of natural and artificial works has started against the background of the gradual rise of the sea level[18]. These actions are also supported by the draft Coastal Protection Act.

In the energy sector, priority projects revolve around the implementation of programs to reduce CO_2-emissions; application of environmentally friendly electricity generation facilities and attendant job creation through investments and scaling up of green energy projects. Priority projects are based around strategic clusters of productive sectors and the emerging cluster of environmentally related use of the forests (including compensation for the preservation of Suriname's pristine tropical forest and recovery of the Surinamese rain forest (REDD+ Green Climate Fund). In addition to timber and non-timber forest products, the forest also provides a number of ecosystem services. These ecosystem services can be converted into funds via the mechanism for REDD+. Suriname is in the process of preparation to take advantage of funding opportunities to maximize this cash value[19].

Development of agrarian and regional development plans, in particular plans for urban centers and zoning require immediate financing. It is a condition to prevent enclave formation in the mining areas and should promote the integration of the various sectoral activities. Considering sea level rise and the increase of precipitation and squalls requires extra investments in agricultural engineering works, such as water-containing dams, spillways, distribution works, irrigation and drainage channels, pumps and sluices.

There is also continuing emphasis on financing for pre and post disaster actions especially climate-related disasters (local storms, floods, droughts). Suriname's National Development Plan notes the options of public finance, conventional sources of funding (e.g. commercial market finance, traditional bi-lateral development assistance, and finance from international development banks) as well as alternative climate financing sources to fund climate compatible development. Public expenditure in Suriname is funded from tax and non-tax public revenues, royalties or fines while major investments such as in infrastructure (e.g. in roads, dikes) are commonly funded by loans. While the total cost of climate compatible development over the next 10 years is difficult to estimate, it is expected that public financing will be insufficient to address all adaptation needs. New climate finance sources will need to be accessed.

Suriname's investment strategy for the Development Plan 2017- 2021 recognizes four basic financing sources, which are also the sources that will be targeted for climate change related programming. These are: Surinamese funds including government revenue or savings and private

[18] Suriname National Development Plan 2017-2021
[19] Suriname National Development Plan 2017-2021

incomes or savings; International Funds including public funds and funds from public multilateral organizations or funds made available by friendly countries and; Foreign Direct Investment (FDI) or funds from international non-profit organizations.

An early priority, therefore, is Suriname's actions to commence discussions between partner ministries and potential external funders including development partners, development banks and the private sector. The objective of discussions will be to finance plans for the next ten years and to discuss finance and investment opportunities. To prepare for such discussions, lead ministries and agencies will cost the adaptation programs and activities they envision and identify pipeline of bankable projects to be developed.

4.5.2 The Way forward with Financing

For Suriname, opportunities that justify harnessing funds to address climate change initiatives are evident. The challenge however, lies in the ability to finance climate change adaptation, including: (a) the ability of Suriname to leverage available resources more efficiently; (b) aligning resources more strategically with adaptation priorities; and (c) the capacity to access resources, develop and implement viable adaptation projects. Figure 11 below provides some feasible examples of how various finance modalities can be approached. Annex 2 provides details about various finance modalities relevant to Suriname's NAP.

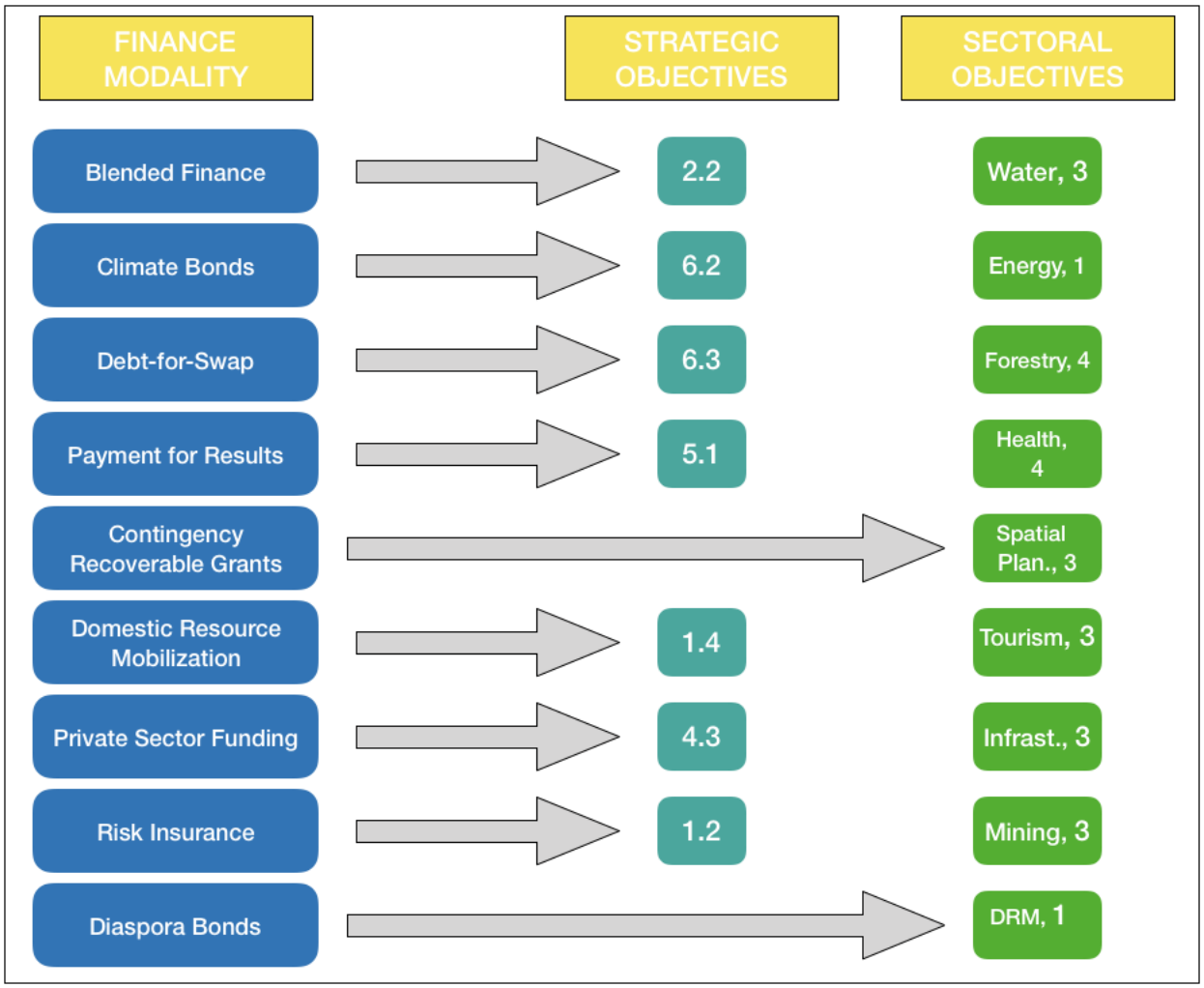


Figure 11: Examples off Strategic objectives and Sectoral Objectives that can be serviced b various finance modalities

Note: (a) See sections 6 and 7 for strategic and sectoral objectives respectively. (b) finance modalities may not be mutually exclusive in the examples listed.

In Figure 11, the blended finance modality is recommended for strategic objective 2.2 – modernizing facilities, tools and equipment for climate activities and for Water sector objective 3 – increasing the resilience of water supply infrastructure. Investing in climate change-related activities and sectors requires developing innovative and robust financing models. It may also require a reconsideration of the rules on concessional finance to make a more strategic link between climate change and economy. Strategies that can assist Suriname in developing innovative finance instruments and accessing the global pool of finance on climate change include: a. building capacity in innovative financing for climate change; b. analyzing and researching the challenges and opportunities associated with climate change impacts; c. identifying and aligning national development priorities and climate change activities that could be supported; d. exploring financial inclusion and inclusive growth to support climate change

adaptation initiatives; and e. Adopting an approach to climate change that will attract foreign direct investments such as developing a climate change investment pipeline.

Most recently, Suriname formally adopted the Joint Declaration, *Krutu of Paramaribo* that articulates the desire of the grouping of countries known as "HFLD countries" or "High Forest, Low Deforestation countries" to work together actively to overcome the barriers of accessing climate finance needed for the continued progress toward sustainable development goals, with concurrent care and protection for their essential intact forest ecosystems. This includes a call to the international community to find practical ways to simplify and better align the financial frameworks and mechanisms to address the urgent and specific needs of HFLD developing countries, in a way which provides economic incentives for the preservation of forest carbon stocks, and thus, recognizing the historic contribution of HFLD developing countries to mitigate climate change. It also invites relevant financial institutions, developed country donors, the private sector, philanthropy and other countries in a position to do so, to increase financing for sustainable forest management, including conservation, and to give special consideration to HFLD countries.

Expected to channel a significant part of the global annual target of USD 100 billion by 2020, the Green Climate Fund (GCF) will rely on this direct access modality through the accreditation of National and Regional Implementation Entities, alongside financial intermediaries (see Figure 10 below). Currently a number of readiness and preparedness support activities are being formulated by development partners. These aim to make countries ready to access, allocate, disburse and make use of this funding, as well as monitor and report on its use. The Caribbean Community Climate Change Centre (CCCCC) is looking for ways to boost the region's access to the GCF. The Centre is on the hunt for proposals from the private and public sector organizations around the region that want to work with the Centre to develop their ideas into successful projects that are in line with their country's national priorities to build resilience to climate change. The CCCCC, has doubled its efforts in the wake of the recent Hurricane Seasons which saw the devastation of several islands and which exacerbates the need for climate proofing critical infrastructure. The GCF has approved over US$100 million in preparation funding for several Small Island Developing States (SIDS) globally.

4.5.3 International Climate Finance Options

There are a number of channels through which climate finance flows, including multilateral climate funds that are dedicated to addressing climate change. Like many developing countries, CARICOM, through the CCCCC has also set up regional channels to receive climate finance. The types of climate finance available vary from grants and concessional loans, to guarantees and

private equity. The architecture has differing structures of governance, modalities and objectives. A multitude of funding channels increases the options and therefore possibilities for Suriname to access climate finance but can also make the process more complicated (Figure 12 below highlights several funds).

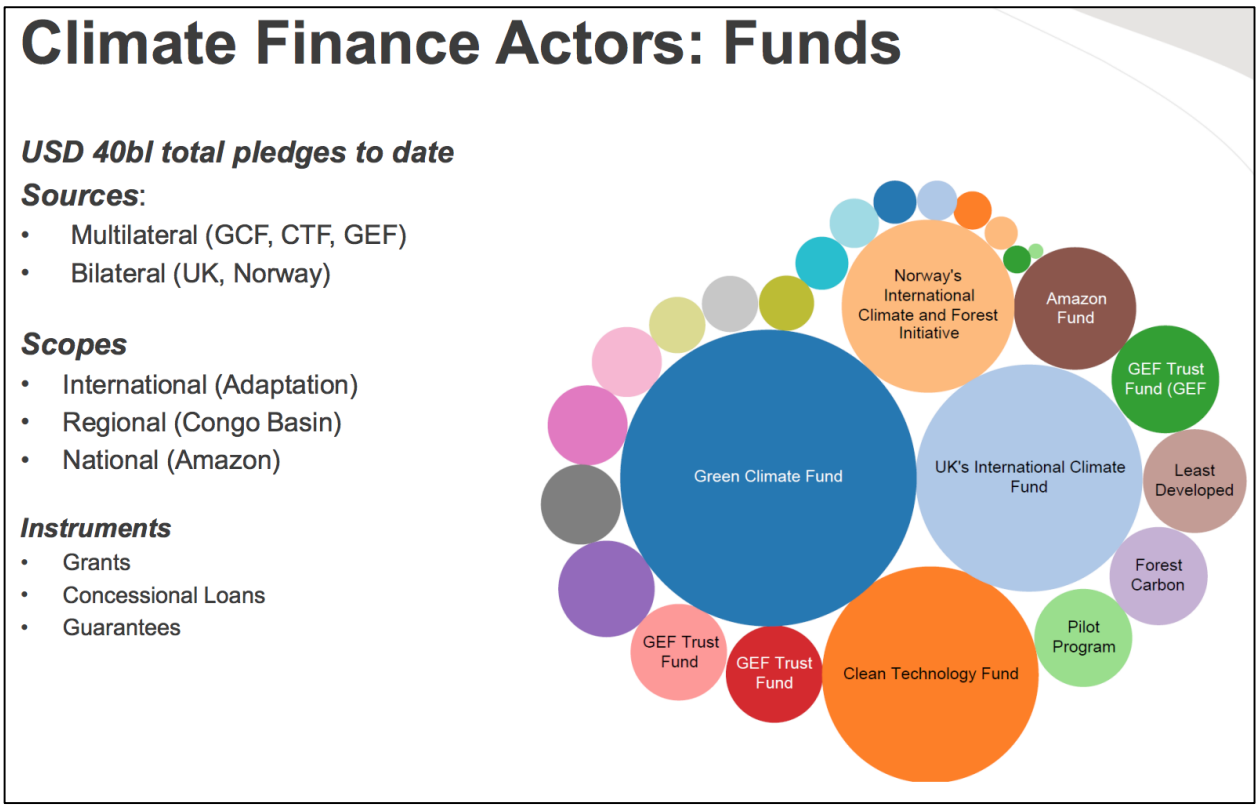


Figure 12: International Climate Finance Options
Source: Climate Funds Update http://www.climatefundsupdate.org

The GEF administers the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF) under the guidance of the UNFCCC Conference of Parties (COP). These funds support national adaptation plan development and implementation, although largely through smaller scale projects. Also, the UNFCCC Adaptation Fund (AF) is financed through a 2% levy on the sale of emission credits from the Clean Development Mechanism of the Kyoto Protocol and developed country grant contributions.

The Climate Investment Funds (CIFs) administered by the World Bank, but operate in partnership with regional development banks including the Inter-American Development Bank (IDB). The CIFs finance programmatic interventions in selected developing countries, with the objective of improving understanding of how public finance is best deployed at scale to assist transformation of development trajectories. The CIFs have a Strategic Climate Fund (SCF), the Pilot Program for

Climate Resilience (PPCR), the Forest Investment Program (FIP), and the Scaling-Up Renewable Energy Program for Low Income Countries (SREP).

Multilateral Development Banks (MDBs) play a prominent role in delivering multilateral climate finance. Many have incorporated climate change considerations into their core lending and operations, and most MDBs now also administer climate finance initiatives with a regional or thematic scope (see Table 4 below). The World Bank's carbon finance unit has established the Forest Carbon Partnership Facility (FCPF) to explore how carbon market revenues could be harnessed to reduce emissions from deforestation and forest degradation, forest conservation, sustainable forest management and the enhancement of forest carbon stocks (REDD+). It also manages the Partnership for Market Readiness, aimed at helping developing countries establish market-based mechanisms to respond to climate change and the Bio Carbon Fund, which is a public-private partnership that mobilizes finance for sequestration or conservation of carbon in the land use sector.

Table 4: Dedicated Funds supporting adaptation (2003-2015)

Table 1: Dedicated Funds supporting adaptation (2003-2015)

Fund	Pledged	Deposited	Approved	Projects approved
Pilot Program for Climate Resilience (PPCR)	1125.00	1125.00	857.31	70
Least Developed Countries Fund (LDCF)	963.66	961.87	794.62	203
Adaptation Fund (AF)	487.10	482.54	330.30	51
Adaptation for Smallholder Agriculture Program (ASAP)	366.46	326.44	239.00	28
Special Climate Change Fund (SCCF)	350.08	344.07	277.89	64

Source: Heinrich Boll Stiftung Foundation, Dec. 2015.

It is also important that climate finance access and management are considered in the context of existing proposals for an Environment Fund which are detailed in the draft Environmental Framework Bill. The government should create an environment which attracts investment in Compulsory Convertible Debenture (CCD) from overseas and domestically. This will involve strengthening the risk reward balance for investors, including establishing financial instruments to overcome risks and to increase returns on investments. As government balance sheets around the world have become increasingly strained, it is widely acknowledged that there is a need to unlock and upscale private sector participation to bridge the climate change funding gap. The GCF will have a dedicated NAP for Suriname facility aimed in particular at supporting activities to enable private sector involvement in SIDS and Least Developed Countries (LDCs). Given Suriname's status as a SIDS, its private sector will be eligible for this.

In this context, fiscal measures such as tax breaks for alternative renewable energy investment, the trial and development of feed-in-tariffs and/or the removal of electricity subsidies especially

where they accrue adaptation co-benefits, should be explored further. In the case of attracting private sector investment, the GoS needs to design and implement an appropriate combination of public policies to change background conditions and manage investment and project risk. A range of sector focused fiscal measures are presented in selected NCCPSAP planning theme programs and actions.

Suriname will ensure that it is an active and willing participant working with development partners to take advantage of the opportunities. With respect to potential new sources of climate finance and investment, it will be necessary for the NAP Implementation focal point to work with the Ministry of Finance to review modalities. The World Bank-UNDP 'Climate Finance Options' website provides a clearing house for climate change-related international financing, lists 31 distinct mechanisms for climate resilience finance and 55 mechanisms for GHG emissions reduction/ mitigation finance. These include national funding mechanisms as innovative ways to link international finance sources with national investment strategies. In addition to a better understanding of existing and potential sources of climate funding, there is a need to consider the current absorptive capacity to effectively access and manage climate finance and investment. This refers to the ability to develop pipelines of projects and programs and implement them.

5.0 Monitoring and Evaluation Framework

The Monitoring and Evaluation (M&E) framework for the Suriname NAP provides an overview and operational mechanism of M&E at the Strategic Level and the Sectoral Level. It also explains the different requirements and responsibilities in M&E and how the results from M&E will be used to inform ongoing and future planning and implementation processes in relation to the NAP.

In the tables below, for each Strategic Objective identified (first column), several Output Measures (fourth column) are identified that correspond with Adaptive measures (second column) and Indicative Outputs (third column). An Achievement Schedule (fifth column) is also presented for the short, medium- and long-term implementation of the NAP. Schematically, the larger circle represents where more implementation effort should take place in the timeline.

5.1 Strategic Level Monitoring and Evaluation

5.1.1 Strategic Outcome 1: Institutional arrangements, policies and capacities able to lead and coordinate national and sub-national climate change adaptation

Strategic Objective	**Adaptive Measure**	**Indicative Output**	**Key Performance Indicators** Output Measurements	**Achievement Schedule** 0-3 yrs.	4-7 yrs.	8-10 yrs.
Strategic Outcome 1: Institutional arrangements, policies and capacities able to lead and coordinate national and sub-national climate change adaptation						
1.1	A	1	Environmental Act entered into force	●	•	•
		2	NIMOS operationalized	●	•	•
	B	1	Number of MOUs signed	•	●	•
1.2	A	1	Availability of scientific measurement of terrain	•	•	●
		2	Availability of scientific measurement of sea level rise	•	•	●
	B	1	Quality and quantity of meteorological datasets	•	•	●

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators Output Measurements	Achievement Schedule 0-3 yrs.	 4-7 yrs.	 8-10 yrs.
		2	Number of information sharing protocol agreements	●	●	•
	C	1	Units of expansion of measurement networks	•	●	●
		2	Number of requests for meteorological datasets by stakeholders	•	●	●
1.3	A	1	Number of active climate adaptation stakeholders	•	●	●
		2	Number of active stakeholders from business and industry	•	●	●
		3	References to climate adaptation in non-climate change policies	●	●	•
	B	1	Reduction in administrative processing times	●	●	•
		2	Number staff trained/ Level of training budget	●	●	•
	C	1	Number of collaborative agreements signed	●	●	•
		2	Number of new programmes with multiple contributing stakeholders	•	●	●
		3	Level of government restructuring	●	●	•
1.4	A	1	Cross cutting Development project implementation (%)	●	●	•
	B	1	Number of public-private partnerships/ budget towards PPP efforts	•	●	●
		2	Time towards PPP agreements	●	●	•
	C	1	Number of local/ district plans developed and implemented	•	●	●

5.1.2 Strategic Outcome 2: Data and information collection systems to fully support national and sub-national climate change impacts, vulnerability and adaptation decision-making.

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators Output Measurements	Achievement Schedule 0-3 yrs.	 4-7 yrs.	 8-10 yrs.
Strategic Outcome 2: Data and information collection systems to fully support national and sub-national climate change impacts, vulnerability and adaptation decision-making.						
2.1	A	1	Number of ministries attaining required technical capacity	•	●	⬤
		2	Number of approved donor funded proposals	•	●	⬤
	B	1	Quality and quantity of data on identified critical variables collected	●	⬤	•
	C	1	Quality of models enhanced by additional datasets	●	⬤	•
		2	Level of statistical/ scientific confidence in models	●	⬤	•
2.2	A	1	Number of weather measurement stations	●	⬤	•
	B	1	Quality and quantity of local/ district level datasets including gender disaggregated datasets	•	●	⬤
		2	Reduction of gaps in current datasets	●	⬤	•
2.3	A	1	Number of MOUs signed between ministries	•	●	⬤
		2	Number of data sharing agreements	•	●	⬤
		3	Number of projects jointly sponsored	•	●	⬤
	B	1	Resourcing of NIMOS for climate adaptation implementation	●	⬤	•
		2	Number of agreements to data sharing protocols	●	⬤	•

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators Output Measurements	Achievement Schedule 0-3 yrs.	4-7 yrs.	8-10 yrs.
2.4	A	1	Quality of downscaled models developed	•	●	⬤
		2	Land and coastal surveys comprehensively completed	•	●	⬤

5.1.3 Strategic Outcome 3: The integration and institutionalization of climate change adaptation in broader Surinamese economic development policies, plans and programs.

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators Output Measurements	Achievement Schedule 0-3yrs.	4-7 yrs.	8-10 yrs.
Strategic Outcome 3: The integration and institutionalization of climate change adaptation in broader Surinamese economic development policies, plans and programs.						
3.1	A	1	Statements of political support for adaptation activities	⬤	●	•
		2	Number of trained professionals leaving government	●	⬤	•
		3	Number of trained professionals leaving government	●	⬤	•
	B	1	Number of inter-ministerial programs	●	⬤	•
		2	Reduced instances of repetitious efforts by ministries	⬤	●	•
		3	Quality and quantity of national data inventories	•	●	⬤
		4	Number of active committees linked together	•	●	⬤
	C	1	Visible leadership on issues cited	⬤	●	•
		2	Number of scientific research and development initiatives	•	●	⬤

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators Output Measurements	Achievement Schedule 0-3yrs.	4-7 yrs.	8-10 yrs.
		3	Citation of government reports in policy positions	•	●	⬤
		4	Number of regional and global partnerships signed	•	●	⬤
3.2	A	1	Citations of climate adaptation in non-climate national plans	●	⬤	•
		2	Number of climate adaptation actions budgeted in non- climate national plans	⬤	●	•
		3	Number of climate adaptation actions budgeted in non- climate national plans	⬤	●	•
	B	1	Poverty level where climate adaptation action is taken	•	●	⬤
		2	Private investments made in sector level climate adaptation	●	⬤	•
3.3	A	1	Private sector strategies citing climate action	•	●	⬤
		2	Budget allocations for sector development that include climate adaptation	⬤	●	•
	B	1	Number and diversity of stakeholders actively engaged	•	●	⬤
		2	Number of state-of-the-art technology based climate adaptation programs started	•	●	⬤
3.4	A	1	Number of local area/ district climate adaptation programs	•	●	⬤
		2	Number of programs focused directly on rural communities	●	⬤	•
	B	1	Number of funded agreements with private sector	•	●	⬤

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators Output Measurements	Achievement Schedule 0-3yrs.	4-7 yrs.	8-10 yrs.
		2	Representation of business and industry on climate adaptation decision making bodies	●	●	•
		3	Incentives designed to attract business and industry involvement	●	●	•
	C	1	Number of Districts approving local adaptation plans	•	●	●
		2	Instances of advanced technical, scientific interventions introduced in local/ districts.	•	●	●

5.1.4 Outcome 4: National technical capacity that is fully trained and skilled at leading and implementing Suriname's climate change adaptation actions

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators Output Measurements	Achievement Schedule 0-3 yrs.	4-7 yrs.	8-10 yrs.
Outcome 4: National technical capacity that is fully trained and skilled at leading and implementing Suriname's climate change adaptation actions						
4.1	A	1	Number of qualified personnel hired	●	●	•
		2	Number of MOUs signed with ministries	●	●	•
		3	Number of ministries involved in training programmes conducted by focal point	●	●	•
	B	1	Regional and global training/ knowledge transfer event participated in	•	●	●
		2	Number of agency 'matching' opportunities engaged in	•	●	●

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators Output Measurements	Achievement Schedule 0-3 yrs.	 4-7 yrs.	 8-10 yrs.
4.2	A	1	Number of 'high priority' human resource gaps filled	●	●	•
		2	Number of critical advanced expertise positions created	•	●	●
4.3	A	1	Human resource budget allocation for climate related spending	●	●	•
		2	Amount of opportunities taken for advanced foreign training	•	●	●
	B	1	Number of new technical positions recruited for	•	●	●
		2	Number of new technical positions recruited for	•	●	●
4.4	A	1	Progress on public sector reforms related to climate action	•	●	●
		2	Number of ministries with approved human resource plans for climate action	●	●	•
		3	Number of ministries with approved human resource plans for climate action	●	●	•
	B	1	# school curricula revised and approved for delivery	•	●	●
		2	Range of stakeholders supporting new curricula	•	●	●
	C	1	Number of new businesses, NGOs, entrepreneurial activities launched	•	●	●
		2	Number of women's groups actively engaged	●	●	•
		3	Number of persons/ communities where livelihoods have been transitioned	●	●	•

5.1.5 Outcome 5: Climate change adaptation that respects Surinamese values and culture and reduces gender and other social inequities

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators Output Measurements	Achievement Schedule 0-3 yrs.	 4-7 yrs.	 8-10 yrs.
Outcome 5: Climate change adaptation that respects Surinamese values and culture and reduces gender and other social inequities						
5.1	A	1	Number of women's groups actively and consistently engaged	●	●	•
		2	Number of vulnerable groups actively and consistently engaged	●	●	•
	B	1	Number of business and industry representatives on decision making bodies for climate action	●	●	•
	C	1	Frequency of communications releases highlighting vulnerable groups	●	●	•
		2	Number of initiatives focused on sustainable livelihood transitions including ensuring the livelihoods of women	•	●	●
5.2	A	1	Number of successful scale ups and usages of local knowledge in adaptation activities	•	●	●
		2	Budget allocations specifically for gender related activities	●	●	•
	B	1	Number of citations of local knowledge in decision making forums	•	●	●
		2	Number of citations of local knowledge in decision making forums	•	●	●
5.3	A	1	Baselines and periodic surveys to gauge climate related behavioral change	•	●	●

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators Output Measurements	Achievement Schedule 0-3 yrs.	 4-7 yrs.	 8-10 yrs.
		2	Baselines and periodic surveys to gauge climate related knowledge change	•	●	⬤
		3	Baselines and periodic surveys to gauge climate related attitudinal change	•	●	⬤
		4	Number of non-government supported climate action programmes	•	●	⬤
	B	1	Number of successful programmes that lead to further programmatic phases	●	⬤	•
	C	1	Prevalence of climate considerations in new and emerging economic activities	•	●	⬤
	D	1	Number of initiatives tailored and specified for respective vulnerable groups	●	⬤	•

5.1.6 Strategic Objective 6: Identify and access financing and investment especially for innovation driven climate change adaptation technologies.

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators Output Measurements	Achievement Schedule 0-3 yrs.	 4-7 yrs.	 8-10 yrs.
Strategic Objective 6: Identify and access financing and investment especially for innovation driven climate change adaptation technologies.						
6.1	A	1	Number of potential financing routes targeted	•	●	⬤
	B	1	Value of financing accessed that goes towards scientific measurement equipment	•	●	⬤
	C	1	Administrative reforms completed to accommodate climate finance management functions	⬤	●	•
6.2	A	1	Prevalence of use of climate risk and vulnerability assessments in climate finance decisions	•	●	⬤
	B	1	Type and value of incentives for attracting climate investors	⬤	⬤	•
6.3	A	1	Number of potential financing routes targeted	⬤	⬤	•
		2	Number and value of inter-ministerial proposals put forward	•	●	⬤
		3	Number of 'climate proofing' business plans approved	•	●	⬤
	B	1	Types and value of fiscal incentives offered	⬤	⬤	•
		2	Types and value of fiscal incentives offered	⬤	⬤	•
	C	1	Level of competition for national sustainability awards and honours	•	●	⬤
6.4	A	1	Number of pitches made to regional and international climate investors	⬤	⬤	•

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators Output Measurements	Achievement Schedule 0-3 yrs.	 4-7 yrs.	 8-10 yrs.
		2	Administrative reforms completed to accommodate climate finance management functions	•	●	⬤
		3	Value of private sector investment committed	•	●	⬤
		4	Retention of climate finance skilled human resources	●	⬤	•
	B	1	Number and value of climate adaptation loans provided to implementers	•	●	⬤
		2	Number and value of matching grants provided to implementers	•	●	⬤
		3	Number and value of guarantees provided to implementers	•	●	⬤
	C	1	Number and value of investments made by government on adaptation projects by third parties	•	●	⬤
		2	Number and value of PPP co-financed initiatives	•	●	⬤

5.2 Sectoral monitoring and evaluation framework

The sectoral M&E will be used to inform ongoing and future planning and implementation processes in relation to the NAP. In the tables below, for each Sectoral Objective identified, several Output Measures are identified that correspond with Adaptive measures and Indicative Outputs. An Achievement Schedule is also presented for the short, medium- and long-term implementation of the NAP. Schematically, the larger circle represents where more implementation effort should take place in the timeline.

5.2.1 Water Resources

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators	Achievement Schedule		
			Output Measurements	0-3 yrs.	4-7 yrs.	8-10 yrs.
1	A	1	District level risk maps developed	●	●	●
		2	Integrated water resource management plan implemented	●	●	●
		3	Successful scale up of pilot projects	●	●	●
		4	IWRM supportive legislation passed	●	●	●
		5	Increase in the level of public awareness	●	●	●
2	A	1	Revised legislation passed	●	●	●
	B	1	Water Resource Authority established	●	●	●
		2	More Water Boards established	●	●	●
	C	1	Pollutant loads in aquifers are lower	●	●	●
	D	1	Increased numbers and volume of reservoirs	●	●	●
		2	Increased budget for water related infrastructure	●	●	●
3	A	1	Pollutant loads in aquifers are lower	●	●	●
		2	Volume and quality improvements in water resources	●	●	●
			Mechanisms to reduce intrusion of river and sea water are developed	●	●	●

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators	Achievement Schedule		
			Output Measurements	0-3 yrs.	4-7 yrs.	8-10 yrs.
	B	1	Volume increase of re-used water	●	●	●
4	A	1	Increased reliability of irrigation infrastructure	●	●	●
		2	Percentage of water loss reduced	●	●	●
		3	Reduced incidence of leakages	●	●	●

5.2.2 Forestry

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators	Achievement Schedule		
			Output Measurements	0-3 yrs.	4-7 yrs.	8-10 yrs.
1	A	1	Emissions reference level established	●	●	●
		2	Number of sustainable forestry actions implemented	●	●	●
2	A	1	Increase in public awareness levels	●	●	●
		2	Number of training programmes implemented	●	●	●
		3	Carbon issues referenced in policy documents	●	●	●
		4	Number of communities actively monitoring forests	●	●	●
3	A	1	Increase in funding	●	●	●
	B	1	State Order approved	●	●	●
	C	1	Area of reforestation increased	●	●	●

5.2.3 Agriculture, Livestock and Fisheries

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators	Achievement Schedule		
			Output Measurements	0-3 yrs.	4-7 yrs.	8-10 yrs.
1	A	1	Data driven trend forecasts improved	●	●	●
		2	Data driven trend forecasts improved	●	●	●
	B	1	Increased climate research output	●	●	●
	C	1	Number of pilot projects implemented and scaled up	●	●	●
		2	Number of activities implemented	●	●	●
2	A	1	Behavior change of farmers documented	●	●	●
		2	Number of local persons trained	●	●	●
	B	1	Number of farms using adaptation techniques	●	●	●
	C	1	Number of farms using adaptation techniques	●	●	●
		2	Improved quality and quantity of feed supply	●	●	●
3	A	1	Increase in infrastructure investments	●	●	●
		2	Increase in infrastructure investments	●	●	●
4	A	1	Increased access to risk insurance	●	●	●
	B	1	Increased access to risk insurance	●	●	●

5.2.4 Energy

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators	Achievement Schedule		
			Output Measurements	**0-3 yrs.**	**4-7 yrs.**	**8-10 yrs.**
1	A	1	Sector plans based on climate risk	●	●	●
		2	Increased renewable energy portfolio	●	●	●
2	A	1	Climate introduced in training of energy professionals	●	●	●
		2	International training facilities established	●	●	●
		3	Increase in public awareness	●	●	●
3	A	1	Market based instruments implemented	●	●	●
		2	Fossil fuel subsidies removed	●	●	●
		3	Increased energy efficiency	●	●	●
4	A	1	Increased energy efficiency	●	●	●
		2	New building codes implemented	●	●	●
	B	1	Import duties on renewables removed	●	●	●
	C	1	Increased funding for rural electrification	●	●	●

5.2.5 Education

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators	Achievement Schedule		
			Output Measurements	0-3 yrs.	4-7 yrs.	8-10 yrs.
1	A	1	Curricula infused with climate adaptation content	●	●	●
		2	Increase in graduates from climate related programmes	●	●	●

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators	Achievement Schedule		
			Output Measurements	0-3 yrs.	4-7 yrs.	8-10 yrs.
	B	1	Number of climate related courses offered	●	●	●
		2	Number of international expert exchanges	●	●	●
2	A	1	Government personnel trained in advanced climate related courses	●	●	●
		2	Increase in consultation with private sector	●	●	●
3	A	1	Investment in climate proofing schools	●	●	●

5.2.6 Health

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators	Achievement Schedule		
			Output Measurements	0-3 yrs.	4-7 yrs.	8-10 yrs.
1	A	1	Expansion of preventative care programs	●	●	●
	B	1	Area of country monitored	●	●	●
		2	Reduced frequency and intensity of outbreaks	●	●	●
2	A	1	Capacity assessment of healthcare system implemented	●	●	●
		2	Number of foreign-local linkages	●	●	●
		3	Health care professionals trained in climate and health related areas	●	●	●
		4	Engagement between practitioners and communities	●	●	●
3	A	1	Increase in public awareness	●	●	●
	B	1	Public access to feedback mechanisms	●	●	●

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators	Achievement Schedule		
			Output Measurements	0-3 yrs.	4-7 yrs.	8-10 yrs.
4	A	1	Health and climate risk maps developed	●	●	●
		2	Number of healthcare indicators monitored	●	●	●
		3	Regularization of healthcare capacity reviews	●	●	●
	B	1	Increase in surveillance programmes	●	●	●
		2	Increased risk mapping	●	●	●
		3	Increased early warning systems	●	●	●

5.2.7 Environment

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators	Achievement Schedule		
			Output Measurements	0-3 yrs.	4-7 yrs.	8-10 yrs.
1	A	1	Increased area of mangrove forest	●	●	●
	B	1	New technologies introduced	●	●	●
		2	Increase in application of clean technologies	●	●	●
	C	1	Accuracy of climate projections	●	●	●
2	A	1	Number of cross-collaborative strategies	●	●	●
		2	Increased funds for climate action	●	●	●
3	A	1	Enact the Environmental Framework Act	●	●	●
		2	Budget allocations to operationalize Act	●	●	●
	B	1	Climate change EIA criteria implemented	●	●	●

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators	Achievement Schedule		
			Output Measurements	0-3 yrs.	4-7 yrs.	8-10 yrs.
	C	1	Climate change EIA criteria implemented	●	●	●

5.2.8 Disaster Risk Reduction

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators	Achievement Schedule		
			Output Measurements	**0-3 yrs.**	**4-7 yrs.**	**8-10 yrs.**
1	A	1	Refinement of DRR projections	●	●	●
		2	Increased disaster monitoring capacity	●	●	●
		3	Number of data sharing initiatives implemented	●	●	●
2	A	1	Strengthened DRR legislation	●	●	●
		2	Updated national safety and disaster plans	●	●	●
		3	Forest Fire Master Plan updated	●	●	●
3	A	1	Increased DRR insurance coverage	●	●	●
		2	Increased public awareness	●	●	●
		3	Increased public awareness	●	●	●
		4	Increased funding for DRR programmes	●	●	●
4	A	1	District level DRR plans	●	●	●

5.2.9 Spatial Planning

Strategic Objective	Adaptive Measure	Indicative Output	Key Performance Indicators	Achievement Schedule		
			Output Measurements	**0-3 yrs.**	**4-7 yrs.**	**8-10 yrs.**
1	A	1	Digital maps updated	●	●	●
	B	1	Number of properties climate proofed	●	●	●
2	A	1	Legislation updated	●	●	●
		2	Legislation updated	●	●	●
3	A	1	Zoning implemented	●	●	●
		2	Land allocation policy implemented	●	●	●
		3	Drainage Plan requirements implemented	●	●	●
		4	Paramaribo Master Plan implemented	●	●	●
		5	Land Tenure System implemented	●	●	●
		6	Agro-Ecosystem Zoning implemented	●	●	●
4	A	1	Increased protected area acreage	●	●	●
		2	New regulations implemented	●	●	●
		3	New regulations implemented	●	●	●
	B	1	Increased area under rejuvenation	●	●	●

6.0 Strategic Adaptation Action Plan

Figure 13 below highlights the six (6) overarching strategic priorities that the NAP will address at the national level with respect to climate action as previously mentioned in section 1.1. These six strategic priorities require action regardless of the sector in which action is taken, the geography of whether hinterland or coastal or urban or rural. Improvements across all six priorities strengthen national policy positions, not only on climate change but also on related policy fronts of environment, social and economic development.

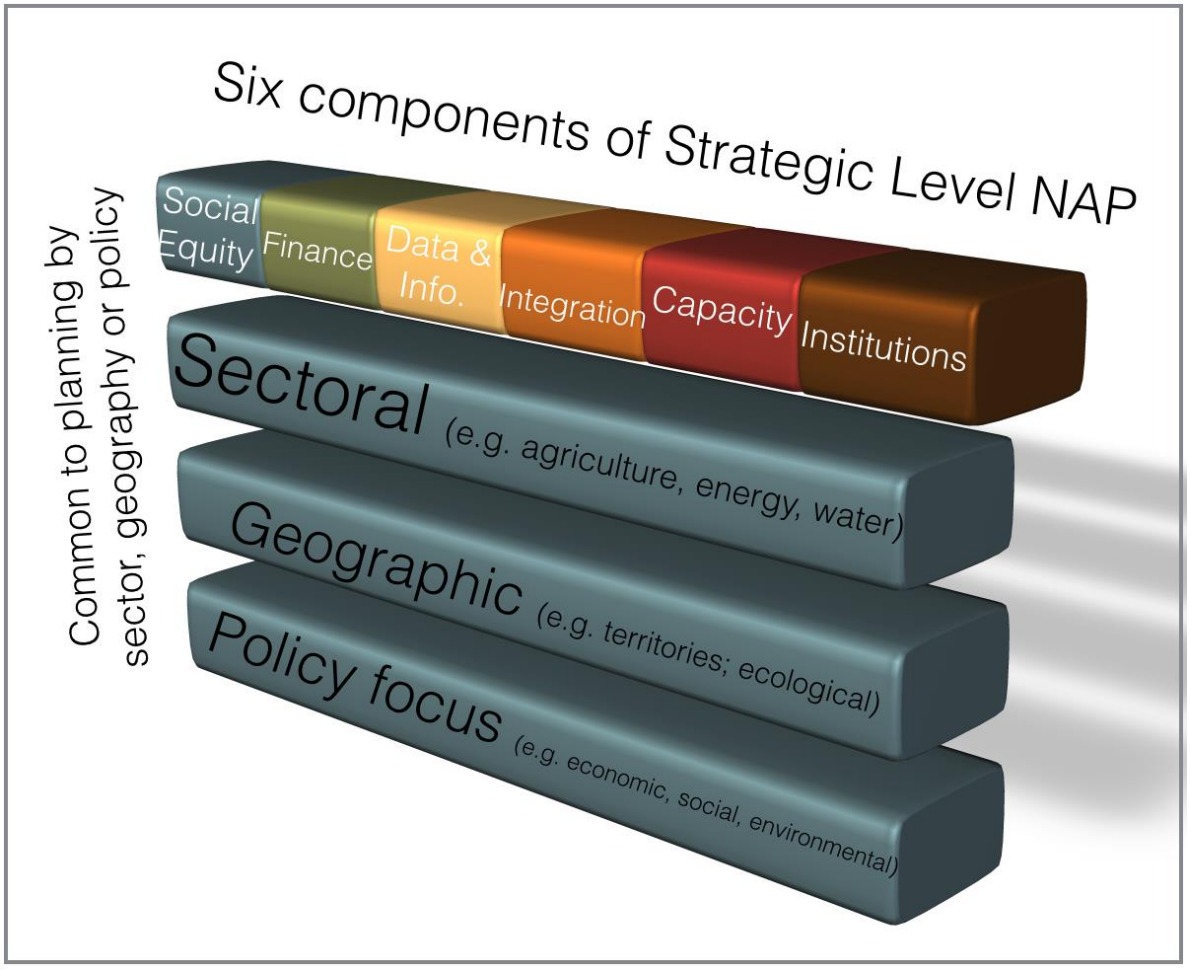


Figure 13: Six components of the Strategic Level NAP

Cross-cutting national needs for adaptation are issues that pervade boundaries of the sectors. Overcoming gaps concerning these issues will help to increase adaptive capacities and reduce vulnerabilities across the board. As in the case of key sectors, cross-cutting areas have also been identified through the consultation of stakeholders and experts. The list of cross-cutting national issues and key areas of interest that emerged are summarized in the Table 5 below.

Table 4: Strategic NAP Priorities and Areas of Interest

Strategic NAP Priorities	Areas of Interest
1: Institutional arrangements, policies and capacities able to lead and coordinate national and sub-national climate change adaptation	▪ Policies and programs ▪ Laws, regulations, standards ▪ Governance procedures and bodies
2: Data and information collection systems to fully support national and sub-national climate change impacts, vulnerability and adaptation decision-making.	▪ Facilities and equipment ▪ Climate forecasting: short and medium term ▪ Long term projections ▪ Communication of climate information
3: The integration and mainstreaming of climate change adaptation in broader Surinamese economic development policies, plans and programs.	▪ Institutional strengthening ▪ Intra and inter-governmental coordination ▪ Mainstreaming
4: National technical capacity that is fully trained and skilled at leading and implementing Suriname's climate change adaptation actions	▪ Knowledge and skills development ▪ Tools and equipment ▪ Knowledge and skills retention ▪ Formal and informal education systems
5: Climate change adaptation that respects Surinamese society and culture and reduces gender and social inequities	▪ Vulnerable group participation ▪ Local knowledge ▪ Public-private partnerships ▪ Attitude, behavior, lifestyle changes
6: Identify and access financing and investment especially for innovation driven climate change adaptation technologies.	▪ Resource mobilization: national and international ▪ Technology transfer and transfer channels ▪ Market based instruments

These Strategic NAP Priorities and areas of interest are elaborated in the following sections through identifying a Strategic Outcome aligned to the noted Priority; several Strategic Objectives that support the realization of the respective Outcome; and more detailed Action measures with one or several Indicative Outputs. Where possible, estimations for indicative outputs are listed in brackets [s=short or 0-3 yrs.; m=medium or 3-6 yrs.; l=long or 7-10 yrs.]. Note that these time estimates for outputs align with the high-level Strategic Roadmap Schedule presented earlier. The main responsible agency/ ministry is included in the first column of the

tables below as follows: Ministry of Education (MinOW); Ministry of Labor; Ministry of Physical Planning Land and Forest Management (ROGB); Ministry of Natural Resources (NH); Ministry of Agriculture, Animal Husbandry and Fisheries (LVV); Ministry of Public Works, Transport and Communications (OWT&C); Ministry of Regional Development (RO); Ministry of Finance; Coordination Environment under the Cabinet of the President (CM); National Institute for Environment and Development (NIMOS); Planning Office; Meteorological Service (MDS); Hydraulic Research Division; Gender Bureau; and National Coordination Center for Disaster Control (NCCR).

It must be noted that the plans developed below, including the actions described to meet the Strategic Objectives, are based on the best available data, information and interpretations of the foreseeable context. In some ways, the planning therefore veers towards actions that can be rationally taken and practically accomplished rather than actions that may be bold, but currently lack full supporting evidence. An illustrative example of this could be making the categorical decision to shift future urban development and population growth towards the hinterland rather than continue in the coastal area. Actions such as these, can clearly be revisited through the NAP process in the future.

6.1 Strategic Outcome 1: Institutional arrangements, policies and capacities able to lead and coordinate national and sub-national climate change adaptation

Strategic Objective 1.1: Develop and strengthen climate action related laws, regulations and standards.		
Adaptation Measures	**Indicative Outputs**	**Lead Agencies**
A. Approve the Environmental Framework Bill which will empower NIMOS and other key government ministry stakeholders to move forward with many of the core elements of the NAP.	1. Enactment of the Bill into Law and operationalizing through government commitment of resources 2. Restructuring of NIMOS to accommodate the implementation of the new Law.	CM and NIMOS
B. Revisit and revise as needed, ministry policies to coordinate	1. Memoranda of understanding between ministries including	CM

climate related joint projects.	agreements on cost sharing and resourcing.	
Strategic Objective 1.2: Align existing and future national policies to be more effective in taking climate action.		
Adaptation Measures	**Indicative Outputs**	
A. Strengthen the Hydraulic Research Division network of hydrometric stations to gather data which can be fed into national climate change adaptation planning processes.	1. Improvements in scientific measurements of terrain elevation along the coast of Suriname, principally the area around greater Paramaribo. 2. Development of more accurate projections of flooding risks as a result of sea level rise.	WLA
B. Resolve existing overlaps in mandates related to climate change adaptation across government ministries while ensuring that all aspects of the NAP are covered and there are minimal implementation gaps between key government stakeholders.	1. Resolution to situations such as Meteorological Services capacity to link climatological data to socioeconomic data, and to translate climate data into climate projections and models. 2. An officially approved system for inter-governmental collaboration on climate change information ownership and sharing including protocols for usage.	CM and NIMOS
C. Focus on strengthening the Meteorological Service which is the primary institution responsible for the collection and analysis of climate data, and the production of weather forecasts.	1. Modernization and expansion of weather measurement systems and trained staff to operate the systems. 2. Uptake of increasingly more robust meteorological datasets by other government ministries for	MDS

	incorporation into climate sensitive planning and projections.	
Strategic Objective 1.3: Design, implement and enforce suitable governance procedures and processes to forward the national climate adaptation agenda.		
Adaptation Measures	**Indicative Outputs**	
A. Establishment of an Office responsible **for collection of data and information management** within NIMOS, that works collaboratively with Coordination Environment	1. Coordination of national climate change stakeholder institutions. 2. Engagement with broader national stakeholders including business and industry. 3. Promotion of climate change adaptation and mitigation mainstreaming.	CM and NIMOS
B. Overcome common ministry barriers to climate activities: lack of information sharing about climate change adaptation priorities and interventions, staff require more training especially in climate change analyses, limited inter-ministerial coordination and knowledge sharing.	1. More streamlined ministry processes and procedures to collaborate and share information across ministries. 2. Seek training opportunities for staff and prioritize in annual training budgets.	CM and NIMOS
C. Conduct a detailed institutional and organizational assessment across government to rationalize climate adaptation responsibilities and programming across ministries, units and agencies.	1. Increased data access and coordination, activity collaboration. 2. Eased organizational tensions, uncertainties and tensions; and empowerment of ministries to mainstream climate adaption in their operations while coordinating within a national system. 3. Detailed institutional and	CM and NIMOS

	organizational assessment to guide an effective institutional reconfiguration across government in support of the NAP.	
Strategic Objective 1.4: Expand institutional arrangements and partnerships to encompass industry, community and international partners.		
Adaptation Measures	**Indicative Outputs**	
A. Enhance climate change communication and partnership building capacities to assist ministries with bridging new climate adaptation partners in business, industry and civil society.	1. Efforts such as the recent GEF funded UNDP supported Cross Cutting Capacity Development project that is primarily aimed at strengthening knowledge systems and advise on national governance structures for the three Rio Conventions, should be a positive step in reducing these deficiencies.	CM and NIMOS
B. Address new institutional policies, guidelines and practices and develop the administrative, logistical and communication routes to encourage the governance system to expand partnerships especially with diverse non-traditional partners and collaborators.	1. Launching of new collaborative public-private partnerships for adaptation activities. 2. Ease of developing new partnerships through reduction in administrative 'red tape'.	CM and NIMOS
C. Development and implementation of District Level climate vulnerability assessments, strategies and local action plans.	Local (District level) Adaptation Plans approved for Paramaribo, Wanica, Nickerie, Coronie, Saramacca, Commewijne, Para, Marowijne, Brokopondo, Sipaliwini.	WLA and RO

6.2 Strategic Outcome 2: Data and information collection systems to fully support national and sub-national climate change impacts, vulnerability and adaptation decision-making.

Strategic Objective 2.1: Provide the resources required for ministries to improve climate forecasting for short, medium and long term.		**Lead Agencies**
Adaptation Measures	**Indicative Outputs**	
A. Undertake an across the board data and information needs assessment that is relevant to climate forecasting. This will involve all **ministries and government agenc**ies that have a mandate to collect data and information that could be useful for climate forecasting efforts.	1. A comprehensive strategic plan focused on acquisition and use of appropriate technological resources including various technologies, equipment, information systems, laboratory facilities to address the data and information needs identified across relevant government ministries. 2. Proposals developed for presentation to donors and financing mechanisms such as the Green Climate Fund and others in order to access the necessary technology resources needed for increased and better data and information acquisition, monitoring and assessment.	NIMOS, CM and MDS
B. Pay particular attention to data and information acquisition that will address forecasting and modelling of impacts in the long term and with respect to slow onset environmental variables.	1. Acquisition of data and information on impact variables include drought, saltwater intrusion, flooding, landslides and sector specific acknowledgements to agriculture, housing, coastal and interior and hydroelectric power generation. These have already been identified as necessary for long term forecasting and requiring significant strengthening.	MDS, WLA

C. Data modelling capabilities including developing climate change scenarios and impacts for 2020s, 2050s, 2080s, 2100s have to be improved to increase the level of confidence in the results, enough for decision makers to include in wider development policies.	1. Quality and quantity of data and information on fundamental variables (e.g. rainfall and windspeed) improved enough to become a basis for confidence in modelling efforts. 2. Improvement in confidence of modelling to the extent where specific models can be generated for major national planning themes - water resources, agriculture, ecology and geomorphology, socio-economy, tourism and human health.	MDS, WLA
Strategic Objective 2.2: Provide the necessary resources to ministries to modernize and expand facilities, tools and equipment for their climate related mandates.		
Adaptation Measures	**Indicative Outputs**	
A. Increase in the quantity, distribution and modernization of climate/weather measurement stations, training and rejuvenation of the scientific staff at key institutions and 'buy-in' from the policy making directorate.	1. Improved data and information collection and monitoring from the installation of new and upgraded weather measurement stations and other equipment requested and justified by relevant ministries and agencies.	MDS
B. Develop and implement plans to coordinate and collect prioritized data variables for use in climate adaptation activities. Many of these 'priority' variables have been identified in previous reports and studies.	1. Reduced gaps in the statistical data on the sub-national/ village level (e.g. number of inhabitants, income levels, access to drinking water, access to electricity etc.) and several parameters lack verification and/or are not up-to-date. 2. Reduced gaps in land use data, tree forest cover, socio-demographic,	MDS

	health, education, water and sanitation, wealth, economic development, inflation rates, GDP, unemployment and natural disaster statistics.	
Strategic Objective 2.3: Develop and maintain cooperative intra-ministerial agreements on the usage, ownership, storage and communication of data and information.		
Adaptation Measures	**Indicative Outputs**	
A. Address issues pertaining to the formal accessing and sharing of data and information from disparate ministries and agencies as well as issues of coordinating data and information gathering mandates by ministries, agencies and other organizations.	1. Formalized agreements and memoranda of understanding between ministries and agencies pertaining to access, sharing and collection of data and information. 2. Reduced tensions and confusion among ministries about access, ownership and responsible usage of data and information. 3. Better coordinated multi-partner initiatives on climate adaptation action where data and information from several ministries play a role in planning and decision making.	CM, NIMOS
B. Parliamentary passage of the Environmental Framework Bill currently before government for ratification.	1. Formalizes the central role of NIMOS and the supportive roles of various other government ministries and agencies in climate adaptation. 2. Stage is set for the documented and accepted mandate for gathering climate data and information in a much more concerted way.	CM, NIMOS
Strategic Objective 2.4: Increase the capacity for wider partnership involvement		

in collecting and using national data and information.		
Adaptation Measures	**Indicative Outputs**	
A. District level adaptation planning focused on information and data collection. Emphasis placed on the interior districts (which were not sufficiently included in past climate action plans) and coastal areas where there are documented significant lack of information on climate science, vulnerability and risk.	1. National level data disaggregated or downscaled to provide estimated information for these district plans. 2. Primary data sets acquired through survey and other means for district level planning. 3. All national data collection and research will emphasize gender sensitivity and investigate gender issues as a central feature moving forward.	OWT&C, WLA

6.3 Strategic Outcome 3: The integration and institutionalization of climate change adaptation in broader Surinamese economic development policies, plans and programmes

Strategic Objective 3.1: Designation and strengthening of a national implementation focal point for the NAP.		Lead Agencies
Adaptation Measures	**Indicative Outputs**	
A. Institutionalize a national climate change focal government organization or statutory body through law. In so doing, prevent or minimize the long-term political risk of its elimination or misuse.	1. Long-term planning that prioritizes evidence-based decision-making and reduces lack of consistency based on political positions. 2. Reduction in institutional knowledge turnover based on shifts or removal of personnel by political interventions. 3. Greater retention of personnel trained in adaptation planning at the focal point and partner	CM, NIMOS

	ministries and agencies.	
B. Empower the focal organization to resolve or reduce existing inter-organizational barriers to a coordinated climate adaptation approach	1. Increased interdepartmental cooperation as evidenced through inter-ministerial committees, projects and initiatives that are identified as priority by the focal organization. 2. Ministries and agencies adhering to clear mandates and responsibilities for climate adaptation as coordinated by the focal organization. 3. Increased access to and cooperation among ministries to improve weak data gathering for national inventories and databases that are prioritized by the focal organization. 4. Stronger and more productive cross-sector communications channels, mechanisms and outlets including use of online and social media options.	NIMOS
C. Develop at the onset, a comprehensive strategic plan for the national focal organization that will allow it to encompass advanced mandates of science and technology innovation and technology transfer over the medium and long term of the NAP.	1. The focal organization's leadership in national feasibility studies related to climate adaptation and mitigation technology development, adaptation and transfer. 2. Active involvement in research and development that supports clean,	CM, NIMOS, Planning Office

	competitive low carbon industrial development. 3. Greater prominence of the focal organization and promotion of climate adaptation arms of ministries and agencies in science-policy interface and policy decision making processes. 4. Increased strengthening of regional and global partnerships and learning from other countries including for example, the recent models of 'Climate Innovation Centers' in Jamaica and Trinidad & Tobago.	
Strategic Objective 3.2: Alignment and reinforcement of climate related implementation mandates among ministries.		
Adaptation Measures	**Indicative Outputs**	
A. Alignment of national climate change adaptation plans and government's 2035 Vision.	1. The commitment to systemically integrate climate change adaptation into broader national development planning is signaled by government leadership and the political directorate. 2. Traditionally focused economic development planning, especially within the framework of the country's long-term vision should include criteria and targets for climate adaptation, that can be monitored, reported and verified. 3. Climate adaptation in broader	CM,NIMOS, Planning Office

	national planning shall not be considered as an addition or auxiliary but as a fundamental constituent of planning and hence rely on core budgetary allocations and not additional budgetary considerations.	
B. Couch climate change adaptation vision in the actual realities and situational context of Suriname so efforts are achievable, tangible and understandable to the general public within the expectations of economic development.	1. Make direct and relevant links in the planning process between economic development and climate adaptation including emphasis on tangible actions to alleviate poverty. 2. Prioritize climate investment in adaptation in conjunction with sectors that can be leveraged to create economic development including those that contribute most to economic growth - wholesale and retail (22%), manufacturing (17%), mining contributes 10% of government revenues and the informal sector with 20% of GDP.	CM, NIMOS, Planning Office
Strategic Objective 3.3: Mainstreaming of climate action across other policy implementation spheres and down through governance levels.		
Adaptation Measures	**Indicative Outputs**	
A. Conduct ongoing strategic mainstreaming of climate adaptation in relevant ministries and agencies.	1. Mainstreaming beyond the punctual level, e.g. assessing changes of water dispatch patterns, or assessing the erosion and sedimentation of land, into medium- and long-term assessment, monitoring and	CM,NIMOS, Planning Office

	evaluation. 2. Align mainstreaming with budgetary and resource requests and allocations including proactive negotiations with donors, multilateral institutions and others for increased financing and public-private partner opportunities with the private sector.	
B. Minimize approvals for and involvement in fragmented and piecemeal projects and replace with integrated and systemic programmatic approaches.	1. Co-ordinated medium and long term programs approved with multiple stakeholders involved in their areas of specialization. 2. Reduction in repetitious and similar projects in the short-term horizon without any plans that will sustain them with finances and resources in the medium and long term.	CM, NIMOS, Planning Office
Strategic Objective 3.4: Operationalization of climate action across government and partners in international and local community, industry and civil society.		
Adaptation Measures	**Indicative Outputs**	
A. Engage a broad set of relevant national stakeholders in the development and implementation of sector specific climate adaptation plans in their respective spheres of activity and local communities.	1. Effective support provided for stakeholder generated initiatives for economic, social and environmental linkages between urban, peri-urban and rural areas to develop sustainable rural climate adaptation. 2. Stakeholder approved initiatives with exclusive targets relevant to	CM, NIMOS, Planning Office

	rural concerns such as climate resilient agriculture and coastal protection.	
B. Identify and cultivate better mechanisms including incentive plans to enhance the involvement of the private sector, business and industry in national climate adaptation activities.	1. More mechanisms developed by government to secure funds to create public-private partnerships. Hold more industry directed consultations throughout program cycles. 2. More representation of business interests on climate related national committees. This includes involvement from early stages and in the decision-making process – not just in seeking their support once decisions are made, as is the current norm. 3. Create and/ or negotiate incentives for business and industry to become more involved by providing technical expertise as well as resources towards climate actions that align with the NAP.	CM,NIMOS, Planning Office
C. Involve districts in climate adaptation initiatives. Convince District Commissioners that actions to minimize the effects of climate change or data collection on climate change is a priority that they can allocate some of their budget towards.	1. Once a standard framework for developing and implementing district climate change adaptation plans is formulated, then each district will work on tailored plans to meet their needs. 2. Each district will also consider the tools and approaches to data and information collection, monitoring, communications and early warning	NIMOS, WLA

	systems. Other aspects of district adaptation plans could include technology transfer and dissemination and insurance and social protection plans.	

6.4 Outcome 4: National technical capacity that is fully trained and skilled at leading and implementing Suriname's climate change adaptation actions

Strategic Objective 4.1: Identify and strengthen knowledge, skills and experience gaps in the NAP implementation focal point.		**Lead Agencies**
Adaptation Measures	**Indicative Outputs**	
A. Institutional support and adequate resource allocations to build the capacity of the NAP implementation focal point to carry out responsibilities.	1. Required staffing of human resources with the necessary skills and expertise to launch the NAP implementation. 2. Collaborative relationships forged with stakeholder ministries in order to share technical resources, knowledge and know-how. 3. Outreach to lead/ assist other ministries with climate mandates to strengthen their human resources and capabilities to service the focal point objectives.	CM, NIMOS
B. An updated stakeholder consultation and analysis is required to drill into details.	1. Models of training and co-coordination capacity building and best practices have to be developed in close conjunction with external actors (e.g. regional CARICOM, multilaterals etc.) as these entities might be co-opted to assist in these	CM, NIMOS

	regards in the present, medium and long term. 2. Supplemental strategies can also be considered such as 'matching' with country, agency and knowledge-based institutions (e.g. regional and international universities).	
Strategic Objective 4.2: Identify and strengthen knowledge, skills and experience gaps in ministries and programmes that contribute to climate action.		
Adaptation Measures	**Indicative Outputs**	
A. Prioritize training and skills development budget allocations to disciplinary fields that have been identified as urgent.	1. Focus on national technical capacity building by filling gaps in knowledge fields, with first option being to educate and train nationals; second being to attract external technical capabilities to Surname and provide routes for experiential learning to flow from the expert to local professionals. 2. Several high priority disciplinary fields and skills already identified can be targeted first: long term physico-ecological data, climatic and weather modelling variables, satellite mapping)	CM, NIMOS
Strategic Objective 4.3: Provide the necessary resources for tools, systems and to provide opportunities for training relevant to NAP implementation.		
Adaptation Measures	**Indicative Outputs**	
A. Alongside rectifying limitations in the number, distribution and quality of climate measurement instruments, commitments must	1. Budgetary allocations for professional, technical and vocational training of personnel to man equipment, instrumentation	NIMOS

be made to training, skills development and knowledge transfer plans to optimize use of new equipment and instruments.	and systems being put in place. 2. Prioritize regional and foreign knowledge transfer and training opportunities for new professional personnel and potential new graduates of local postsecondary education programmes.	
B. Assessment and recommendations from key stakeholder ministries on the human resources they require for fulfilling their mandated climate related responsibilities as well as supporting the NAP.	1. Ministries should identify (1) where human resources need advanced training and (2) where new or more human resources are required. 2. Priority ministries and agencies are: the Ministry of Public Works, Transport and Communication, Ministry of Regional Development, Environment Coordination Unit in the Office of the President, NIMOS, Planning Office, National Coordination Center for Disaster Relief, Meteorological Services, Hydraulic Services	NIMOS
Strategic Objective 4.4: Focus on strengthening formal and informal education systems for climate action in Suriname including national retention of capacity.		
Adaptation Measures	**Indicative Outputs**	
A. Implementation of an across the board government sanctioned education, training and skills development programs across ministries.	1. Public sector reform including among the ministries and agencies to deal directly with climate change. 2. Ministry level training plans that include relevant knowledge and skills development in climate adaptation.	Minov, CM

	3. Ministry recruitment plans that emphasize hiring of personnel with backgrounds in climate adaptation related fields.	
B. Integration of climate adaptation learning in the national education system vertically from primary through secondary and tertiary levels and horizontally across academic disciplines of relevance.	1. Curricula reforms developed by education experts and sanctioned by relevant ministry of Education authorities. 2. Curricula reforms that have input from national stakeholders especially regarding fitness of the curricula for employment and livelihoods. 3. Build environmental awareness at all levels through education and evidence-based research. Particularly through the promotion of higher-level scientific education.	Minov, CM
C. Education, training and skills development through interventions and programming in communities and accessing livelihood groups.	1. Focus on innovation, entrepreneurship, job creation and sustainable livelihoods. 2. Focus on the formal and informal roles of women and skills and training for them to advance climate adaptation objectives in their spheres of influence. 3. Transitioning of persons in livelihoods that have negative climate change impacts into livelihoods that are more aligned with adaptation objectives.	Minov, CM

6.5 Outcome 5: Climate change adaptation that respects Surinamese values and culture and reduces gender and other social inequities

Strategic Objective 5.1: Equitable participation by vulnerable and underrepresented constituents in climate adaptation implementation.		**Lead Agencies**
Adaptation Measures	**Indicative Outputs**	
A. Encourage deeper participation including leadership roles for vulnerable communities/ groups/ populations including indigenous communities, economically challenged classes, elderly, youth, disabled and others. Early 'buy-in' will assist with planning and later local, sub-national and sectoral implementation.	1. Greater visibility of women's organizations such as women organizations (*Stg. Nationale Vrouwenbeweging*), NGOs (NGO Forum), Maroon representatives (KAMPOS), indigenous (VIDS, Sanomaro Esa) and others. 2. Greater visibility of these communities/ groups in implementation activities and in the evaluation of the performance of adaptation measures. 3. Strengthen formal legal and institutional avenues for women to access natural resources and leverage such natural resources for direct economic gain and increased quality of life.	CM, NIMOS, Gender Bureau
B. Make climate adaptation activities more inclusive by broadening the identification of critical stakeholders to include a balance of industry and private sector representatives in more meaningful ways. Early 'buy-in' will assist with planning and later local, sub-national and sectoral implementation.	1. Increased participation in adaptation programming by a wide cross-section of the business and industry/ private sector community.	CM, NIMOS, Planning Office

C. Undertake group specific vulnerability assessments and analyses to identify the particular vulnerabilities of target groups and tailor adaptation plans for their needs.	1. Encourage more messaging and language focused on gender mainstreaming and gender sensitivity to climate change or consideration of differential perspectives and impacts by gender in government programming, public awareness material and communications. 2. Livelihood vulnerability reports that target vulnerable groups including, the elderly, children, indigenous and the disenfranchised who will likely experience climate change impacts differently and require special consideration in efforts to build climate resilience.	CM,NIMOS, Gender Bureau
Strategic Objective 5.2: Incorporation of local knowledge, experiences and practices in climate actions.		
Adaptation Measures	**Indicative Outputs**	
A. Make specific point to allocate budgetary and other resources to fostering the incorporation of local knowledge into programming, especially gendered participation.	1. A variety of appropriate methods and techniques utilized to incorporate local knowledge, experiences and practices of men and women including but not limited to public meetings, town halls, interviews and observations. 2. Specific budget line items that are dedicated to gender specific activities; other vulnerable groups.	CM, NIMOS, Gender Bureau
B. Update or augment existing risk and vulnerability assessment and action plans (such as those for Integrated Coastal Zone Management in Paramaribo and Wanica)	1. Increased recognition of the value of local ways of adapting, recorded in assessment reports. 2. Increasing parity of local approaches, including gender perspectives, techniques, learning, practices for adaptation alongside and in tandem with technological and	OWT&C, NCCR

to include participation by vulnerable groups. Incorporate their understandings of water, soil and resources in the coastal zone where useful.	engineered adaptation solutions.	
Strategic Objective 5.3: National behavioural, attitudinal and lifestyle transformation to support climate adaptation activities.		
Adaptation Measures	**Indicative Outputs**	
A. Focus identifying the generalized social and **behavioural** norms that have both positive and negative impacts on climate change. - Use multiple approaches (e.g. education, social support, laws, incentives, behavior change program). - Address multiple levels of influence simultaneously (i.e. individuals, families, communities, territories). - Take account of the special needs of target groups (i.e. based on age, gender,	1. Behavioural norms in Surinamese society are identified and characterized through scientific means e.g. surveys. 2. Noticeable shifts in societal views, awareness and knowledge about climate change and adaptation processes. 3. Noticeable and compelling shifts in societal attitudes and behaviors that impact on climate change adaptation success. 4. Develop strategy on how gender norm information, special needs of men and women, knowledge and awareness of men and women about climate change will be disseminated and communicated so as to mainstream in respective sectors. 5. More societal generated climate change adaptation initiatives, projects and efforts especially those that are innovative in design and less dependent on government support.	CM, NIMOS

race ethnicity, social class). - Take the 'long view' of climate change outcomes, as changes often take many years to become established.		
B. Develop structured and researched societal intervention strategies for promoting behavioral change including: providing information and outreach; giving feedback; persuading; offering rewards and incentives; changing defaults, nudging choice, and enabling adaptive comfort; and gaining commitment	1. Sustained change leverages successes, updates and embeds formal and informal norms to support sustainable resource use, and strategically promotes change in societal culture driven by leaders and others playing key roles in the community.	CM, NIMOS
C. Identify key societal trends and emerging changes that will signal new and future sustainable growth opportunities and take steps to shift attitudes an behaviors towards these activities/ sectors/ opportunities.	1. Integrate climate change adaptation into the nurturing of these emerging sectors and those to be newly developed in alignment with low emissions pathways.	CM, NIMOS, Gender Bureau

D. Interior populations, local communities and many vulnerable groups that will likely be disproportionately impacted by climate change and feel the effects sooner, may require interventions earlier than other parts of society.	1. Knowledge, awareness and behavior change campaigns that are tailored for specific target groups in society that are on the frontlines of climate impacts.	CM, NIMOS, Gender Bureau

6.6 Strategic Objective 6: Identify and access financing and investment especially for innovation driven climate change adaptation technologies.

Strategic Objective 6.1: Mobilize national and international financial resources.		**Lead Agencies**
Adaptation Measures	**Indicative Outputs**	
A. The National Development Plan suggests that government will utilize public finance, conventional sources of as well as alternative climate financing sources to fund climate compatible development.	1. Government's increased utilization of funding such as commercial market finance, traditional bi-lateral development assistance, and finance from international development banks.	CM, NIMOS,
B. Under the EU-funded Global Climate Change Alliance Plus program, it is planned that the network of the HRD and	1. Both institutes will receive more measurements instruments, to be able to more accurately measure climate data over a larger area. The project will also fund a project to measure water levels in	MDS

the Meteorological Service will be elaborated.	Maroni, Suriname, Saramacca, Coppename, Nickerie and Corantijn Rivers. The Anton de Kom University will be the implementing partner of this project.	
C. Build and institutionalize a finance and investment 'ecosystem' for climate adaptation.	1. Promotion of features such as: provision of advisory services, a supportive intellectual property regime, access to markets, attainable exits for investments, an effective governance structure, and the rule of law.	CM, Ministry of Finance
Strategic Objective 6.2: Create a national enabling environment for financing adaptation.		
Adaptation Measures	**Indicative Outputs**	
A. Assessment, measurement, reporting, and verification. Demonstrate a commitment to evidence-based and transparent adaptation investment. Demonstrate the logic of public investments and attract additional funding.	1. Publication of vulnerability, risk, or adaptive capacity assessments. Tracking and public reporting of adaptation performance indicators on a city's website.	NIMOS, CM, Ministry of Finance
B. Regulation, plans, and policies. Raise and maintain confidence that the operating environment of a given sector (for example, land use) will be consistent. Demonstrate a commitment to climate change adaptation and an	1. Sound, consistent and transparent land use administration. Climate-smart policies to influence private sector activity, ranging from stricter land use administration to guide development away from vulnerable floodplain lands, to positive incentives to promote green infrastructure among building and infrastructure developers.	NIMOS, CM, Ministry of Finance

ability to deliver service effectively. Develop a culture of proactive leadership and innovation.		
Strategic Objective 6.3: Introduce market-based incentives for climate financing to encourage private investment in climate adaptation.		
Adaptation Measures	Indicative Outputs	
A. Increase the current knowledge and understanding of climate finance within the Ministry of Finance and other ministerial budget offices.	1. More communications and exchanges with international climate finance mechanisms. 2. Clarify to what extent the relevant government authorities are communicating on how to finance future climate change programming (Ministries of Finance, Public Works etc.). Priorities in the NAP will have to be based in a realistic context of projected finances and conceivable avenues for accessing grants and loans (e.g. GCF, AF). 3. Documented and followed through commitments to capital and start up investments, business plan etc. moving forward.	NIMOS, CM, Ministry of Finance
B. Fiscal incentives. Cover the incremental costs of adaptation (for example, building a stronger foundation for a facility already under construction). Encourage investments primarily dedicated to adaptation (for example, increasing	1. Tax benefits, subsidies, property taxes differentiated by risk, differentiated insurance premiums, subsidized loans. 2. Provision of cash payments for home renovations that reduce vulnerability can motivate some homeowners, especially if viewed as a time-limited opportunity.	NIMOS, OWT&C Planning Office

the elevation of existing buildings in zones exposed to frequent flooding).		
C. Inducement prizes and public recognition of corporate responsibility. Promote excellence and leadership by example among private sector actors.	1. Launch green building ratings and corporate sustainability awards.	NIMOS, CM, Ministry of Finance
Strategic Objective 6.4 Build investment-friendly environment for technology transfer and technology driven adaptation solutions.		
Adaptation Measures	Indicative Outputs	
A. Develop a comprehensive strategic plan to consider investment in the context of Suriname's total support ecosystem of policies, culture, business climate, availability of skills, the legal framework, national innovation capacity for technology absorption and adaptation and commercialization.	1. Creation of a sufficient flow of quality opportunities for investment. 2. Development of an ecosystem to support deal flow and investments. 3. Government investment of limited amounts of capital in a "smart" fashion, especially to attract private sector participation. 4. Build the institutions to facilitate this spin-in/spin-out process and train local staff to handle these highly technical, specialized tasks.	NIMOS, CM, Ministry of Finance
B. Develop and expand on traditional government/ public sector financing mechanisms such as	1. Provide loans that may range from micro-finance to large scale loans, sometimes with specially adjusted interest rates and	NIMOS, CM, Ministry of Finance

grants, guarantees and loans that may be wholly publicly funded or require matching private sector funds in some public-to-private ratio.	with public and/or private sector components. 2. Develop grants that may be wholly publicly funded or require matching private sector funds in some public-to-private ratio. Repayment is usually not required on grants. 3. Government could guarantee the principle of a loan or the amount of an initial investment thus reducing the risk for private sector investors in high risk situations.	
C. Develop and expand into new kinds of structured financing arrangements such as equity investments and public-private co-financing partnerships.	1. Equity investments where a share of the ownership is taken in expectation of the share increasing in value because of the investment made and assistance provided by the fund management or other advisory service providers. That is, there should be a return on investment for financing the intervention. 2. Public-private partnerships involve co-financing by the public and private sector partners, used for adaptation infrastructure development and large-scale engineering projects.	NIMOS, CM, Ministry of Finance

7.0 Sector Adaptation Action Plans

Table 6 provides the priority ranking of the productive sectors. By applying simple rank scored calculation with the equation: Risk = (Exposure – Adaptive Capacity) x Sensitivity. Where exposure is proxied to the average of direct, indirect and cumulative impact; adaptive capacity is proxied to the ability of the sector to be strengthened through cross-sectoral linkages to environment, disaster risk reduction and spatial sectors; vulnerability is proxied to the average of natural capital, socio-economic, human and physical vulnerability. The Phase 1 or "Now Sectors" ranked 1-4 are presented in this chapter. The Phase 2 or "Next Sectors" ranked 5-8 can be found in Annex 4.

Table 6: Priority Ranking of sectors for climate action

Priority Rank	Productive Sector	Summary of vulnerabilities	Action Plan Priority
1st	Water	Changes in precipitation leading to drought or flooding may cause a decrease in the availability of fresh water, as well as an increase in the risk of contamination of water reservoirs due to water-borne diseases. There is an increased risk of salt water intrusion into coastal ground water reservoirs due to sea level rise.	1st (Phase I or *Now* sectors)
2nd	Forestry	Lack of legislation on land use planning already jeopardizes Suriname's ability to retain its high forest cover classification. This will only be exacerbated by the negative impacts of climate change, for example increased temperatures and drought, leading to an increase in the risk of forest fires.	
3rd	Agriculture, Livestock & Fisheries	This sector is highly dependent on water resources and climatic conditions, and currently employs outdated technology, increasing its sensitivity to climate change. Saltwater intrusion and	

Priority Rank	Productive Sector	Summary of vulnerabilities	Action Plan Priority
		variations in rainfall patterns could lead to a decrease in available productive land, which could have negative repercussions on national food security and export earnings.	
4th	Energy	Dependence on existing hydropower facilities increases vulnerability to climate impacts such as drought and increased temperatures, which affect the amount of water available and the functioning of Suriname's electricity generation, transmission and distribution systems. These impacts have already led to increased costs and a loss of energy security	
5th	Infrastructure	Coastal and urban infrastructure is more exposed to flooding as the sea level rises. Susceptibility to flooding is increased due to existing poor drainage.	2nd (Phase II or *Next* sectors)
6th	Housing	Housing in the low-lying coastal zones is more exposed to flooding as the sea level rises. Housing in the interior is vulnerable to flooding due to heavy rainfall. Increasing intensities and incidence of *Sibibusi* events will increase the risk of structural damage to roofs.	
7th	Tourism	Eco-tourism is an important source of revenue for indigenous communities and is highly dependent on Suriname□s environment and biodiversity, which may be negatively impacted by changes in climate. For example, sea level rise may cause degradation of nature reserves and wildlife habitats, including	

Priority Rank	Productive Sector	Summary of vulnerabilities	Action Plan Priority
		the nesting grounds of various turtle species.	
8th	Mining	Mining is highly dependent on electricity generated by hydropower, as well as freshwater resources for production. Decreases in water resources may require expensive import of electricity or challenges in accessing freshwater for production and increasing competition with other users and the wider environment.	

7.1 Water Resources

Strategic Objective 1: Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management.	
Adaptive Measures	Indicative Outputs
A. Undertake in-depth studies and establish an observation network and monitoring system, in order to enhance water management and sustainable use of water resources.	1. Climate change related data collection, capacity building, institutional strengthening, data processing and analysis and data management. 2. Assess vulnerabilities and risk from climate change to drinking water and other uses e.g. irrigation, fisheries, etc. Including gender responsive assessment on water management including survey on unpaid time spent by individual household members in supplying water, making it safe for use, and managing it. 3. Undertake an assessment of water needs (for example, irrigation, drinking, waste treatment, industrial) and sources, identify and appraise options for new sources (including water balance and aquifer replenishment studies).

	4. Conduct feasibility studies to explore the possibility of additional groundwater projects, as well as alternative freshwater resources, to buffer the effects of saltwater intrusion. 5. Explore the development of mechanisms to facilitate Integrated Water Resources Management (IWRM), including appropriate institutional and legislative frameworks at all stages of water planning and management. 6. Awareness raising programme on the impacts of climate change on water resources and management of these impacts, including from gender perspectives[20].
Strategic Objective 2: Develop and implement law, policy and regulation to ensure sustainable exploitation and use of drinking water resources and waste water management.	
Adaptive Measures	Indicative Outputs
A. Addition of the climate change aspect including the law on meteorological services after formal approval of the water law; and development of surface water law.	1. Include provisions for 1) the protection of water resources 2) the promotion of theirsustainable use and 3) for water quality standards and wastewater discharge
B. Assess options for the establishment of an institutional organization for the enhancement of water management.	1. Study to indicate the required water resource governance and administration system best suited to Suriname.
	2. Establishment of more water boards and a national water authority.

[20] The "gender perspective" focuses particularly on gender-based differences in status and power, and considers how such discrimination shapes the immediate needs, as well as the long-term interests, of women and men. In a policy context, taking a gender perspective is a strategy for making women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programmes in all political, economic and societal spheres, so that women and men benefit equally and inequality is not perpetuated. Source: European Institute for Gender Equality. https://eige.europa.eu/thesaurus/terms/1197

C. Develop robust land management and waste management policies.	1. Establishment of water quality standards for each wastewater type. 2. Treatment so as to reduce discharge of pollutants including sediments, sewage, agrochemicals and mining pollutants into water systems and protect aquifers from surface contamination.
D. Develop policy, regulations, standards and best practice guidance to support national water resource management that is adaptive to climate change.	1. Construction of water storage mechanisms for use of water in times of drought; possibilities include artificial controlled ground reservoirs, water towers, or bottled water reserves in strategic locations throughout the country. 2. Policies to increase efficiency of drinking water use and supply mechanisms (for example improving infrastructure, capacity building and raising awareness). 3. Policies to increase efficiency of other water type use and supply mechanisms (for example improving infrastructure.
Strategic Objective 3: Water management programme to increase resilience of water supply.	
Adaptive Measures	Indicative Outputs
A. Consider current integrated water resource management approaches and future proposals with an intent of mainstreaming climate change adaptation processes into these frameworks.	1. Develop and implement land and waste management solutions to reduce discharge of pollutants into water resources. 2. Develop, implement and monitor drinking water storage mechanisms for use in times of drought and flooding. 3. Develop, implement and monitor other water types storage mechanisms for use in times of drought and flooding.
B. Identify and implement wastewater recycling schemes, including mining and forestry sector.	1. Wastewater from domestic, tourism, industrial and agricultural use can be re-used, for example for agricultural irrigation, reducing demand for drinking water.

Strategic Objective 4: Climate-resilient infrastructure development to ensure availability of drinking water and other uses of water	
Adaptive Measures	Indicative Outputs
A. Develop and upgrade infrastructure for water supply, irrigation.	1. Construct an emergency network of agricultural irrigation pipes and pumps connected to reliable water sources, such as nearby larger freshwater rivers or controlled reservoirs. 2. Increased efficiency of water use, including storage and distribution, without compromising sanitation systems.
B. Develop and upgrade infrastructure to cope with the effects of climate change and sea level rise e.g. drainage and flood protection.	1. Develop mechanisms to reduce intrusion of river and sea water. 2. A leakage management programme including mains rehabilitation, to reduce water leakage from distribution and supply networks.

7.2 Sustainable Forest Management

Strategic Objective 1: Comprehensive national research program on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management.	
Adaptive Measures	Indicative Outputs
A. Continue analysis on past climate impacts on forests and sustainable forest management with emphasis on mangroves	1. Research is able to establish a Reference Level for forest carbon emissions, with special attention for mangrove forests and wetlands.
B. Identification, analysis and implementation of sustainable forestry options in Suriname including but not limited to: soil degradation and nourishment, reforestation planning, irrigation, protected areas, agro-forestry, buffer zones, production and harvesting, natural stands and participatory management.	1. Research and analysis conducted to enable impact mitigation, climate resilience and risk management in forest including protected areas.
Strategic Objective 2: Awareness raising and capacity building programme on sustainable forest management, forest carbon accounting and forest carbon monitoring.	

Adaptive Measures	Indicative Outputs
A. Perform awareness activities regarding the role of forest conservation, restoration and sustainable use of forests in climate change.	1. Target groups: private sector, students, local communities, decision makers on national and district level, judiciary, executive and enforcement personnel are made aware of sustainable forestry management. 2. Training and education with a focus on sustainable forestry management are incorporated into school system and informal learning communities including men and women's groups. 3. Capacity and knowledge regarding accounting of forest carbon stocks including Forest carbon credits and markets, emissions and carbon sequestration improved. 4. Target groups including local communities including groups focused on opportunities and equality for men and women, in monitoring of forest carbon levels.
Strategic Objective 3: Develop and implement governance and finance regime to incorporate climate resilience and mitigation in forestry.	
Adaptive Measures	Indicative Outputs
A. Assess options to access climate finance through UNFCCC mechanisms and other related funding avenues financing carbon sequestration by forest and sustainable forest management or Climate resilience and mitigation action	1. Focal point established and financial plan developed for identifying funding sources.
B. Review and update Forest Management Act to include climate change considerations.	1. A State Order for the protection of all forests and in particular mangrove forests is developed.
C. Further strengthen National Forest Management System (NFMS)	1. A state of art institutionalized National Forest Monitoring system established
Strategic Objective 4: Management of mangrove and coastal forest resources	
Adaptive Measures	Indicative Outputs

C. Include mangrove conservation and afforestation in REDD+ strategy and identify REDD+ readiness actions needed for mangrove carbon sequestration including through mangrove planting, effective management and rehabilitation.	1. A programme for mangrove conservation and reforestation and afforestation of mangroves along coastline is implemented.

7.3 Agriculture, Livestock and Fisheries

Strategic Objective 1: Comprehensive national research program on climate resilient crops, agricultural practices, animal husbandry and fisheries.	
Adaptation Measures	Indicative Outputs
A. Develop a comprehensive national research program on climate resilient crops, adaptive agricultural practices, animal husbandry and fisheries.	1. Analyze the impact of changing climate situations / extreme weather conditions; continuously gather and compile gender disaggregated data regarding yield, production and specified losses and link those to the weather pattern during the related growing seasons while looking for trends. 2. Improve data compilation and data management, transparency / availability/ accessibility including from gender perspectives.
B. Conduct analysis on past and future climate impacts on Suriname's agriculture, livestock and fisheries sector and responses	1. Attention paid to impacts on yield, agro- ecological research on pests and diseases, and impact of drought and heavy rain on water and food shortages in the interior.
C. Strengthenparticipation in agricultural activities particularly among women and vulnerable groups.	1. Develop and trial agricultural, livestock and fishing techniques that build resilience to a variable and changing climate in a participatory way. 2. Activities are planned with gender specific considerations and according to Free Prior and Informed Consent (FPIC) protocol.

	3. The livelihoods of women farmers and other vulnerable groups are strengthened through training and supported through female headed household specific financing, resource sharing and ownership and network support.
Strategic Objective 2: Integration of climate resilience into agricultural extension services.	
Adaptation Measures	Indicative Outputs
A. Increase the capacity and effectiveness of the agriculture extension services.	1. Increased capacity of agriculture extension service providers (LVV, RO, private entities)
B. Focus on community specific and loca lspecific awareness and training.	1. Raised awareness of farmers, pastoralists and fisherfolk on the impacts of climate change. 2. Increased local level capacity on how to manage impacts based on research results.
C. Provide training and guidance in climate smart crop production.	1. Increased adoption of techniques such as appropriate greenhouses and hydroponic gardens, improved drainage systems, crop diversification, etc. (fruit and vegetables).
D. Climate-control systems on livestock farms and modification of livestock feed, in both the coastal area and the interior.	1. Increased adoption of such modern systems on livestock farms especially in rural areas. 2. Increased access to appropriate livestock feeds at economic prices.
Strategic Objective 3: Develop and implement Sustainable Agriculture Policy including relevant climate resilience mechanisms in existing and new regulations.	
Adaptation Measures	Indicative Outputs
A. Implement the Water Boards Act as the most relevant legislation for water management in the agricultural sector and strengthen the governance in water management for agriculture.	1. Mandated infrastructure development to conserve water, provide irrigation or fast drainage and protect agriculture from saltwater intrusion. 2. Integrated climate change considerations (including results from climate impact

	studies) into national dike construction programme in low-lying areas. 3. Local water management bodies established and operational
Strategic Objective 4: Financial support to farmers, pastoralist and fisherfolk to build up climate resilience.	
Adaptation Measures	Indicative Outputs
A. Develop and provide a financial incentives scheme for farmers, based on research results appropriate to each region and ecotype, to implement climate resilient farming techniques/actions.	1. Evaluate opportunities for parametric insurance schemes to compensate farmers/pastoralists whose agricultural production suffers damage from climatic events.
B. Develop and provide a financial incentives scheme to promote aquaculture.	1. Evaluate opportunities for parametric insurance schemes to compensate fishers and farmers whose harvest suffers damage from climatic events.

7.4 Energy

Strategic Objective 1: Comprehensive national research programme including analysis and collect data on past climate impacts.	
Adaptation Measures	Indicative Outputs
A. Implement an energy sector focused national research programme to address: links between climate change and climate impacts; gaps in understanding about the sector and climate change; translation of data analysis to useable and well communicated policy options.	1. Research including but not limited to salinization, erosion, water levels, river dynamics, natural ecosystems) on energy sector (operational, performance, maintenance, financial impacts); and research on household energy consumption from gendered perspectives including gaps in access to clean energy; tidal and wave energy and waste energy. 2. Feasibility of new energy sources, such as wind, solar, biomass and hydropower, as

	well as electricity generation methods. 3. Improve data and data analysis to increase usability, which in turn will be fed into policy development. Stakeholders involved: NH, AdeKUS, NIMOS
Strategic Objective 2: Awareness and capacity building programme to encourage training of new professionals in energy research and development.	
Adaptation Measures	Indicative Outputs
A. Facilitate technical and university education that focuses on the use of new technologies and research into alternative technologies. B. Strengthen government institutions or establish new institutions to facilitate the newly trained professionals in research and development.	1. New and enhanced vocational and degree programmes developed in conjunction with regional and international expert education partners. 1. Establish access to international training facilities (including the international private sector). 2. Develop and implement an awareness raising programme to promote energy conservation and efficiency for domestic and commercial users. 3. Facilities developed to enable the professionals to do the work required of them. Stakeholders involved: NH, AdeKUS, NIMOS
Strategic Objective 3: Financial incentives to influence energy use and decrease emissions.	
Adaptation Measures	Indicative Outputs
A. Deploy market-based incentives to transform the energy sector.	1. Taxes, emission trading and other economic instruments to steer energy use and emissions, conveying clear, long-term market signals (for example develop a Feed-in-Tariff policy for renewable energy to encourage private investment).

	2. Remove fossil fuel subsidies for the energy sector. 3. Promote procurement of energy efficient goods and services by public and private sector; explore provision of incentives for using energy goods and services. 4. Facilitate and/ or incentivize alternative means of transportation. Stakeholders involved: (NH, Finance, Coordination Environment)
Strategic Objective 4: Conduct assessment and baseline for the development of the national energy strategy.	
Adaptation Measures	Indicative Outputs
A. Develop national energy policy, strategy and regulatory framework.	1. Minimized energy use, increased efficiency and enabled renewable energy development. 2. Design a building code for housing and infrastructure with regards to energy use (focusing on green energy), electricity efficiency and locally-sourced building and construction material. 3. Improved enforcement of zonal planning and regulation to stimulate efficient city design (smart cities). E.g. Stimulate building flats instead of individual houses. Restrict the repurposing assigned land use. Stakeholders involved: NH, OWT&C, RGB
B. Amend the Act on Import Duty 1996.	1. Inclusion of other sources of renewable energy than solar systems to qualify for an

	exemption from import duty. Stakeholders involved: HI, Ministry of Finance
C. Develop and deploy new financing mechanisms for communities, entrepreneurs and small business owners.	1. Consider a revolving fund for rural electrification which could be used to reduce the costs of startup renewable energy operations and provide capacity-building support to implement small scale power projects. Stakeholders involved: HI, Ministry of Finance, RO, AdeKUS

7.5 Education

Strategic Objective 1: Provide climate change information at all levels of formal education.	
Adaptation Measures	**Indicative Outputs**
A. Incorporate climate change into curricula for primary, secondary, tertiary and vocational educational institutions.	1. Comprehensive programming and curricula review and revision and commitments from government and schools to implement changes aligned with mainstreaming climate adaptation. 2. Increased attention to and emphasis on school graduates continuing into advanced studies, entrepreneurship, vocational and professional livelihoods that contribute to climate adaptation efforts.
B. Develop advanced research capacity by offering academic courses at the higher	1. Comprehensive assessment of the needs of national academic institutions for focused academic courses that are needed

curricula level on sustainability topics to train scientists and engineers.	for climate adaptation. 2. More partnerships with regional and global experts and institutions of learning that assist with building Surname educational human resources. 3. Strengthen University capabilities and resources to undertake Suriname specific research in order to support evidence based environmental information, education and training and in turn lead to more realistic policies and actions.
Strategic Objective 2: strengthen public and private sector contributions to education programmes on climate resilience and mitigation.	
Adaptation Measures	**Indicative Outputs**
A. Provide incentives to public and private sector experts and organizations to become involved in academic training with professional educators.	1. More advanced training courses offered and taken up by government experts, that is then both implemented in the workplace but shared with students in academic settings. 2. Greater interest in private sector contributions to academic curricula development in their areas of subject expertise that can lead to employment and entrepreneurship opportunities in climate adaptation.
Strategic Objective 3: Develop climate resilient infrastructure in the education sector.	
Adaptation Measures	**Indicative Outputs**
A. Plan and build new school and allied infrastructure with climate impacts such as flooding, drought, extreme weather events and other factors in mind.	1. School buildings and support infrastructure should include the impacts of climate change in determining their location, design and construction. One example could be building on higher elevations or greater heights to prevent their flooding.

7.6 Health

Strategic Objective 1: Create comprehensive national research programme to track international research.	
Adaptation Measures	**Indicative Outputs**
A. Keep abreast of the latest scientific and medical findings and evidence related to the spread of disease likely caused by climatic changes.	1. Surinamese authorities are aware of newly emerging pathogens relevant to Suriname's future and keep abreast of preventative measures such as new vaccination protocols, new antibiotics, and new health related precautions.
B. Stimulate national health research and conduct a continuous programme for monitoring diseases that have been highlighted with a climate change signal for Suriname, which include malaria, yellow fever and dengue fever.	1. Increased capacity for monitoring activities across more regions of the country. 2. Higher levels of disease surveillance and means to provide early warning of outbreaks and increased risk to communities.
Strategic Objective 2: Create a capacity building programme for public health sector on climate resilient health practices.	
Adaptation Measures	**Indicative Outputs**
A. Strengthening of technical and professional capacity of health personnel, the organizational capacity of health systems, and their institutional capacity to work with others. In order to public health resources for the surveillance, prevention and control of vector borne diseases.	1. Focus on actors' needs in order to ensure the implementation of accurate interventions, any initiative on capacity development at any level should start by a capacity assessment of the corresponding health system. 2. Foster collaboration and partnerships, especially with and between countries and regions, and within and between related departments and units 3. Enhance the sustainability of capacity building efforts by integrating climate

	change at early stages of professional health training. 4. Engage with wider audiences outside of the core health community, including other sectors, the media and community groups.
Strategic Objective 3: Launch awareness raising programme on climate-related health impacts, prevention and treatment.	
Adaptation Measures	**Indicative Outputs**
A. Conduct a public-awareness campaign on climate related health impacts, such as dangers of prolonged heat stress.	1. Communication strategy on climate risks to health developed and implemented, outlining the scope of information for diverse audiences (e.g. media, public, health personnel and other sectors) and events, including who should communicate, and the means of communication.
B. Provide information to the public on climate related vector-borne diseases.	1. Community engagement and feedback mechanisms established to empower affected populations to respond to warnings, and to guide future development of monitoring and warning systems.
Strategic Objective 4: Develop climate resilient health infrastructure and initiatives.	
Adaptation Measures	**Indicative Outputs**
A. Establish medical centers near potential risk zones and hospitals in areas that are not vulnerable to climate-change impacts.	1. Identify potential risk zones and locations vulnerable to climate change health impacts. Crucial infrastructure will be moved to higher grounds that are less vulnerable to floods, sea-level rise, landslides etc. 2. Monitoring indicators on climate change impacts, vulnerability, response capacity

	and emergency preparedness capacity, as well as climate and environmental variables included in relevant monitoring systems at national level and reported over time. 3. Periodic reviews for improvements or deterioration of capacities identified in assessments including impacts of main environmental determinants of health monitored by the health sector.
Strategic Objective 4: Integrate new technology and procedures into the health sector to enhance disease control.	
Adaptation Measures	**Indicative Outputs**
A. Introduce Early Disease Warning Systems that consider temperature signatures for vector borne diseases and other diseases.	1. Early detection tools (e.g. rapid diagnostics, syndromic surveillance) used to identify changing incidence and early action triggered. 2. Technology employed to understand geographic and seasonal distribution of health risks and outcomes (i.e. risk mapping) tracked. 3. Early warning systems for relevant extreme weather events and climate-sensitive diseases (e.g. heat-stress, zoonotic diseases, undernutrition) established.

7.7 Environment

Strategic Objective 1: Research natural ecosystems and the natural protection they provide from extreme weather events, and how these will be impacted by climate change.	
Adaptation Measures	**Indicative Outputs**
A. Provide support for climate adaptation along the coastal region including mangroves.	1. Engineering measures to increase sedimentation rates along severely encroached coastal stretches in order to support mangrove growth.
B. Perform Technology Needs Assessment to draw out and identify priority resilience and low emission technologies required.	1. Introduction of new low carbon technologies and ecological and engineering practices and methods. 2. Encourage relevant industry sectors as well as responsible ministries and agencies to put clean technologies and modern climate adaptation techniques into practice.
C. Support and advance scientific understanding of climate phenomena and harness that understanding for action in Suriname.	1. Continue development of climate change projections, including general circulation model (GCM) statistical downscaling to 25-50 km resolution.
Strategic Objective 2: Create capacity building programme on climate resilience.	
Adaptation Measures	**Indicative Outputs**
A. Lead climate adaptation strategy and country implementation.	1. Coordination with ministries and agencies to carry out the national climate action strategies and actions. 2. Increased applications for and access to climate funds and financing to implement national climate adaptation strategies.

Strategic Objective 3: Develop and implement law, policy and regulation to protect natural environment and build climate resilience.	
Adaptation Measures	**Indicative Outputs**
A. Enact the Environmental Framework Act 2000, which stipulates that climate change be considered in development planning and proposes a fund to finance climate related research.	1. Enactment into force of the Environmental Framework Act. 2. Government support of the Act by budget allocations to operationalize the activities that it governs.
B. Require environmental impact assessments when developing long-term projects.	1. Reviews of environmental impact assessments that take active consideration if the inclusion of climate adaptation measures where appropriate.
C. Implement conservation strategies designed to protect marine turtles in the face of climate change.	1. Reviews of environmental impact assessments that take active consideration if the inclusion of climate adaptation measures where appropriate.

7.8 Disaster Risk Reduction

Strategic Objective 1: Conduct research into past *Sibibusi* trends and relationship with regional climatic events and climate change.	
Adaptation Measures	**Indicative Outputs**
A. Conduct research into past hurricane trends and potential links to climate change.	1. More informed understanding of extreme weather events especially as they interaction and/ or impact with Suriname's Exclusive Economic Zone (EEZ). 2. Strengthen existing monitoring of hurricanes, storms, droughts and their potential impacts in Suriname's EEZ.

	3. Greater interactions and stronger cross-regional collaborations and sharing of information, data and methods to enhance Suriname's extreme weather prediction capabilities.
Strategic Objective 2: Expand and improve equipment of the existing infrastructure and implement a National Early Warning System.	
Adaptation Measures	**Indicative Outputs**
A. Develop specific legislation with regards to disaster management, incorporating climate change.	1. Utilization of the UN National Disaster Risk Country document prepared for Suriname (2014) to inform specific legislation for parliamentary approvals. 2. Develop linkages between draft legislation and the National Road Safety Plan and a National Health Disaster Plan. 3. Incorporate forest fire measures into the national disaster plan.
Strategic Objective 3: Establish a disaster relief fund.	
Adaptation Measures	**Indicative Outputs**
A. Establish a disaster relief fund.	1. Establish specialized insurance coverage schemes for health, housing and infrastructure and other areas vulnerable to the impacts of extreme weather conditions. 2. Develop printed and other materials to promote awareness that clearly shows men and women disaster victims how to handle potentially contaminated water sources in order to prevent illness. 3. Increase awareness on preventative measures, regarding operating

	procedures for an emergency response plan that is activated before a natural disaster strikes Suriname. 4. Provide psychological guidance and physical relief measures to victims.
Strategic Objective 4: Incorporate sub-national disaster and hazard concerns in climate adaptation planning and actions.	
Adaptation Measures	**Indicative Outputs**
A. Take actions on priority climate related risks identified for the Districts of Commewijne and Para.	1. Actions by ministries and district administration offices to alleviate current and potential vulnerabilities of men and women including but not limited to: - Flooding from sea and rivers causing soil erosion - Coastal erosion that destroys roadways causing hazardous travel routes for vehicles - Salinization of soils and inundation that reduces crop productivity - Reactionary interventions of farmers by using excessive pesticides and fertilizers

7.9 Spatial Planning

Strategic Objective 1: Conduct mapping of land titles across the total surface area of Suriname.	
Adaptation Measures	**Indicative Outputs**
A. Mapping that includes vulnerability of land under various uses to climate change impacts, hazard and vulnerability mapping of land conditions.	1. Updated digital mapping records and related outputs of land use conditions that can be used in climate adaptation planning.
B. Awareness campaign about land title holders' rights and responsibilities as	1. Increased numbers of people in more communities that are taking actions on

relates to climate change impacts and adaptation.	their properties that are consistent with climate adaptation and resilience.
Strategic Objective 2: Review the current legal framework for spatial planning.	
Adaptation Measures	**Indicative Outputs**
A. Planning Act 1973, Urban Planning Act 1972, and the Decree on Issuance of Domain land considered for revisions to incorporate potential climate change impacts into future spatial planning legislation.	1. Climate proofing revisions made to existing legislation where appropriate. 2. New legislation that incorporates consideration of climate adaptation from the introduction. 3. Ensure that spatial planning geared towards moving critical infrastructure to higher ground is incorporated into health sector, disaster response and other sectors.
Strategic Objective 3: Implement land-use planning through the creation of a single land-use authority.	
Adaptation Measures	**Indicative Outputs**
A. Implement land-use planning through the creation of a single land-use authority that considers vulnerability, land availability and location, and the suitability of land for industrial, agricultural or human settlement purposes.	1. Implement spatial planning and zoning by a central authority in order to promote appropriate urban growth. 2. Assess natural waterways and streamline with land allocation policy to mitigate flooding and drainage problems. 3. Require drainage plan for allotment and housing projects. 4. Update master plan of Greater Paramaribo to integrate climate change considerations.

	5. Establish flexible and appropriate land tenure systems that allow for long-term decision making on the part of land owners, tenants or other users. 6. Establish agro-ecosystem zoning based on vulnerability and risk assessment of land.
Strategic Objective 4: Regulate activities such as sand and shell mining and the issuance of land rights in the estuarine zone.	
Adaptation Measures	**Indicative Outputs**
A. Establish protected area and buffer zone along the coastline and along other water bodies such as rivers and lakes.	1. More acreage of protected areas and buffer zones to protect against climate impacts such as storm surge and inundation. 2. More responsible building and settlement practices with minimal incursions into protected areas and buffer zones. 3. Protect mangrove forests; regulate and enforce regulations on tree removal.
B. Forbid new development initiatives in vulnerable zones and gradually reduce existing activities in vulnerable zones and in potential future buffer zones.	1. Rejuvenation of vulnerable zones because of less development activities.

7.10 Infrastructure and Housing

Strategic Objective 1: Enhance comprehensive infrastructure and housing information and data for decisive decision-making	
A. A comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management.	1. Undertake analysis of and collect data on past climate impacts (including but not limited to salinization, erosion, water levels, river dynamics, natural ecosystems) on infrastructure (operational performance, maintenance, financial impacts). 2. Climate proofing of road infrastructure based on strategic functions for the Surinamese economy, through the Multi-Annual Policy Plans of the Roads Authority. 3. Undertake research to assess the role of mangrove forests and coastal dikes/drainage systems to provide protection against storm surge and flooding.
B. Expand climate data monitoring network (number of stations and climate variables collected).	1. Identify sources of funding for climate resilient infrastructure and train stakeholders in how to access. 2. Introduction of equipment as advised by respective ministries and experts: stations, synoptic stations, climate stations, automatic stations, hydro-metrological stations, data retrieval and space-based tools, hydrometric measuring stations, digital telemetric recorders, data loggers etc.

Strategic Objective 2:_Design and Implement infrastructure and housing regulations, standards and guidelines	
A. Develop specific infrastructure guidance on the appraisal, design and operation of assets under conditions of a changing climate.	1. Develop and implement design criteria to protect new key assets in flood risk areas (for example, the protection of mangrove forests and the prohibition of coastal sand and shell ridge removal). 2. Conduct an awareness raising programme to inform the general public about climate resilient building and its importance.
B. Develop and implement law, policy and regulation to integrate climate change resilience into infrastructure planning and development.	1. Develop and implement design criteria to protect new key assets in flood risk areas (for example, the protection of mangrove forests and the prohibition of coastal sand and shell ridge removal).
C. Design and implement measures to protect existing assets located in flood risk areas.	1. Establish building codes that incorporate new, appropriate and affordable technologies to improve the resilience of physical infrastructure to climate change 2. Provide incentives to encourage the implementation of building codes.
Strategic Objective 3:_Build infrastructure and housing sector skills, training and expertise; manage and keep human resource capital	
A. Promote infrastructure development to improve drainage, storm surge and flood management and prevent saltwater intrusion in “at risk areas.	1. Identify “at risk areas” and develop flood management options, for example dikes and adequate drainage systems (e.g. roadside drainage system to deter water pooling and stagnation), and strengthen riverbanks (especially in areas where a road runs parallel to the river or where communities have built near the bank).

B. Conduct regular maintenance and frequent inspection of infrastructure and identify areas which require investment for improvements. Incorporate climate change considerations into road development and maintenance.	1. Conduct regular maintenance and frequent inspection of infrastructure and identify areas which require investment for improvements.
Strategic Objective 4: Co-ordinate infrastructure and housing efforts in transportation and capital projects	
A. Assess and adjust the coordination of the main transport infrastructure, currently located in the vulnerable coastal zone.	1. Increase access to finance for climate-resilient infrastructure development. Identify sources of funding for climate resilient infrastructure and train stakeholders in how to access such funding. 2. Assess and adjust the coordination of the main transport infrastructure, currently located in the vulnerable coastal zone. Develop roads that are climate-proof (i.e. resilient to heavy rainfall) and hydrologically sensitive (that do not disrupt the hydrological processes essential to preserve ecosystems).
B. Develop roads that are climate-proof (i.e. resilient to heavy rainfall) and hydrologically sensitive (that do not disrupt the hydrological processes essential to preserve ecosystems).	1. Determine categories of road infrastructure for climate proofing based on strategic functions for the Surinamese economy, through the Multi Annual Policy Plans of the Roads Authority.

7.11 Tourism

Strategic Objective 1: Improve knowledge on how climate change will impact the tourism sector.	
A. Create comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management.	1. Comprehensive baseline understanding of the bio-physical resources that underlie the Surinamese tourism products and services offered, leading to better management frameworks. Including variables such as ecosystem functions and values and carrying capacity. 2. Comprehensive baseline understanding of the socio-economic situation of communities that underlie the Surinamese tourism products and services offered, leading to better management frameworks. Including variables such as balancing hunting/ fishing/ gathering with site seeing and tours; land ownership rights, squatting and cultural and resource rights.
Strategic Objective 2: Communicate with industry on how to manage climate impacts..	
A. Undertake engagement and awareness raising programme on climate impacts and climate resilient decision-making.	1. Evidence of more informed and responsible natural resource management and tourism activities by those involved in the sector. 2. Integration of climate adaptation practices into mainstream tourism sector planning.

Strategic Objective 3: Promote conservation, protection and monitoring of ecotourism.	
A. Integrate measures to protect tourism attractions, operators, and tourists from climate impacts.	1. Marketing of sites, destinations, tours and activities as ecologically sensitive. 2. Engagement on social media and other new platforms to raise funds from supporters globally for sustainable tourism and conservation efforts.

7.12 Mining

Strategic Objective 1: Rehabilitate forests that have been impacted by mining operations.	
A. Implement a forest rehabilitation programme to sequester carbon dioxide.	1. Design and implementation of offset/ compensation programmes for exhausted and/ or abandoned areas.
Strategic Objective 2: Develop and implement law, policy and regulation to integrate climate resilience into mining operations.	
A. Include updating the Mining Decree and standards considering climate change through State Orders.	1. An updated Mining Decree that includes considerations for climate change adaptation. 2. Develop standards for energy efficiency and reforestation of mined out areas in all mineral agreements with national mining companies and small-scale mining operations. 3. Enhance awareness and capacity building programmes for climate resilient and low emission mining such as the use of alternative mercury-free mining

	techniques and the closure of pits after mining.
Strategic Objective 3:_Promote a comprehensive national research programme on social, environmental and economic baselines, climate change in the mining sector.	
A. Promote a comprehensive national research programme on social, environmental and economic baselines, climate change in the mining sector.	1. Research on sustainable mining practices (e.g. research on climate impacts, alternative sources of freshwater, alternative mercury-free mining techniques and appropriate reforestation systems; analysis on past climate impacts on the sector (small and large scale) and modelling of future risks (e.g. impacts on infrastructure, operations, labour, etc.).

Annexes

ANNEX 1: NATIONAL TRAINING AND CAPACITY BUILDING PLAN

Training for NIMOS as National Focal Point for NAP Implementation

Core business: Data rescue	- digitalization of hard copy data - collection of scattered saved data
Institutional - Partnership co-ordination with key stakeholders and data providers - Communications, listening and interpreting information with key stakeholders and data providers - Client relationship building and establishing relationships - Cross-sectoral/ cross-jurisdictional understanding to deal with various differently focused ministries/ units/ agencies	
Organizational - Conflict management - Project management - Time management - Results based management	
Individual • - Data Science and Data Mining • - Computer Science, Computer Engineering, Statistics, Math, Analytics • - Big Data technologies • - Programming and statistical software • - Multivariate statistics • - Data-driven predictive model development • - Large Dataset experience • - Business Intelligence tools	

Core business: Data management	- data collection - storage - handout - data archiving
Institutional - Partnership co-ordination with key stakeholders and data providers	

- Communications, listening and interpreting information with key stakeholders and data providers
- Client relationship building and establishing relationships
- Cross-sectoral/ cross-jurisdictional understanding to deal with various differently focused ministries/ units/ agencies

Organizational

- Conflict management
- Project management
- Time management
- Results based management
- Transparency, accountability and professional data ethics
- Legal and regulatory understanding with respect to public and private data and intellectual property rights

Individual

- Looking at and Analyzing Data. The ability to use data effectively to improve programs, including looking at lists and summaries, looking for patterns, analyzing results. Includes familiarity with the data available; knowledge of project goals and willingness to explore creative approaches to using data.

- Navigating Database Software. Knowing how to use database software to find records, sort, review, edit, print, and other functions. Knowing how to use built-in forms and reports in a database. Writing queries and reports using available tools; copying data into Excel or other formats for further analysis.

- Data Integrity. Understanding definitions, program guidelines, and sources of data. Reviewing data to make sure that data is accurate. Knowing how to organize files and folders on your computer or network.

Core business: Observation network	- setting up a strategic observation network - setting up a structured management system - develop procedures for automated data storage

Institutional

- Partnership co-ordination with key stakeholders and data providers

- Communications, listening and interpreting information with key stakeholders and data providers
- Client relationship building and establishing relationships
- Cross-sectoral/ cross-jurisdictional understanding to deal with various differently focused ministries/ units/ agencies.

Organizational

- Participatory planning and decision-making
- Understanding of measures, indicators, monitoring and valuations in key sectors in the observation network including forestry, agriculture, water, land use, disaster risk
- Project management – project development; cross-cutting management

Individual

- Database Design and Planning. Understanding database design concepts, including relational database design concepts. Understanding the benefits and limits of various types of databases, including PC and online databases. Ability to participate in short-term and long-term planning about database projects and to decide how to efficiently store and analyze various types of data.

- Data Migration. Covers storage platform migration, application migration to new storage, moving operating systems to new storage, consolidation of data or database instances etc.

Core business: Capacity building	- setting up training programs for future workers; - organizing courses for UNIT employees; - expanding climate services and knowledge, etc.

Institutional

- Partnership co-ordination with key stakeholders and data providers
- Communications, listening and interpreting information with key stakeholders and data providers
- Client relationship building and establishing relationships
- Cross-sectoral/ cross-jurisdictional understanding to deal with various differently focused ministries/ units/ agencies

Organizational

- Developing human resource frameworks to cover policies and procedures for recruitment, deployment and transfer, incentives systems, skills development, performance evaluation systems, and ethics and values.
- Leadership - use coaching and mentoring programs to help encourage the development of leadership skills such as, priority setting, communication and strategic planning.
- Knowledge - investments should be made in establishing strong education systems and opportunities for continued learning and the development of professional skills related to job and task specific activities.
- Accountability measures and frameworks that monitor and evaluate organizational work and outputs. Promote the development of capacities such as monitoring and evaluation systems.

<u>Individual</u>

- Communications with diverse stakeholders
- Listening and interpretation of technical information
- Organizational and human resource management
- Training and Skills development assessment
- Employee motivation and engagement
- Performance tracking

Organizational and national matters	- developing policy programs - participating in national international and regional partnerships; outreach, etc.

<u>Institutional</u>

- Partnership co-ordination with key stakeholders and data providers
- Communications, listening and interpreting information with key stakeholders and data providers
- Client relationship building and establishing relationships
- Cross-sectoral/ cross-jurisdictional understanding to deal with various differently focused ministries/ units/ agencies

<u>Organizational</u>

- Strategic leadership
- Social responsibility – appreciating and applying social responsibility, sustainability, humanity and ethical considerations
- Financial management – budgeting, resource mobilization, resource management

- International climate change diplomacy
- Project management
- Time management
- Results based management
- Reporting skills

Individual

- Policy research and analysis
- Policy development tools: social, economic, statistical
- Climate change negotiations and collaborative skills
- Climate risk, economics, finance
- National development and planning
- Environmental assessment skills
- National budget process

Building Capacity among Ministry stakeholders

The capacity building plan for Ministries, to be coordinated through the NIMOS Climate Change Unit[9] is threefold. First, at the most fundamental level in some ministries there will be activities for the introduction and mainstreaming of climate change knowledge in core ministry operations. Second, where such mainstreaming has already been fairly established, there will be activities for strengthening and reinforcing such knowledge and skills in relevant ministry personnel. Third, in ministry situations where strong technical competencies already exist, activities will revolve around re-orienting ministry personnel skills and competencies to tackling climate adaptation mandates within the jurisdiction of their roles and the respective ministry mandates.

Strengthening capacities for adaptation planning and implementation in Suriname at national level through research, training and capacity building. Capacity building that increases the existing capabilities of ministries and agencies that have direct and/or indirect climate change adaptation mandates. The training emphasis is on increasing their own ability to make improved contributions to national efforts within their own spheres of influence. Focus training and capacity building on the key sensitive sectors and cross-sector linkages identified in the NCCPSAP. Facilitating training and capacity building that will enable and encourage constructive dialogue between government and non-government stakeholders for mainstreaming climate change concerns into development planning.

[9] At time of this report, this point is under active discussion.

Table 7: Guidance for Ministry Level Training Plans

Ministry/ Agency/ Unit	Areas for Training & Capacity building	Training Priorities (High, Mid, Low)		
		Immediate	Medium Term	Long Term
	- Policy development	H	M	L
	- policy analysis and evaluation	L	M	H
	- Environmental law, development of regulatory mechanisms	H	H	L
	- Market based mechanisms, standards development, monitoring and assessment	M	H	H
	- Negotiation skills as applied to international forums	M	M	M
	- Climate change communications and behavioral change skills	H	H	H
Ministry of Physical Planning Land and Forest Management	- Land use planning and development	M	H	M
	- Land surveying and geomatics	M	M	L
	- Carbon sequestration, silviculture	L	M	H
	- integrated ecosystem based management	M	H	M
Ministry of Natural Resources	- Integrated water resource management; watershed management	H	H	M
	- environmental management of oil and gas fields; energy sector development	H	H	H
	- Energy efficiency and conservation measures and technologies	L	M	M
Ministry of Agriculture, Animal Husbandry and	-climate smart agricultural practices including soil and crop management	H	H	H
	- climate smart agricultural technologies	M	H	M
	- disease and drought resistance			

Fisheries	crops - water resource management - Integrated coastal zone management - Fisheries, stock and nursery management	M H M H	M H M M	M H M M
Ministry of Public Works, Transport and Communication	- climate resistant infrastructure engineering - building standards and best practices for extreme weather resistance - storm water management -flooding and drainage engineering -coastal resilience infrastructure - Integrated solid and hazardous waste management - geospatial technology	H H M H H M M	H M M H H M M	H L H H H H M
Ministry of Regional Development	- Local area climate adaptation planning - stakeholder communications - climate change awareness and education	L H H	H H M	L H M
Climate Compatible Development Unit (CCDU) – housed in the Cabinet of the President	- market based mechanisms; climate finance and economics - green financing -climate change economics - finance policy design and analysis - credit and risk assessment carbon market design and mechanics	H H M H H	H H M M H	H M M L H

		L	H	M
National Institute for Environment and Development (NIMOS)	- climate change adaptation programme design and implementation - project management - Mainstreaming of climate change into ESIA	H M M	H M M	H M H
National Council for the Environment	- Environmental and climate change governance - Institutional design, analysis and assessment - Negotiations and stakeholder relations	H M M	M M M	M M M
Planning Office	- climate change impact on community development - land use regulation - Geographic information systems - Linking climate change to demographic, health, transportation planning	M H L H	H M M M	M L L M
National Coordination Centre For Disaster Relief	- Mainstreaming climate change into disaster risk reduction - extreme weather event forecasting - Emergency early warning systems - Climate vulnerability and risk assessment -Post event assessment - Communications	H H M H M H	H M H H M H	M M M H M H
The Foundation for Forest Management	- sustainable forestry management - Participatory forest management - Conservation of soil, water,	M M	M M	H M

and Production Control	biodiversity - forestry monitoring and data management - sustainable forest product harvesting and processing	M M M	H M L	M M L
Meteorological Service	- Climate and weather systems and physics - measurements and instrumentation - forecasting systems and applications - Data exploration, visualisation and communications - numerical modelling of atmosphere and oceans Tropical weather systems and climate changes	H M H M M H	M H H H H H	M H H H H M
Hydraulic Research Division	- Hydrological monitoring system design and implementation - developing standards and quality assurance - designing and operating observation networks - communicating hydrological forecasts and water resource assessments	H H H M	M M M H	M L L H

ANNEX 2: FINANCING MODALITIES

Blended finance

This is broadly understood as the strategic combination of public and/or private development finance flows (e.g. concessional finance and philanthropic resources) with other public or private capital to enhance resources for investment in key areas such as infrastructure. Blended finance can therefore involve public-public financial partnerships as well as public-private partnerships. The rationale behind blended finance is broadly threefold: (1) to increase capital leverage (aid funds are used to attract/mobilise additional public or private capital); (2) to enhance impact (skills, knowledge and resources of public and private investors combined can increase the scope, range, and effectiveness of the project); (3) to deliver risk-adjusted returns (manage risks so that returns are in line with market expectations) (World Economic Forum, 2015).

Interest in blended finance has mushroomed in recent years, and it is one of the most dynamic fields in the climate risk arena. A host of actors are involved in blended finance-from bilateral development agencies to multilateral development finance institutions and philanthropic foundations. Many are also keen to expand their activities in this arena as blended finance presents an opportunity to scale up both public and private financing for development in an overall context, where public aid resources for development are constrained (Agence Française de Développement (AFD) 2016). Against this backdrop, there may be opportunities to explore how blended finance arrangements can support climate change interventions. Much blended finance has been used to support investments in infrastructure development and other interventions where there is an expected economic return. Climate investments supported with blended finance include: renewable energy technologies; clean transportation; and energy efficient (zero-carbon) buildings.

The concessional finance element in blended finance packages can be used for technical assistance (for project preparation services, and to provide advice/training to public or private investees to lower transaction costs); underwriting risk (to fully or partially protect the investor against various forms of risk); market incentives (to provide guaranteed future payments to investors in exchange for upfront investment in new markets, or to stimulate innovation around new products or services); insurance against climate induced disasters; and provision of incentives for successful performance (AFD 2016). This helps to reduce financing costs and make investments viable and/or profitable for the private sector.

For Suriname, there can be challenges to pursuing blended finance. These include the length of time needed to finalise finance arrangements where typically multiple financing instruments and institutions or entities involved; limited knowledge and awareness of such instruments and limited technical capacities to structure, manage and execute these types of arrangements. Suriname will have to carefully consider since debt is already a major concern. One recommendation is that Suriname pools technical expertise specifically dedicated to supporting project development and implementation utilising blended finance structures. This would build blended finance capacities, develop a project pipeline and coordinate execution capacity.

Climate Bonds

Such instruments have been issued by multilateral financial institutions, sovereign states and municipalities to fund investments in sustainable energy, clean transportation, and other areas. They offer private investors an opportunity to diversify their investment portfolios into products that generate a financial return as well as deliver climate change related benefits. In this context, sometimes a small interest discount can be obtained where there is a commitment to use the proceeds for specific climate investments, though usually these bonds are issued at market rates. Suriname can utilize such a bond to leverage finance from the international capital market at a discount. Climate bonds have the potential to raise large amounts of capital, which can assist Suriname in financing initiatives such as forestry and land conservation and ecotourism among others. For this to be possible, Suriname can consider: the importance of technical assistance provided by multilateral financial institutions to enable the bond issuance at an affordable rate; the need to ensure that the bond complies with good practice principles, such as transparency in the projects to be financed with bond proceeds; careful consideration of debt overhang and how this financing modality is aligned with the countries' debt sustainability and debt management strategies; and development of a concrete project pipeline suitable for effective deployment of the resources raised via bond issuance.

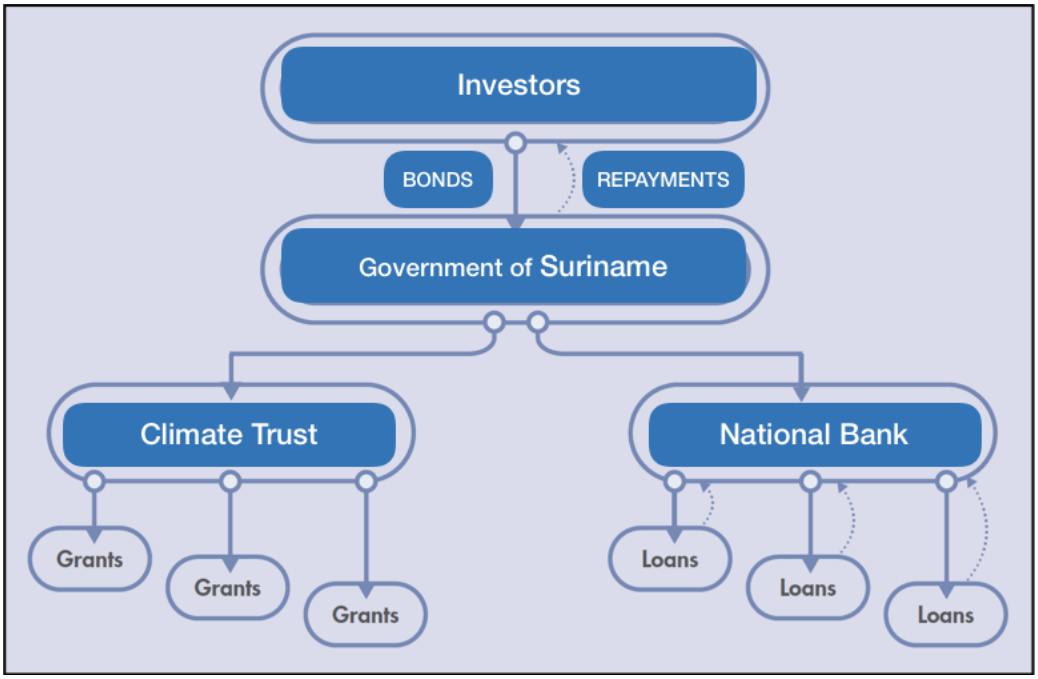


Figure 12: Model for Climate Bonds

Source: Adapted from The Nature Conservancy, 2017

Debt-for-nature swaps

This leverages funds for use in national conservation efforts and are based on the model of debt-for-equity swaps (in which discounted debt is exchanged for investments in the assets of an indebted country). In the case of debt-for-nature swaps, the proceeds of the swap would be invested in Suriname's conservation activities. Under a typical debt-for-nature swap, a conservation organisation buys part of a country's debt from an official or commercial lender on the secondary market at a sizable discount. The NGO then swaps all or part of the face value of the debt with the debtor country for 'conservation payments-in-kind'. Debt–for-nature swaps present a potential avenue through which debt can be reduced and complementary funds raised based on Suriname's ***'carbon sink'*** status, given the vast intact tropical forest resource. Some drawbacks are potentially high transaction costs, particularly financial and legal fees, where there may be a need to issue new instruments to re-finance the loan (buy-back).

A debt-for-nature climate resilience financing facility for small states was recently proposed by the World Bank[10]. The facility proposes to retire high-cost commercial or bilateral debt, such that

[10] Debt for climate swaps: A Caribbean Outlook, 2017
https://climateanalytics.org/media/debt_for_climate_swap_impact_briefing.pdf

the savings from the debt reduction creates additional fiscal space, which can be used to finance current or capital expenditure. The qualifying criteria include: willingness to implement policy and institutional reforms for climate resilience; identification of debt that could be bought back, preferably at a discount and/or replaced by cheaper and longer-maturity debt; and identification of a donor/or donors who can provide additional funds for the debt buyback operation (in exchange for policy reforms).

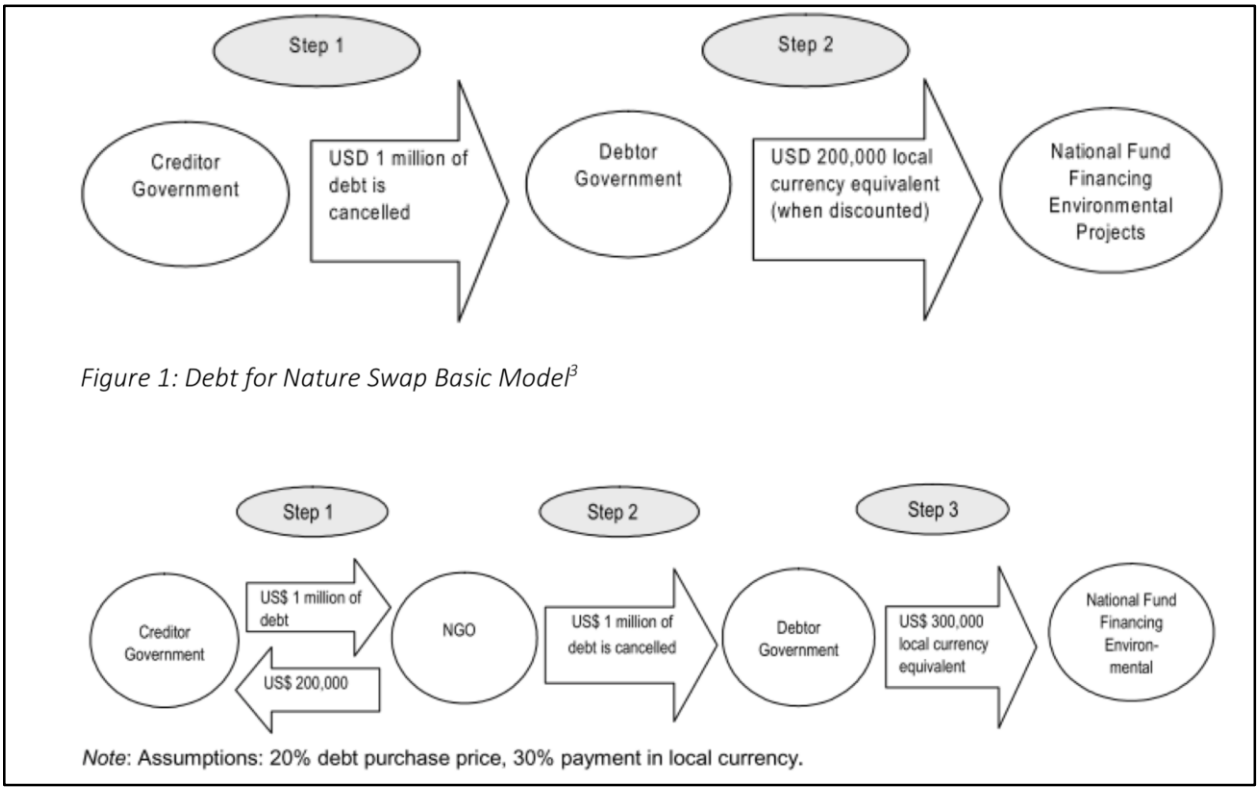


Figure 13: Model for Debt for Nature Swap

Source: Climate Analytics, 2017

Payment-for-results schemes

These schemes can be based on a public-private partnership arrangement between government (or donors and the private and non-profit sectors to deliver projects with climate risk reduction, adaptation or mitigation objectives. Payments are distributed only if specified social or environmental outcomes are achieved. Sometimes referred to as 'impact bonds' they typically involve three key actors: investors who provide up-front capital for the project; service providers who implement the project; and outcome funders (also known as payors) who return the capital

to the original investor(s) plus a small return in the event of success (outcome funders can be donors, business and industry or national authorities).

Such schemes have been used to fund interventions such as biodiversity loss, sustainable livelihood generation; climate smart agriculture; waterway clearance and other areas. These instruments are typically better suited to smaller well-targeted interventions. This financing tool is still relatively new but with respect to climate change in a country like Suriname, this financing model may have several applications, which warrant further exploration. These include biodiversity conservation or mangrove restoration and green jobs programmes for indigenous peoples, women and youth.

Significant lead time is required to prepare clearly defined and quantifiable performance metrics (that are used to trigger payments to the initial funder); lead time is also required to put in place the mix of partners needed (i.e. private sector provider of the upfront capital; project implementation partner(s); independent performance evaluator; outcome funder(s)—which could be an official donor or the national government, or both). Notably, many investors use intermediaries to structure and oversee the contracts on their behalf given their complexity. Nevertheless, this financing model may offer opportunities to fund smaller niche interventions which could otherwise be left unfunded.

Contingently recoverable grant

Such grants provide resources to reduce climate risks and upfront costs associated with the exploratory phase of capital-intensive projects particularly commercial extractive-type resources. The resources are usually provided to a special-purpose-vehicle to fund, for example, resource exploration. If the resources are proven, the contingently recoverable grant converts to loan resources and can be complemented with the issuer of the initial grant resources exercising an option to undertake future debt financing, if the project is to advance beyond successful exploration. This instrument provides a vehicle to reduce the risks and costs associated with the exploration of unproven resources and a means to bring private sector players to the table. Through such grants, the CDB provides resources to finance: pre-investment activities such as climate risk assessments; and field and power plant development activities.

Diaspora Bonds

A relatively new concept, Suriname has a sizeable diaspora, and remittances are an important source of household income and foreign exchange. The diaspora is also a potential source of complementary in climate change. A number of countries, especially in sub-Saharan Africa, have benefited from initiatives that aim to connect the diaspora to equity and bond deals for development projects in their countries of origin through, for example, crowdfunding investment platforms. The IDB has explored the extent to which ***diaspora bonds*** are indeed a viable financing source[11]. Based on criteria such as: the size of the stock of emigrants; whether migrants have above average median incomes; sovereign credit ratings above the speculative grade; lower perceptions of public corruption; and above-average ratings in global competitiveness and government effectiveness, it was found that Suriname has a fair chance of making use of this modality. The Government of Suriname could explore connecting the diaspora with climate change investment opportunities, through crowdfunding investment platforms. Such an initiative could leverage improved information and transparency, legal and regulatory frameworks and tax incentives to support specific projects.

Domestic resource mobilization

Opportunities for domestic resource mobilization are critical to supporting investments in the climate change. In Suriname, potential exists to scale up domestic resource mobilization for climate financing. Belize, for example, imposes a tourism entry fee, which is used to fund conservation projects. Other countries impose an Environmental Protection Levy and/or Tourist Enhancement Tax/Levy on visitors to the destination. Other potential sources include grants, donations and revenues from energy and mining. Similarly, a climate change levy can be explored as a mandatory or voluntary charge on specific high impact industries and activities. This, however, would require preparation of a well-researched and credible climate change strategy, backed by policies and procedures for transparent use of the funds mobilized.

Private sector

Known to be the driver of productivity and participation, which drives economic growth, hence, leveraging private capital can widen and deepen the pool of funding for governments to address development needs, while driving economic growth and creating jobs. Given the current

[11] Wenner, Mark D. (2015). Can Diaspora Bonds be Used in the Caribbean?

economic conditions in the Suriname, the need and scope for increased private sector activity has been elevated, particularly in the development of new industries and sectors. There are many benefits to engaging the private sector in efforts towards climate adaptation and mitigation. For example, actively engaging the private sector in the development and provision of key infrastructure to facilitate the climate change could provide greater access to funding as well as assist with increasing the value-for-money proposition of a project through the provision of global best practices, experience, innovation and capital. This value-for-money benefit should be reflected in the quality of the infrastructure, leading to greater long-term efficiencies as the private sector would be incentivized to provide the highest quality standards given their direct stake in investments.

For the Suriname, private sector partnerships and engagements in key productive projects also represent opportunities for governments to create much needed fiscal space, hence avoiding further accumulation of debt. An efficient Suriname private sector could mobilize the needed resources to accelerate the climate change growth agenda particularly in key productive areas, given the potential economic profits and rents.

The private sector can contribute in a number of ways including: advocating for a better business environment and lobbying for greater participation in the development process; participating in well-structured, win-win public-private partnerships; leveraging their networks and international institutions to provide syndicated loans; supplying technical support to supplement in areas where governments may be deficient; and providing opportunities for the enhancement of the public sector through capacity building.

The main challenges to the Suriname private sector are access to and the cost of finance as well as an inadequately skilled workforce[12]. To attract the quantum of capital that will be needed to develop and capitalize the existing and potential climate change industries, Suriname's government must assist in the provision of an environment with sufficient accessible finance; stable and proactive policies; reliable and quality infrastructure; a healthy and relevantly educated workforce; adequate regulation; and appropriate taxation.

Risk Insurance Instruments

[12] Caribbean Regional Quarterly Bulletin. Development Challenges in the Caribbean. Volume 7, Issue 3 | September 2018

The ***insurance*** sector plays an important role in national economic development. By design, insurance pools and/or transfers risks in an effort to reduce the impact of climate related loss and damage. For Suriname, many of the climate change interventions that may be contemplated are relatively new and therefore carry higher investor risk. A means to transfer some of the risks associated with developing new and innovative economic activities would be to consider the use of insurance. Insurance instruments may be of interest for Suriname, given recent history of frequency of hinterland flooding, drought in agricultural areas and coastal storm surge and erosion impacts of climate change.

The availability of an insurance tool to cover climate risk would directly reduce the perceived risks of new activities, and act as a conduit to facilitate new investment and finance. Insurance could also contribute to improved efficiency of other industries by enhancing the value of collateral by reducing losses. Other potential benefits include encouraging innovation and longer-term planning horizons as risk-adverse investors may be more willing to pursue an unproven activity when not subject to major exogenous insurable risks.

The development of ***parametric insurance instruments*** may be one of many insurance tools that could augment the attractiveness of investing in measures to reduce the impact of climate change. While this offers an option similar to the Caribbean Catastrophe Risk Insurance Facility (CCRIF), it would require research and design for which donor agencies and partners could provide technical assistance. Similar to the capitalization of CCRIF, this form of instrument would also need to be supported by the international community for the development of a climate change insurance product.

Leverage international climate finance

Climate finance is based on the agreed responsibility of developed countries to assist low-emitting climate vulnerable countries to respond to climate change (CDB, 2014). To facilitate this shift towards climate change objectives, Suriname will need to fully tap into existing funds for climate mitigation and adaptation, while developing innovative financing mechanisms that leverage these pools of resources. Global investment to address climate change averaged approximately USD382 bn over the last five years, peaking at USD437 bn in 2015 (Climate Policy Initiative 2017). This peak was due primarily to increased investments from countries such as China, Japan and the United States of America, with about two-thirds of investment funds coming from the private sector and one-third being sourced from the public sector. Over the same period, globally, development finance institutions accounted for the majority of public flows (89%) for climate change adaptation and mitigation.

ANNEX 3: SECTOR BACKGROUND PAPERS ON RISK, VULNERABILITY AND ADAPTATION

Upon completion of the priority impact assessment, an understanding of vulnerabilities, the relative priorities and where and when the sector wants to direct its adaptation efforts was developed. Each sector adaptation plan consists of established goals, objectives and prioritized actions as well as initial timelines and responsible parties to implement the plan. In addition, the plan is also cognizant of risks, barriers and enablers associated with the implementation of identified adaptation options. It is likely that no single adaptation action will achieve all objectives and that a variety of actions will be required. Adaptation actions must address both current sectoral impacts and those that will build capacity to implement, monitor and evaluate the actions being introduced and those that address emerging and future climate-related impacts.

Sector Adaptation Plans are an important component of the NAP. The action plans presented below help to prioritize climate change adaptation activities across the key sectors of the country. They have been developed in consultation with sector and industry stakeholders to reflect the needs and priorities of each sector. They identify emerging opportunities, share knowledge and encourage collaboration. They should all be considered as guides or frameworks of essential actions, that while not meant to be comprehensive, are meant to be a solidly founded departure point for action.

Based on the findings of the risk and vulnerability assessment conducted, it becomes clearer that for Suriname there cannot be a linear approach to national climate change adaptation. There are risks and vulnerabilities spread across multiple sectors as well as concentrated risk and vulnerability characteristics within each sector, which is derived from the intrinsic nature of the sector itself (e.g. national annual budgetary allocations) and/or from extrinsic pressures and drivers (e.g. the sector activity depends on seasonal stabilities). It is therefore equally important to rank and prioritize sectors as matters of national priority, as to plan with and across sectors holistically so that national adaptation comes to resemble a model of several moving parts (sectors). These sectors are activated in and of themselves, but in so doing, also build resilience cross sectorally. In this way, adaptation efforts are more likely to make multiplicative gains rather than only additive ones. The proposed strategic model for national climate change adaptation planning based on sector level risk and vulnerability assessment will therefore have four overarching pathways to be operationalized in compliment to one another.

Figures below show the relative risk to each sector from the direct impacts of climate change. Direct impacts occur through direct interaction of climate change with an environmental, social,

or economic component of the sector. Comparatively, results suggest that the Water Resources sector will have the most direct impacts while Mining and Education sectors will be impacted least. Figure 14 shows indirect impacts of climate change to each sector. Indirect impacts on the environment are those that are not a direct result of climate change but are often produced away from or as a result of a complex impact pathway. Figure 1-2 show cumulative impacts by sector which are those impacts of climate change, either direct or indirect that build in severity over time.

Figure 14: Risk of Direct Impacts of Climate Change by Sector (relative % scale)

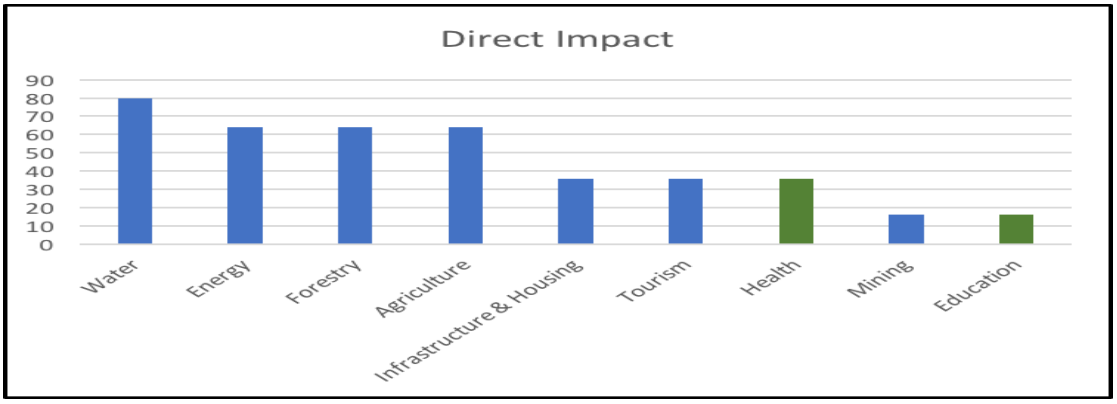


Figure 15: Risk of Indirect Impact of Climate Change by Sector (relative % scale)

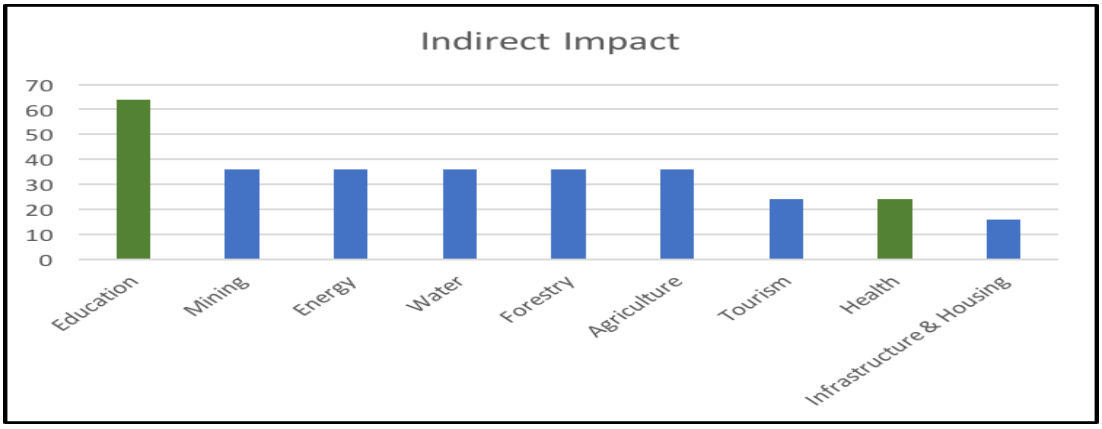
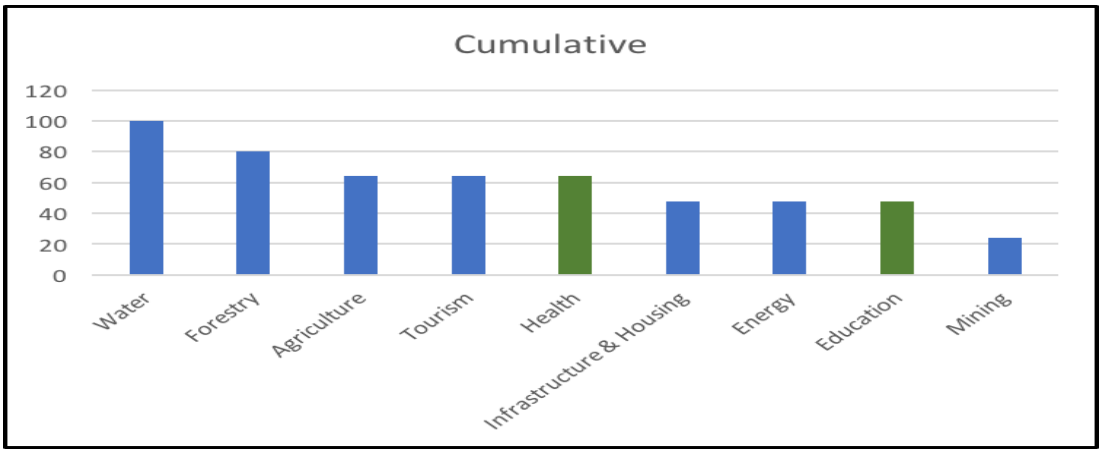


Figure 16: Risk of Cumulative Impact of Climate Change by Sector (relative % scale)



The following set of figures 4-9 describe each sector by 'capital' which is a particular asset base or set of tangible factors that comprise the sector. These can be physical, natural or socio-economic capital. The results suggest, for example, that in Suriname, the natural capital and socio-economic capital of the Forestry sector is the most vulnerable, while human resource capital is the most vulnerable in the Water Resources sector. All these considerations must be considered in prioritizing actions to combat climate risk.

Figure 17: Vulnerability of Natural Capital to Climate Impacts, by Sector (relative % scale)

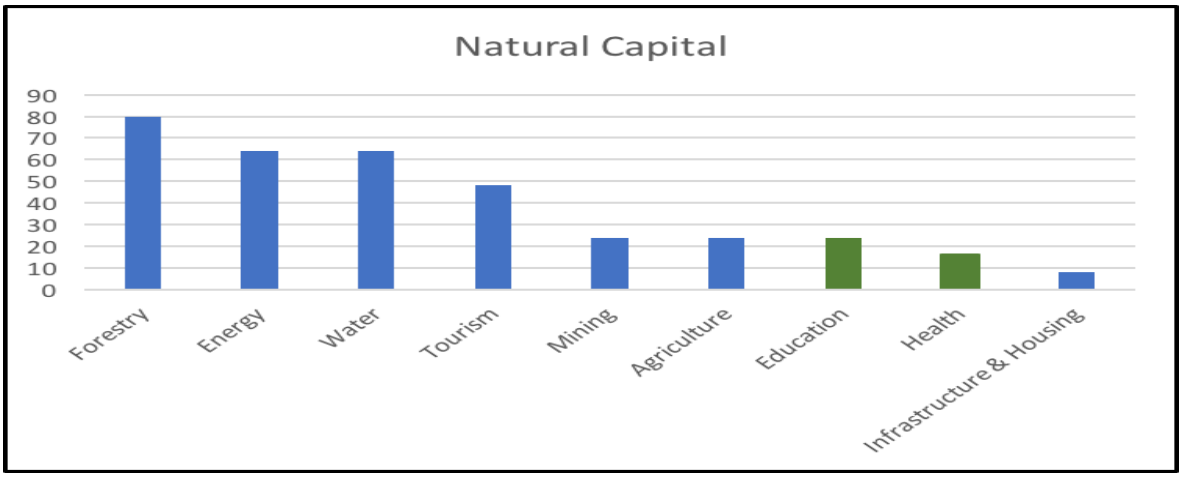


Figure 18: Vulnerability of Socio-Economic to Climate Impacts, by Sector (relative % scale)

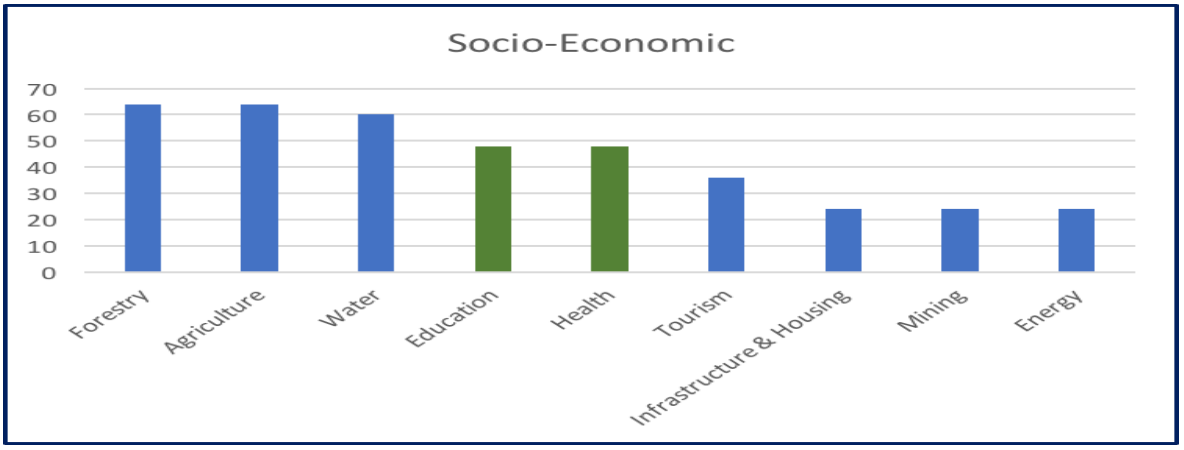


Figure 19: Vulnerability of Human Capital to Climate Impacts, by Sector (relative % scale)

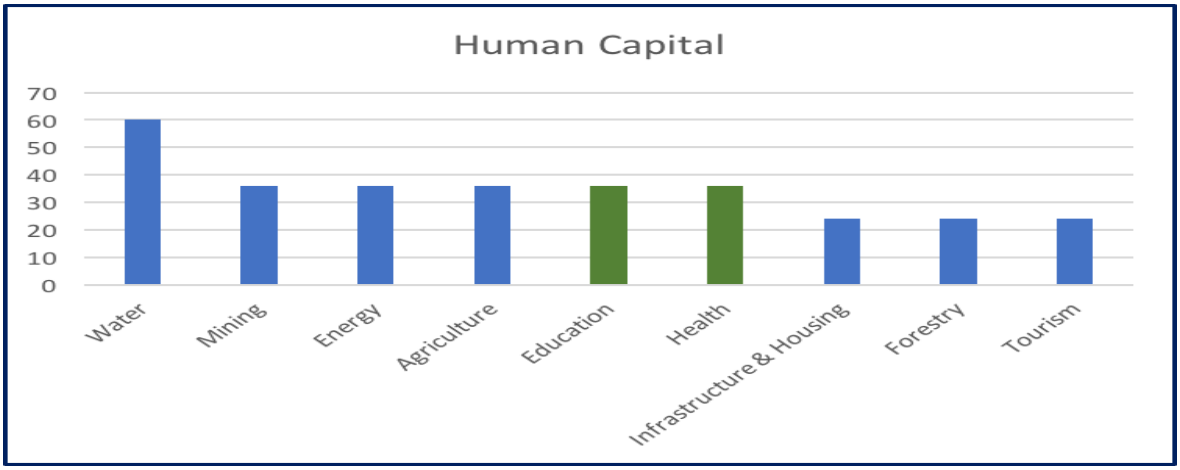
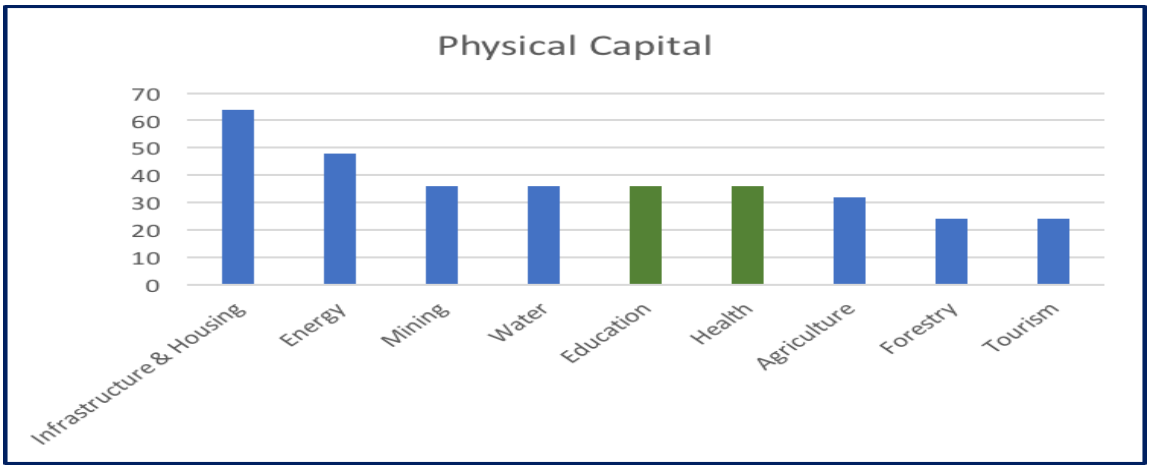


Figure 20: Vulnerability of Physical Capital to Climate Impacts, by Sector (relative % scale)



Figures 8 and 9, present the relative vulnerability of sectors based on whether the threat from climatic change is long term or slow onset and short term or immediate in impact. The water and forestry sectors are reported to be most vulnerable to long term/ slow onset impacts while the water and infrastructure/housing sectors are reported to be the most vulnerable to short term/ immediate impacts.

Figure 21: Vulnerability of Sectors to Long Term/ Slow Onset Impacts (relative % scale)

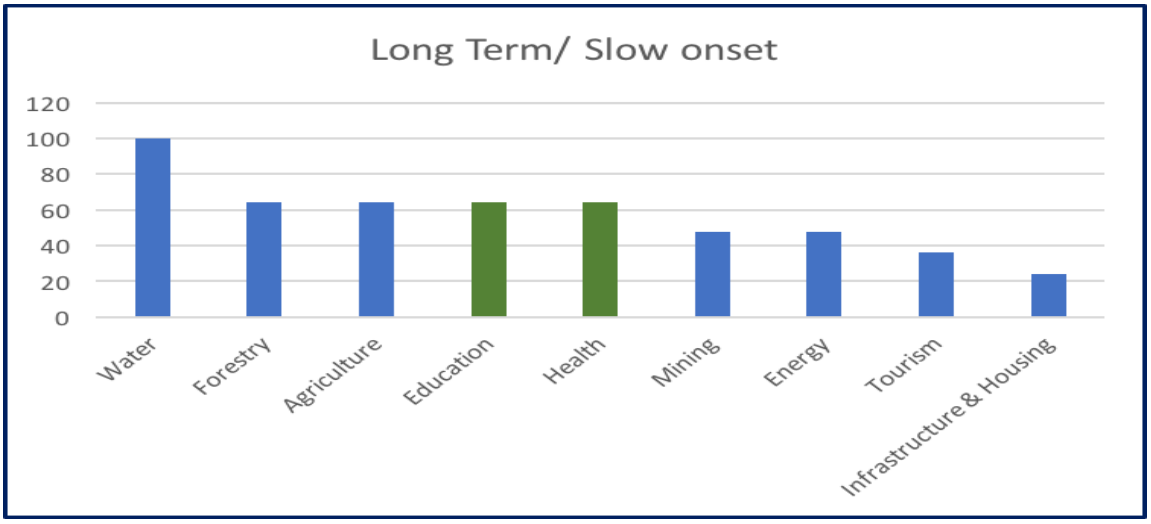
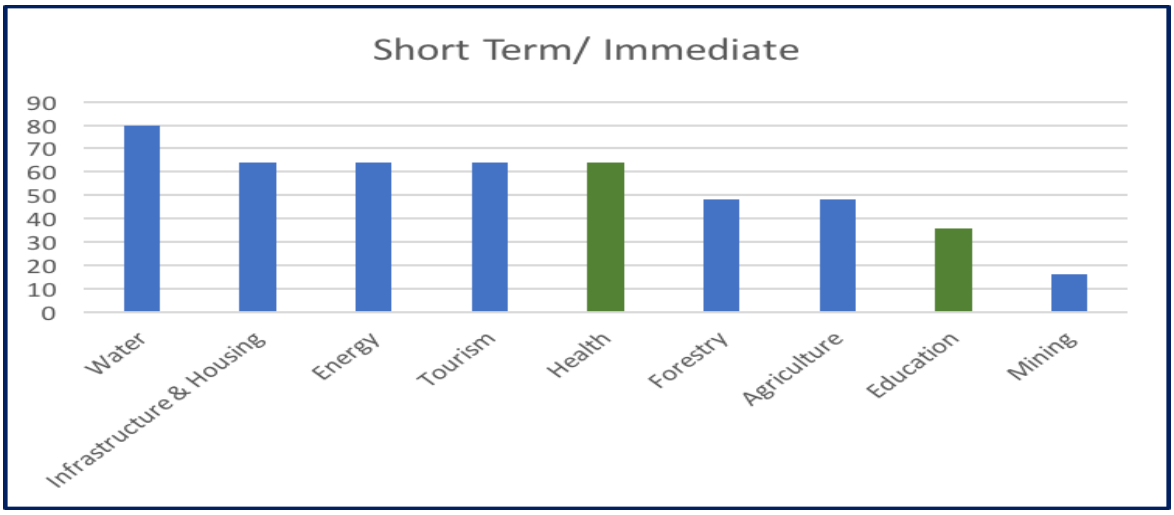


Figure 22: Vulnerability of Sectors to Short Term Onset Impacts (relative % scale)



Water Resources

The Suriname water sector policy is based on the availability of healthy and affordable potable water to ensure a healthy Surinamese population. The view is that healthy potable water is a crucial link in the social economic development of a country.

Impacts and Vulnerability

The SWOT Analysis[13] for the water sector presented the following strengths and weaknesses:

Table 8: SWOT Analysis based on expert stakeholder input at National Workshop

Strengths	Weaknesses
Sufficient resources of ground and surface water	Insufficient legal, regulatory and institutional framework to protect and regulate the sector
Central role of water supply	Legislation and regulations relating to water supply
Opportunities	Threats
Partnerships for financing of projects	Climate change induced drought due to prolonged dry periods
Invest in internal expertise	
Continuation with the implementation of the initiated projects in 2018	
New water sources for the expanding of the water supply network in order to improve the drinking water supply.	Salinisation of water resources

The current and future plans in the water sector include the improvement of the integrated approach to water policy. First steps were taken for the development of an integral water resource management system, in which all parts related to water are better attuned to each other. The necessary preparations will also be made for the establishment of a Water Authority

[13] Developed and presented by sector experts at the 2nd NAP Workshop, Paramaribo, Suriname, December 2017.

Suriname, which will mainly focus on the implementation of an Integral Water Management System and management plan.

The implementation of a project to put in place a water purification system for the village of Nieuw Lombé is currently in process. The proposed Project entitled 'Climate resilient access to drinking water for the Maroon community of Nieuw Lombé ', has as overall objective to strengthen the resilience capacity of sustainable water management. The objectives of the project are to (1) achieve 100% access to clean water; (2) enhance water storage capacity to overcome water shortage in dry and rainy seasons; (3) institutionalise monitoring framework in place to meet its quality standards; and (4) contribute to increase women's social and productive activities by reducing their time in collecting water from a remote area.

An UNDP/ NH project "Strengthening of policy formulation, drafting of legislation and data management for the water sector in Suriname" is in the process of preparation. The overall goal of the project is to strengthen the policy formulation, drafting of legislation, data management and institutional capacity building to work towards integrated water resources management (IWRM).

Vulnerability factors from previous studies (including the SNC, 2013 and NCCPSAP, 2015)

- Water resources in Suriname may experience stress as a result of climate change through the combined effects of reduced annual rainfall, increased evapo-transpiration, and prolonged dry periods.
- Reduced rainfall and the resulting reduced discharge will lead to saltwater intrusion in the rivers, creeks and streams that flow directly into the Atlantic Ocean. A linear projection of this relationship with respect to a one-meter sea-level rise causes a displacement of the saltwater wedge by approximately twenty kilometres upstream
- The tidal effect of the Atlantic Ocean on the water system and the freshwater discharge from upstream. It is certain that under such conditions, water resources of all rivers and significant parts of the wetlands in the coastal zone will decline rapidly.
- Without proper adaptation measures, saltwater intrusion will have a significant impact and even jeopardise the agricultural sector, while other sectors will be strongly affected as well.

Sustainable Forest Management

Impacts and Vulnerability

The current status of Surinamese forests reflects the following distribution: 4-5 million ha is dedicated to sustainable timber harvesting; 2,1 million ha representing 13% of Suriname's land

area is formally designated as protected areas such as Nature Reservation, Muma's, and Nature Park.

The strategic function of the forest to combat climate change has been highlighted as an asset to sustainable development. The forest is the largest visible renewable natural resource in Suriname and could be vulnerable if not used and managed responsibly. Sustainable use includes responsible logging, collection of forest byproducts, sustainable fisheries management and eco-tourism. The forest stores CO2, which functions as a mitigation mechanism against climate change. The forest also functions as a natural buffer, such as along waterways, slopes that are vulnerable to erosion, and mangrove forests for coastal protection, among others. For forest-dependent communities, the forest ensures food security and functions as their supermarket. Lastly, it also regulates water management for agriculture purposes and energy provision.

Climate change could have the following impacts on the forest: loss of biodiversity and forest degradation; flooding of both the interior and coastal areas; rising sea level (Suriname is among the ten most vulnerable countries when it comes to rising sea level); waterways will no longer be navigable; change in composition of biodiversity; outbreak of diseases; and increased chance of wild fires (forest fires).

There is a misconception in Suriname, where most people think that logging causes deforestation; but that statement is false, because sustainable logging specifically does not cause deforestation[14]. Clear guidelines for sustainable forest management/timber exploitation should be adhered to, whereby the principle of selective logging is used to prevent clear-cutting and to create opportunity for natural regeneration. Also, proper supervision should be in place to ensure that activities are following the Forest Management Act.

The high increase of wood harvesting and export of logs may pose a risk to the sustainability of forest production. Unlimited export of unprocessed round logs is likely to increase the demand for logs, which can lead to forest degradation. Log production and export from Community Forest Areas needs to be monitored more closely.

The measures and actions to be taken to ensure sustainable forest management (sustainable development) and thus sustainable use of the forest include: sustainable logging, collection of forest by-products, selective logging, protection of vulnerable areas during operation, setting up buffer zones and unutilized areas, minimal deforestation when towing roads, protection of

[14] Opinion stated by Ministry of Forestry representatives at the 2nd NAP Workshop, Paramaribo, Suriname, December 2017.

forests through establishment and maintenance of nature reserves; setting up a National Forest Monitoring System, and capturing a forest reference emission level.

The Foundation for Forest Management and Production Control (SBB) currently implements the following projects:

1. REDD+ Readiness Phase 1: a US$3.8 project, coordinated by NIMOS and funded by the Forest Carbon Partnership Facility (FCPF / WB) for the period of 2013 to 2018. This project aims to develop a national REDD + Strategy (NS) for sustainable use and protection of Suriname's forests, to retain 93% forest cover nationally, and to develop a National Forest Policy in alignment with the Development Plan 2017-2021.

2. National Mangrove Strategic Policy Document 2017-2018: Developing a National Mangrove Strategic Policy Plan under the Global Climate Change Alliance (GCCA +) project. This project aims at formulating an effective strategy for sustainable management of the mangrove ecosystem that includes various actions for the sustainable use of services and goods, conservation and rehabilitation. The project is meant to support Suriname's strategic planning for integrated coastal management, by providing the necessary insights on how the country can use new coastal conservation techniques and can adapt new and existing legislation and regulations to protect the entire mangrove ecosystem in Suriname. In addition, it will focus on strengthening capacity and activities for adequate management and monitoring of the mangrove ecosystem in Suriname.

3. Project "Setting up a Mangrove Biodiversity Monitoring System", is a GCCA + Suriname Adaptation project, which started in January 2018 for a duration of 1 year with a budget of USD 205,000. This project is being undertaken by SBB and UNDP Suriname and is a combination of mitigation and adaptation strategies aimed at setting up a National Forest Monitoring System (NFMS). Through this project, up-to-date and reliable information will be collected in a structural, scientific way pertaining to the size of the mangrove ecosystem, the change of this area, and the fragmentation of the ecosystem. This information is crucial for monitoring and protecting biodiversity as well as for using natural resources sustainably.

Agriculture, Livestock and Fisheries

The national objective is to "ensure food security and food safety related to agricultural products for the Surinamese society, and promote and facilitate sustainable development of the agricultural sector" (NCCPSAP, 2016).

Impacts and Vulnerability

The agriculture sector in Suriname provides national food security and is therefore an important pillar of the economy[15]. The vulnerability of Suriname to climate change is due to its geographical position. The agriculture sector will be highly impacted by climate change, as it is mainly concentrated in the low-lying coastal zones and is therefore vulnerable to a number of climate change impacts, such as sea level rise and more frequent and extreme weather events. Sea level rise causes breaks in the sea defense infrastructure (dykes) along the coast and salt intrusion, while the whirlwinds cause damage to crops such as rice and banana. Extreme rainfall provokes erosion and leaching, the growth of weeds, productivity decline of traditional crops and cropping systems, and a regular pattern of flooding not only in the hinterland but also in the coastal plain.

Agriculture in the coastal plains is threated by a combination of sea level rise, dilapidating coastal protection structures (dykes and sluices) as well as neglected management practices. All of the above will lead to increased salination of water and soils and need to be addressed urgently. In the hinterland interior, the Inter-American Institute for Cooperation on Agriculture (IICA) has noted shifting from the predominant slash and burn type of agriculture to more permanent production systems including emphasis on sustainable irrigation and rainwater harvesting; plant propagation and nursery set ups for resistant crop varieties to be able to adapt to changing environmental conditions (IICA, 2016 Annual Report).

Drought causes water scarcity for livestock and crops as well as loss of pasture. Rising temperatures have a severe impact on most crops (e.g. rice)[16]. As a result, Suriname's agricultural sector is experiencing slow overall growth and development of traditional crops, reduction of grain production, heat stress in poultry and cattle, degraded water quality for fish farming, and higher occurrence of pests, diseases and weeds. There is a decrease in fishing activities due to the lush growth of the sea algae "Sargassum," which is caused by rising ocean temperatures[17].

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[15] "The share of the agricultural sector in the Gross Domestic Product (GDP) at factor cost was approximately 7 percent in 2013, compared with 11.0 percent in 2000. Available data shows increasing trends in the agricultural crops and meat production and a slight decrease in the catch of fish and shrimp from 2005 - 2009." Food and Nutrition Security Policy: The Way Forward. Government of Suriname, 2015.

[16] R. Wassmann, S.V.K. Jagadish, S. Heuer, A. Ismail, E. Redona, R. Serraj, R.K. Singh, G. Howell, H. Pathak, K. Sumfleth (2009). Chapter 2 Climate Change Affecting Rice Production: The Physiological and Agronomic Basis for Possible Adaptation Strategies, Donald L. Sparks, Advances in Agronomy.

[17] "Sea grass threatens fishing along Suriname coast." Staebrok News Guyana. May 27, 2014

The Ministry has taken some adaptive measures against climate change including: promoting good agriculture practices or climate smart agriculture for resilience, researching and promoting protective agriculture structures for horticulture, promoting integrated pest and crop management, performing research on water and soil management, researching drought resilience in crops and breeds, training, technical support and adaptive actions for fisheries and animal husbandry (Samoender, 2017).[18]

The Inter-American Development Bank (IDB) has approved loans for strengthening innovations in the agriculture sector to fund projects relating to adaptation. FAO is undertaking a technical cooperation project with the following objectives: to scale up proven good practices and technologies for disaster risk reduction, to promote climate change adaption and natural resource management, and to support policy-making for sustainable agriculture in Suriname. One of the most important outputs of the project will be the development of an Agriculture Disaster Risk Management (ADRM) Plan for Suriname and the establishment of an institutional mechanism to implement it. There is also a project with IICA with the objectives to build capacity of farmers in the use and management of protected agricultural structures, rainwater harvesting, and irrigation systems for sustainable commercial vegetable production.

Some of the adaptive actions that are being undertaken for the fisheries sector are promoting aquaculture by setting up an agricultural technology center with the cooperation of China and by establishing research stations for fresh and brackish water. The adaptive actions being undertaken for animal husbandry are: pasture and breeding management, adjusting housing facilities, increasing awareness on general and nutrition management, and promoting animal diversity.

Climate change can exacerbate the potential for natural disasters related to coastal flooding and increased storm surges in Suriname. It can also affect disease and pest prevalence in crops and livestock, as well as growing conditions for fruits and vegetables. In the last several decades, coastal and river flooding has increased in scale and frequency and many tornadoes have occurred.13 Increased coastal flooding has already damaged agricultural production in some areas and there is saltwater intrusion into agricultural lands in the Nickerie region. ADRON rice breeding has reported that there has been a significant increase in the number of rice pests over the last few years and that increases in temperatures have caused problems with rice seed production (no seed formation) in some varieties. Climate change is definitely a consideration in the ADRON rice breeding program with the goals of not only increasing productivity but also

[18] Based on presentation made by Iwan Samoender of the Ministry of Agriculture, Animal Husbandry and Fisheries at the 2nd National Adaptation Plan Workshop, Dec. 2017).

resistance to pests and resilience to climate change factors. Suriname contributes little to greenhouse gas generation but does have potential for low carbon emission development. Suriname's agricultural activities contribute an estimated 12% to national greenhouse gas emissions, but Suriname's Forests act as a sink, sequestering greenhouse gases. These numbers could change if there is significant deforestation, or agriculture becomes more unsustainable. Vulnerabilities previously identified are summarized in Table 14 below.

Vulnerability factors from previous studies (including the SNC, 2013 NCCPSAP, 2016)

- Rice subsector would be significantly threatened by seawater intrusion, strong and unpredictable variations in rainfall patterns or the combined effects of these two. Rice production may also be hampered by frequent occurrences of crop diseases and pest infestations in the coming years. Inland flooding and sea-level rise, may become more evident and seriously hamper food security.
- Bananas subsector will also experience stress, since it is located on the young coastal plain.
- Vegetable Crops can only be effective if accompanied by large-scale Investments. Using existing farming systems, farmers who produce in areas susceptible to flooding and salinization may no longer be able to produce their crops and have to move to other, lower-risk areas or to adapt their livelihoods to the changed conditions. Under such circumstances, the number of farmers involved in vegetable production could decline, making produce more expensive.
- Livestock subsector is under pressure due to several factors: agronomical constraints (rainfall, soil fertility and texture, temperature) and scarcity of good breeding stocks. Without strong support for adaptation to new production conditions, stagnation or decline in livestock production will remain of great concern.
- Fisheries/Aquaculture subsector is in decline, a situation expected to worsen in the near future due to climate-related processes.
- Trends in mean sea surface temperature (SST) and SST anomalies for the Caribbean Large Marine Ecosystem (CLME) show a steady warming trend since 1982. Rising sea water temperatures may have a large impact on the distribution of maximum catch potential (a proxy for potential fisheries productivity) of pelagic and demersal species by 2055. Such a redistribution of catch potential is driven by projected shifts in species' distribution ranges and by the change in total primary production within the species' exploited ranges. The catch potential in the CLME decreases considerably under a high range scenario[19]

Energy

The Energy Policy in Suriname is based on three (3) pillars, namely energy access for all; to promote energy efficiency; and to promote the use of renewable energy (RE). Sustainable energy is of imminent importance for the social and economic development of Suriname. The use of solar energy for electricity generation seemed to be more favorable through technological

[19] Caribbean Large Marine Ecosystem Regional Transboundary Diagnostic Analysis, UNDP/GEF CLME Project (2011)

advances and declining prices of equipment. High investment costs for purchase and installation are still a constraint to enable the wide spread use of solar energy. National policy will support this development because of its environmentally sound characteristics.

Impacts and Vulnerability

The expansion of RE projects depends more or less on available financial resources. A SWOT Analysis[20] (see figure below) conducted for the energy sector resulted in the following strengths and weaknesses:

Table 9: SWOT Analysis based on expert stakeholder input at National Workshop

Strenghts	**Weakness**
Approval of Electricity Law and the role and function of the Energy Authority	Limited attention to environmental issues e.g. CO2 emission and Renewable Energy
Central role of electricity supply	Energy inefficient street lighting
Opportunities	**Threats**
Research in sustainable alternative energy sources	Climate Change and New Climate Change protocols
Enforcement of Electricty Law	Demand for change in technical corporate management and production technologies
Public – Private Partnership and Corporate Social Responsibility	

Infrastructure and Housing

For the Infrastructure sector, the national climate change aim is to ensure that all that is designed, built and operated should be done in a climate resilient manner and produce minimal greenhouse gas (GHG) emissions (NCCPSAP, 2016). Infrastructure development increases the

[20] Developed by expert stakeholders during the 2nd NAP Workshop, Paramaribo, Suriname, Dec. 2017.

adaptive capacity of Suriname's population through increased access to markets and social services.

Impacts and Vulnerability

Current population projection will see increases to up to 2.5 million by the end of the century, with most growth in vulnerable areas of Paramaribo and Wanica (approximately 74.4% of the households)[21]. Due to temperature and rainfall increases, and sea level rises, climate change impacts would affect over 40% of Suriname's GDP. The low-lying coastal lands with the highest concentration of population and economic activities are vulnerable to hazards related to Climate Change.

The National Climate Change Action Plan highlights several points. The transport sector was presented as the main source of GHG emissions (10% of total GHG). The current situation is one of urban areas concentrated in the coastal zone, while other dwelling areas are established near rivers, which are already susceptible to flooding due to poor drainage, mangrove deforestation and abundant rainfall. Appropriate spatial planning is needed to address the issues around infrastructure, both for the coastal areas and hinterland. Maintenance and upgrade of the existing drainage system was among the activities listed to mitigate flooding in urban areas. An example of this is the infrastructure and drainage-works currently taking place along the whole length of the Zwartenhovenbrugstraat.

Construction of coastal protection works (dikes) started in Coronie in 2008, at the market in Domburg, Wanica in 2014, and construction of river bank defenses on the right bank of Suriname river and left bank of the Commewijne river in 2008. As part of the Sustainable Land Management initiative sediment trapping units were constructed at Weg naar Zee and Nickerie. Although the impact is not clear, other activities were also implemented such as in the area of energy use in buildings; the EBS had launched an energy efficiency programme that started in 2014. It was noted that no projects had been initiated in the transport sector while in the area of Building and Construction, still no increase in enforcement and adjusted/improved construction methods and building plans had taken place.

Regarding housing, those settlements in coastal areas are exposed to flooding due to sea level rise, while in the interior, flooding occurs due to heavy rains. Heavy rains combined with strong winds, *Sibibusi*, resulted mostly in damaged construction (roofs). Spatial planning was mentioned

[21] Publication Bureau of Statistics Suriname, September 2013

to be an adaptation option although it was also agreed that more emphasis should be put on permit control and enforcement.

Currently an adaptation plan is developed for Paramaribo and included elements such as urban investments for the resilience of Paramaribo, aiming at building adaptive capacity of communities. When implemented it can have substantive impact on the resilience of Paramaribo. Apart from that plan, the Ministry of Public Works, Transport and Communications, and Tourism have taken actions within their mandate (such as waterway maintenance), but such actions remain minimal.

Tourism

Suriname promotes itself as *"the beating heart of the Amazon."* [22]Suriname has been making strong efforts to expand the management of the area of forest that is under its protection despite the increasing encroachments from mining activities. Apart from those challenges on the ground, there are also challenges of an institutional nature in the form of weak regulations and legislative framework necessary to conserve and protect rainforests through sustainable tourism activities. As the tourism authorities of Suriname plan to accelerate growth in the tourism sector and to increase visitors, the impacts of climate change on sustainable tourism practices should not escape their attention.

Impacts and Vulnerability

Current sustainable tourism policies and strategies of the Surinamese Government indicate a potential for the tourism sector to contribute to the gross domestic product. It is evident in this plan, that tourism policy is strongly attached to environmental preservation and protection of local community rights. The prospects for tourism development are positive, not only for large companies, but increasingly for small and medium enterprises and community-based initiatives. The country's tourism policy is clearly focusing on sustainable management of natural and cultural resources and promotes ongoing monitoring and mitigation of negative impacts on the

[22] Remarks first delivered by Riane de haas Bledoeg, deputy programme manager, culture, Caricom secretariat, at the opening ceremony of the Caribbean artists uniting against gender-based violence workshop, 18 July 2011, Paramaribo, Suriname.

resources that the industry relies on. Of particular interest are the sustainable benefits for the community and the human rights of Maroons and indigenous peoples.

The government favors tourism development through private investments, supportive to the following areas: legislative and institutional strengthening of the tourism sector; human resource development and training for necessary staffing; support for the improvement, development and promotion of tourism products; execution of awareness programmes to public and private sector to promote tourism; and integration of sectors and sub-sectors to promote economic growth.

The regional cooperation between countries of the Amazon basin to collaboratively develop a rainforest product is applauded and marks an important step to further integration in the region. The forestry sector in Suriname has also clearly advocated the importance of ecotourism development. Full support is provided for ecotourism and recreational use of the rainforest by granting licenses and promoting adequate infrastructure. Ecotourism is marginally developed at present in Suriname, but has the potential to grow, provided that requirements for competitive supply and international standards are met.

Vulnerability factors from previous studies

- The tourism sector in Suriname is only a small contributor to GDP, yet it is one of a few

sectors that have achieved continuous growth over the past decade. The tourism sector is also an important source of revenue for Maroon and Amerindian communities who host visitors in their villages and sell crafts. However, these groups also have some characteristics that make them vulnerable to climate change, such as their high dependence on raw natural resources for survival and their high vulnerability to the effects of prolonged drought and flooding.

- Any increase in the level of eco-tourism in Suriname will mean more vulnerability to climate change. Projected changes in temperature and precipitation involve corresponding changes to vegetated areas, including displacement and/or loss of habitats and other adverse changes to plant and animal species.
- Forest and bush fires, augmented by reduced moisture levels, will have profound negative impacts on Suriname's biodiversity, rural communities and hence eco-tourism. Flooding and prolonged drought will also negatively affect the hinterland, its inhabitants, and the means of transport necessary to bring tourists in and out of the area.
- A one-meter sea-level rise by the year 2100 will change existing ecosystems, almost surely in negative fashion, primarily in the coastal zone, and result in degradation of nature reserves, wildlife habitats and the overall biodiversity. Tourism activities in the coastal area, which mainly consist of bird, dolphin and turtle watching, will be severely affected.

Mining

The mining sector views 'making Mercury history for the well-being of the environment and future generations' as its main challenge. Combatting climate change is a relatively newer focus and the sector has declared that it will work to introduce environmentally friendly technologies for mining; rehabilitate mining areas and stimulate sustainable land use. The overall objective is to make mining infrastructure and operations climate resilient and produce minimal GHG emissions.

Impacts and Vulnerability

The sector is currently undertaking a Mercury Initial Assessment to enable the GoS to determine the national requirements and establish a sound foundation to undertake future work towards the implementation of the Convention. The project "Improving environmental management in the mining sector of Suriname, with emphasis on Gold mining" aims at improving the management of gold mining and promote uptake of environmentally responsible mining technologies.

Mining in Suriname is guided by the Mining Act (Decree E58) of 8th of May 1986. There are different types of mining such as Surface and Underground mining. In Suriname mining activities are concentrated around bauxite, gold mining (Large, MSGM & ASGM), oil, construction material (sand, gravel, crushed stone, dimension stone, shells) and potentially diamond.

Within the mining sector not many are aware of the effects that climate change has on this sector. Exploitation of shells are a further threat to the already vulnerable Surinamese coast. The exploitation by State Oil Company and other commercial activities such as agriculture can lead to flooding as a result of swamp elevation. Mining operations in the interior includes large-scale gold mining which leads to increased planned deforestation, and small-scale gold mining, which can lead to increased unplanned deforestation and flooding. Mining has a high energy demand, and as such may be regarded as major admitter of greenhouse gasses. Also, as the process progresses the ore deposits are increasingly deeper situated while the ore grades are declining, which resulted in increased demand of water. Noteworthy to highlight is that IAMGOLD Rosebel Goldmines, one of the two large-scale gold mining companies in the country, installed a 5MW solar plant in 2014[23].

[23] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=5&ved=2ahUKEwi-7Pia7ffeAhVKJt8KHekAAVoQFjAEegQIBBAB&url=https%3A%2F%2Fissuu.com%2Fswattdesign%2Fdocs%2Fsbm_rosebel_brochure&usg=AOvVaw18R2x9aFI1SYWYePCEVPnv

Recommendations for combatting climate change impacts in the mining sector include: fostering partnerships with other projects/programmes to implement the comprehensive national research programme; creation of a national platform with participation of all relevant stakeholders; the use of innovative communication tools to inform stakeholders in the hinterland (create an application with relevant up to date information as well as the use of more traditional communication tools (radio, etc.); advising that climate resilience for mining operations should be part of any decent mine plan as well as corporate social responsibility (CSR) towards the local communities; and the provision of institutional strengthening and capacity building for the mining institutions.

However with oil there will be pertinent change via offshore drilling. The State Oil Company is busy with the process of looking at replacement of fossil fuels. In the years ahead it does not seem likely that fossil fuel will be replaced, especially if there is no legislative regulation. Lastly, rehabilitation is very important if Suriname wants to keep the commitment of 93% forestation that was made at COP 23 in Bonn, Germany.

FOUNDATION SECTORS

There are two foundation sectors upon which the productive sectors and the cross-collaborative sectors depend. These are the education and health sectors. Long term resilience cannot be confidently built without first paying substantial attention to these two sectors. In this pathway, therefore, in the immediate near term, there should be strong emphasis on building resilience in the education and health sectors. Over time through the medium and long term, while resiliency must be maintained in these sectors, the foundation would have been sufficiently strengthened so as to shift focus from building up resilience to maintaining it.

Education

The Ministry of Education is responsible for education in Suriname. The central aim has historically been to entrench an 11-year basic education system, which consists of an integration of pre-primary, primary and junior secondary school. Higher education is mainly offered by the country's national university, Anton de Kom University, and has been organized into 3-year

bachelor's and 2-year master's programmes since 2004. Education in Suriname is provided by both state-run and private schools.

Anton de Kom University has five faculties[24] and various research institutes, described in more detail below. Suriname has various higher professional education institutes and an institute offering higher professional bachelor programmes, (higher professional) master and postgraduate programmes (FHR Institute for Social Studies). The M.Sc. in Sustainable Development which started six years ago is highly regarded and a main conduit for training new personnel to be absorbed in various climate change related roles across the public sector as well as for preparation for higher level research and roles in the private sector.

The University has several faculties that are directly and indirectly involved in research and training that supports advancements in climate change adaptation. These include the Medical Sciences offering MD degrees and allied health related Bachelors; the Social Sciences with bachelors, masters and doctoral programmes including the Masters in education for sustainable development which was introduced in 2010. Within the Institute of Graduate Studies and Research (IGSR), founded in 2006 master's programmes are offered in development and policy, international relations (in collaboration with the University of the West Indies), macro-economic analysis and policy and public health. Several recent theses have focused on climate related governance issues in Suriname.

College of Technology and Science is perhaps the epicenter for climate relevant research in Suriname, especially in the physical and chemical sciences and engineering disciplines. In 2013, the renewed bachelor's programme infrastructure was launched. The nominal duration is 3 years and the admission requirement is the VWO diploma. The following specializations are offered: Agricultural Production (Agriculture, Forestry, Animal Husbandry, Fishery and Aquaculture, Soil Science and Horticulture), Mineral Production (Geology and Mining), Electrical Engineering (Energy and Computer Technology), Infrastructure (Architecture, Civil Engineering and Land/Water Management), Mechanical Engineering and Environmental Science (Environmental Management and Environmental Technology).

The Environmental Sciences Department can be expanded and supported in its efforts to train students in the environmental sciences, technologies and skills required for national adaptation initiatives in the future. It is especially important for the Department to make progress in deepening research about aspects of the Surinamese context as it relates to climate change. There is already much research that can be utilized, if available and accessible. This includes

[24] At time of report, the Faculty of Law was in the process of being re-established.

research thesis work that is digitalized and held in the AdeKUS Library. Masters and doctoral programmes in Environmental Science are initiated in collaboration with the University of Florida with specializations in Environmental Forensics, Environmental Health and Environmental Bioactive molecules.

The FHR Institute for Social Studies consists of the following schools: FHR School of Business, FHR School of Management, FHR School of Law and the School of Governance. The institute has cooperation with among others the Maastricht School of Management, the Erasmus University Rotterdam/ International Institute of Social Studies and the University of the West Indies. In 2014, the Nationaal Orgaan Voor Accreditatie (NOVA), the national accreditation organization in Suriname) accredited 2 of FHR master's programmes: the master's in international and Comparative Law Program and the Master of Public Administration in Governance Program.

Higher education includes all training at the post-secondary level which requires at minimum a diploma at senior high school level or its equivalent for admission. AdeKUS, the Institute for training of Advanced teachers (IOL), the LOBO, the Polytechnic College and the AHKCO are institutions governed by ME. The Central Training for nurses and those in related professions (COVAB) and youth dental care are governed by the Ministry of Health. The relationship with ME and the degree of autonomy awarded to each institution are all different. Semi-government AdeKUS has a large degree of autonomy. IOL is governed by the Directorate of Education and falls under the statutory regulations for schools. This is subsumed under the Directorate for AHKCO culture, while PTC was established as a public foundation.

In addition to the national education infrastructure, other institutions such as CELOS (the Foundation, Center for Agricultural Research) make contributions via training, knowledge transfer and certifications in areas including: research on sustainable agricultural production, forestry systems and biodiversity and other services rendered to these sectors by the laboratories (chemistry, microbiology, phytopathology, wood technology, plant tissue culture, GIS and remote sensing).

Health

"Dringi dresi wakti siki"; (take precautions to fight against diseases)

Traditional Surinamese saying

The health sector's strategic agenda consists of 1) health programs; 2) health systems and 3) determinants of health. Looking towards future needs of the population, there is a need to shift towards a diagonal approach to health programs aiming for disease-specific results through improved health systems. Focus on preventing or treating individual diseases or working with specific populations can lead to substantial successes with specific conditions. Nevertheless, more can be achieved through comprehensive, coordinated care to address multiple health issues and risk factors, grounded in practices based on inclusion and evidence. This diagonal approach helps to continue the specialization required for some conditions, while strengthening the integration that is beneficial for others. With this approach, desired health outcomes and specific burdens of disease are the basis for identifying services and emphasizing integration into a strengthened primary health care system.

There is a need to reorient the health system to ensure maximum responsiveness and efficiency and to prepare for and mitigate future threats. At present, the health system is facing many crucial challenges, while also being presented with numerous opportunities. Crucial challenges, including rising expectations, increased demands, and inequalities in access, coverage and expenditure, can be mitigated. The mutual demand for change from all stakeholders provides the opportunity for the health sector to reaffirm its commitment to the values of equity, solidarity, and social justice. Changes to reorient the health sector require a horizontal and systematic approach to primary care: dealing with health inequalities by moving towards universal coverage; putting people at the center of service delivery; integrating health into public policies across sectors; and providing inclusive leadership for health governance. The reorientation of the sector will also focus on aligning the building blocks of health systems: the health workforce; the health information system; the systems to provide access to medical products, vaccines, and technologies; the financing system; and leadership and governance.

The important interface between health, well-being, economic development, and social determinants is becoming more prominent in Suriname because existing inequalities have a significant impact on development. Reducing these inequalities increases the capacity for learning, strengthens families and communities, supports sustainable habitats and environments, and contributes to security, poverty reduction, and social inclusion. In turn, quality of life improves and workforce productivity increases, thereby facilitating broader developments. The implications of social determinants extend well beyond the realm of health. However, the health sector is a well-positioned leader and catalyst that can provide a sense of direction required for sustained commitment from other sectors to address these concerns, thus establishing meaningful multi-sectorial partnerships. These partnerships must focus on engaging all stakeholders to commit and implement practical, cross-sector initiatives to address social determinants. Table 17 summarizes key vulnerabilities already identified.

Vulnerability factors from previous studies (including the SNC, 2013 NCCPSAP, 2016)

- Human health in Suriname is vulnerable to the effects of climate change, such as increased temperature, alternating rainfalls leading to excessive stagnant water, floods, droughts, and rising seawater levels that cause flooding and intrusion of saltwater further inland.
- These effects, occurring either separately or in combinations, have impacts on:

- population concentrations located in the low coastal area;
- population concentrations located in isolated and remote areas in the hinterlands;
- low-income members of the population, many of whom lack insurance; and
- members of the population who are in poor health, infants, and the elderly.

- Rising temperatures will affect health in various ways, including:

- an increase in numbers of existing microorganisms including pathogens, disease vectors and diseases that will potentially thrive and cause a significant threat;
- development of new pathogens as a result of conditions more hospitable to mutant species, which could significantly challenge the country's disease-control ability; and
- an increase in mortalities due to high temperatures, particularly during heat waves, especially among the elderly and those with specific cardiovascular, cerebrovascular and respiratory diseases.

- Changes in precipitation may have the following impacts on Human Health:

- increases in cases of vector-borne diseases, such as malaria in the interior and dengue in the coastal area;
- increases in cases of upper (nasal area and throat) and lower (respiratory tract and lungs) respiratory illnesses; and
- increases in incidents of diarrhoea and in the likelihood of cholera outbreaks.

Although global warming may bring some localized benefits, the overall health effects are likely to be negative. Climate change affects social and environmental determinants of health – clean air, safe drinking water, sufficient food and secure shelter. Extreme high air temperatures contribute directly to deaths from cardiovascular and respiratory disease, particularly among elderly people. Pollen and other aeroallergen levels are also higher in extreme heat. These can trigger asthma and similar conditions.

Increasingly variable rainfall patterns are likely to affect the supply of fresh water. A lack of safe water can compromise hygiene and increase the risk of diarrheal disease. Floods are also increasing in frequency and intensity. Floods contaminate freshwater supplies, heighten the risk of water-borne diseases, and create breeding grounds for disease-carrying insects such as

mosquitoes. They also cause drownings and physical injuries, damage homes and disrupt the supply of medical and health services.

Climatic conditions strongly affect water-borne diseases and diseases transmitted through insects. Changes in climate are likely to lengthen the transmission seasons of important vector-borne diseases and to alter their geographic range. The *Aedes* mosquito vector of dengue is also highly sensitive to climate conditions, and studies suggest that climate change is likely to continue to increase exposure to dengue. Areas with weak health infrastructure – mostly in developing countries – will be the least able to cope without assistance to prepare and respond.

CROSS-CUTTING/ COORDINATION SECTORS

These are sectors that overarch the functioning of the productive sectors and while they each have separate risk and vulnerability profiles in and of themselves, they can also be leveraged to affect multiple productive sectors at the same time, cumulatively, in parallel and even additively. The sectors clustered here are: environment, disaster risk reduction and spatial planning.

For each 'cross-cutting' sector below**,** there is also an analysis of the feasibility of the respective sector being collaborative with the 'productive sectors' on issues of climate change adaptation. The more closely collaborative the cross-cutting sector is with a productive sector, the greater the likelihood of successful implementation of adaptation activities. Where the analysis suggests a more distant collaborative relationship between the cross-cutting sector and a productive sector, that is where more attention is needed in order to increase adaptation activities. See figures 19, 20 and 21.

Environment

The environment is cross-sectorial, and therefore climate change adaption is also cross-sectorial, earmarking that adaptation is linked to various sectors. The environment therefore has a more coordinating and facilitating role when it comes to adaptation actions (depicted in Fig. 11). Key sector elements of this coordinating role:

- National Focal Point to UNFCCC
- Reporting to UNFCCC (1st and 2nd National Communications)

- Responsible for overall environment policy in Suriname
- Signing of Paris Agreement (April 2016)
- Process of ratification and (re) formulation of NDC

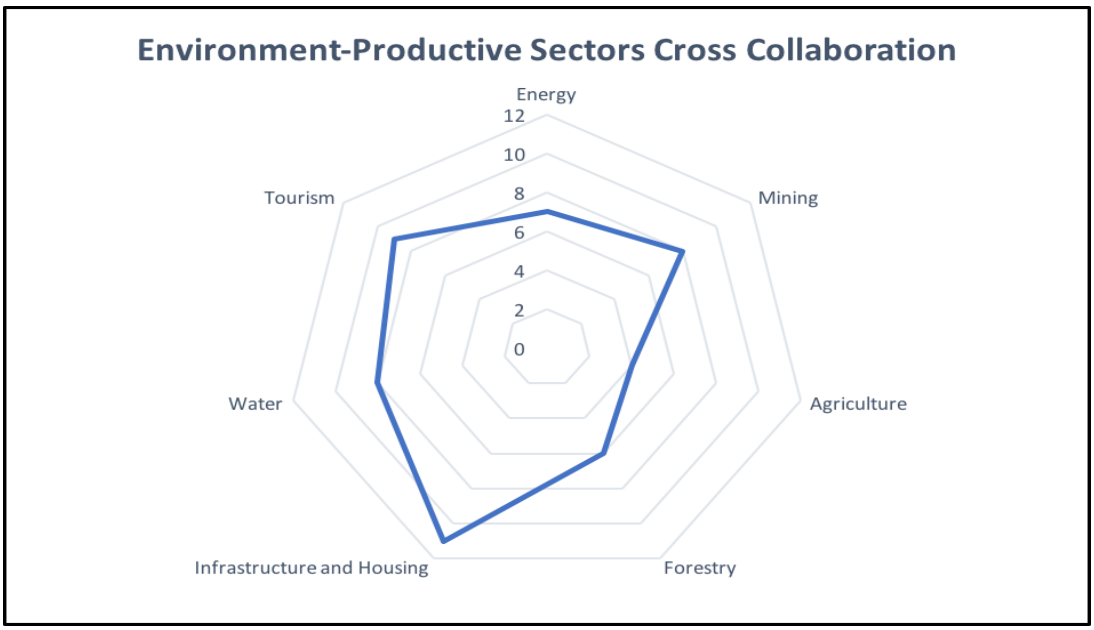
It should be noted that Suriname has no comprehensive and overarching law for environmental protection and management and the institutional framework for environmental management is not well defined. The Constitution of 1987 lists as one of its objectives, "The creation and promotion of conditions, necessary for the protection of nature and for conservation of the natural environment". Also, there are various laws and policies related to social and environmental issues and various institutions involved in carrying them out. Suriname is a party to numerous international conventions related to the environment, which drive many of its environmental policy efforts.

The National Institute for Environment and Development in Suriname (NIMOS) was created in 1998 to support the National Council for the Environment (NMR) in implementation and research and to create a national framework for environmental policy and management. NIMOS's current activities include review of environmental and social impact assessments of proposed projects, environmental monitoring and enforcement of environmental mitigation plans, and education and outreach. NIMOS is also involved in grant-funded projects related to the environment.

In 2013, the Environment Directorate was removed and a National Environmental Policy Office was created in the Cabinet of the President of the Republic. The Policy Office started operating in late 2015. The Office is responsible for formulating and coordinating environmental policy and environmental legislation and serves as the environmental focal point, representing the country internationally. NIMOS and the National Environmental Policy Office co-ordinate on a more ad hoc basis rather than using a solidified framework.

Suriname is also party to the Kyoto Protocol of the UNFCCC. The country's 2012-2016 National Development Plan, the 2013 Second National Communication to the UNFCCC and the 2012-2016 Environmental Policy Plan all recognized the significance of climate change impacts on Suriname, with special emphasis on developing opportunities for lowering carbon emissions. The most recent Suriname National Climate Change Policy, Strategy and Action Plan (NCCPSAP) extends over the period 2014-2021. In April of 2016, Suriname signed the COP 21 climate agreement negotiated in Paris, pledging to reduce its GHG emissions by 0.01 percent.

Figure 23: Feasibility of Environment Sector Cross Collaborating on Climate Change Adaptation with Productive Sectors



The Figure above summarizes analysis showing that environment sector collaboration on climate change actions is currently most feasible with the Agriculture sector but least feasible with the infrastructure and Housing sectors.

Disaster Risk Reduction

The international context for disaster risk reduction (DRR) in Suriname is defined by global DRR strategies such as the Hyogo Framework for Action (HFA) 2005–2015: Building the Resilience of Nations and Communities to Disasters. It is also defined by a growing awareness that the current global development path leads dangerously towards pushing the boundaries of resilience of our planet, with corresponding impacts on Suriname. Suriname is party to major environmental conventions, among them the UNFCCC and the UN Convention on Biological Diversity (CBD). Suriname has acceded to the Minamata Convention, a global treaty to protect human health and the environment from the adverse effects of mercury (opened for signature on 10 October 2013) [25].

The Constitution of Suriname has no specific provisions for disasters, but it mandates the President to declare a state of emergency to maintain external and domestic security in case of danger or threat in any part of Suriname, subject to previous consent of the National Assembly

[25] There continues to be successful efforts including the 2018 signing of the Minamata Convention by the Government of Suriname.

(Art. 102 paragraph 3). The Act on Regional Bodies gives the District Commissioner (DC) a specific mandate to demand the use of buildings and vehicles, and demand the assistance of capable residents, in case of disasters and calamities in the district; this mandate is enforced by the police if needed (Art. 49 paragraphs 1 and 2). The DC is in charge of the police and the fire department in his/her district and has extensive local regulatory and administrative powers.

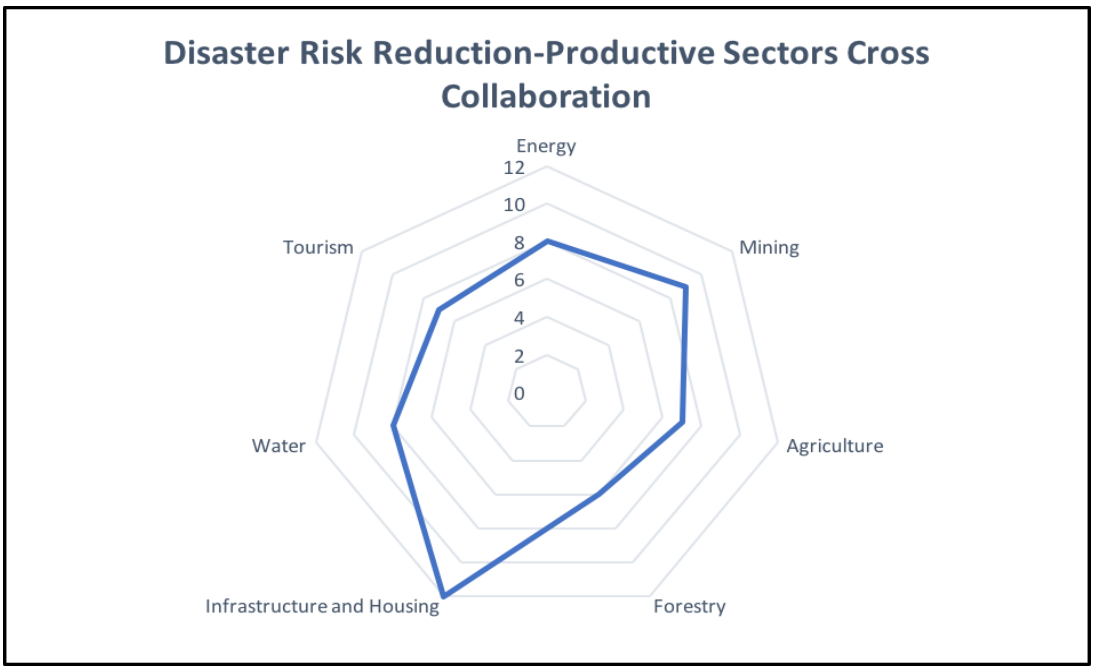
Since 2014, the National Coordination Centre for Emergency (NCCR) has been institutionally moved from the Ministry of Defense to the Cabinet of the President. The draft Disaster Management Legislation and the law providing NCCR a legal base have not yet been approved. Other main legislative gaps identified in the context of DRR are the absence of national environmental legislation (the existing draft of such legislation has yet to be discussed and approved) and the delay in operationalization of the Planning Act.

Cohesion between different disaster-related plans (which are often responding to different international commitments) should be improved. As climate change has a clear impact on biodiversity, the National Biodiversity Action Plan (NBAP) 2012-2016 should be better linked to the National Climate Change Action Plan (NCCAP), which has a focus on adaptation and mitigation. Furthermore, a National Road Safety Plan and a National Health Disaster Plan have been developed but it is not clear how operational they are currently.

NCCR works most closely with five selected Ministries who each have a designated Disaster Coordinator. NCCR has adapted the Incident Command System (ICS) as the strategy that best suits the current reality: based on the size of Suriname and the huge variety in population density, NCCR strives to enable the population at district and community levels to be first responders. In the envisioned structure, the District Commissioner is the Head of the Disaster Committee in the district and central in the response network.

According to NCCR, the Bureau for National Security (BNV) should focus on making broad policy and produce an overall National Strategic Safety Plan, while NCCR concentrates on preparedness, concept legislation, response coordination and early recovery. Producing the National Disaster Response Plan would be a part of this.

Figure 24: Feasibility of Disaster Risk Reduction Sector Cross Collaborating on Climate Change Adaptation with Productive Sectors



The Figure above summarizes analysis that notes the currently stronger feasibility of the disaster risk reduction sector working with Tourism and Agriculture sectors on climate actions compared to the least feasibility with the Infrastructure and housing sectors. This means that much more effort is needed to mainstream disaster risk reduction into the Infrastructure and Housing national portfolios.

Spatial Planning

Economic development created a proliferation of competing demands on Suriname's rich natural resources. Land use planning in Suriname is characterized by the issuance of overlapping mining and forestry concessions; double issuance of domain land; lack of structure, planning and zoning plans; and even land degradation in protected areas. The Government expresses the need for spatial planning of its territory in the Development Plan 2012-2016. The Government intends to prioritize the development of updated legislation for spatial planning.

The government acknowledges that spatial planning is needed to ensure responsible use of the land. It is a priority of the government to develop updated legislation for spatial planning, which will provide the government the authority and the obligation to direct said planning. The government will implement spatial policy through zoning plans, which will be the policy vision of the government for future spatial development for specific areas. Both the Government as well

as citizens will have to obey to these plans. Planning of land and natural resources will be concretized within zoning and structural plans, while regional and zoning plans will consider physical development opportunities and social, cultural and economic circumstances of the area in question. The Land Registration and Land Information System (GLIS) project is an important foundation for sound spatial planning, especially in terms of the uniformity and the accuracy of geographic information. The digital land information will be used as the basis for developing regional, structure and zoning plans as well as in monitoring of projects.

Current legislation related to spatial planning is scattered across various laws and regulations administered by different ministries and government agencies. Planning legislation dates back to the colonial period, while legislation relating to the use and management of land and natural resources was adopted after independence. The Planning Act and the Urban Planning Act set out a strategic framework for zoning and land use planning. The legislative regime for land management consists of mainly fragmented pieces of legislation regulating the issuance of land and use of natural resources. Some legislation has its own land use planning scheme:

– The Forest Management Act designates different types of forest, which should be in conformity with national and regional plans;
– The Mining Act provides for designating areas for small scale mining;
– The Hindrance Act provides for designating streets, neighborhoods, towns and cities where certain facilities are not allowed to be established;
– The Nature Conservation Act provides for establishing nature reserves.

Some of the challenges faced by the spatial planning sector will weaken the country's climate change response, especially since this sector will play a coordinating role. Some of the key risks and vulnerabilities of the sector include: different pieces of legislation provide different government bodies with responsibilities for planning; the Ministry of RGB's responsibility for spatial planning was given by a State Order, which is lower in hierarchy than an Act of Parliament; there is a lack of a structured coordination between relevant government agencies in the land allocation process; the permitting process for exploitation of natural resources also lacks coordination between permitting agencies (GMD, SBB, DC), resulting in overlapping concessions; planning institutions are not established, hampering the implementation of planning legislation; there is confusion about and overlap of responsibilities related to spatial planning due to the fact that different ministries and organizations have departments responsible for spatial land use allocation.

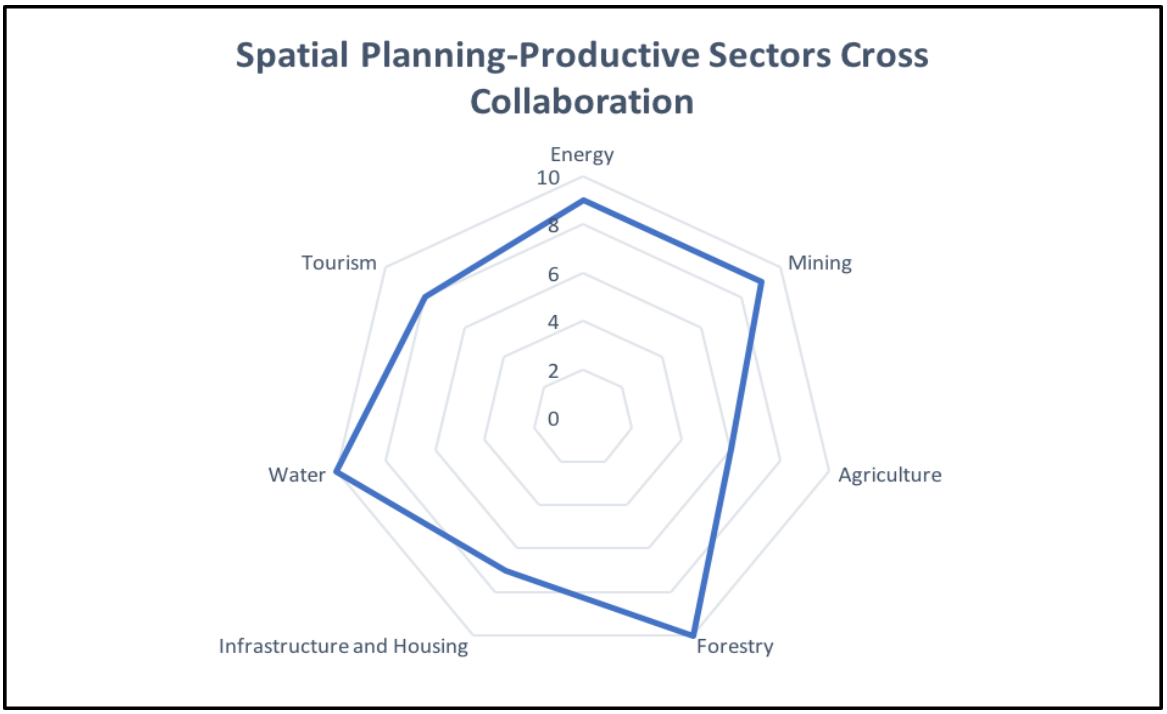
There is growing evidence to suggest that spatial planning geared towards moving infrastructure systematically to higher grounds is needed, in light of the impacts of climate change. This is

especially the case for critical health and disaster response infrastructure. To date however, this kind of approach to planning has not been adopted.

Vulnerability factors from previous studies (including the SNC, 2013 NCCPSAP, 2016)

- The largest portion of productive land is found in the fertile young coastal zone.
- A number of factors jeopardize the country's ability to retain this classification, however. One is the lack of land-use planning. Necessary legislation on the issue has indeed been discussed, but it has never been implemented.
- This deficiency is certain to exacerbate the negative effects of climate change in terms of changing rainfall patterns and sea-level rise, especially in the coastal area.

Figure 25: Feasibility of Spatial Planning Sector Cross Collaborating on Climate Change Adaptation with Productive Sectors



This Figure summarizes analysis that notes that all the productive sectors are largely distant in terms with working with the Spatial Planning sector on climate change issues.

ANNEX 4: PHASE 2 SECTORS AND M&E FRAMEWORKS