Caribbean Community
Climate Change Centre

REPUBLIEK SURINAME

Final National Climate Change Policy, Strategy and Action Plan for Suriname

2014-2021

Ministry of Labour, Technological Development and Environment

MINISTERIE VAN ARBEID
TECHNOLOGISCHE ONTWIKKELING
EN MILIEU

Caribbean Community Climate Change Centre

GCCA Intra-ACP Programme

An initiative of the ACP Group of States funded by the European Union

Final National Climate Change Policy, Strategy and Action Plan for Suriname

January 2015

Published by Caribbean Community Climate Change Centre, Belmopan, Belize

Digital Edition (June 2015)
Printed Edition (June 2015)

Caribbean Community Climate Change Centre, Ring Road, P.O. Box 563, Belmopan, Belize

Visit our website at http://www.caribbeanclimate.bz

ISBN-13 978-976-8253-41-5 (paperback)
ISBN-13 978-976-8253-42-2 (pdf)

Foreword

Minister of Labour, Technological Development and Environment, Michael Miskin

The Directorate for Environment of the Ministry of Labour, Technological Development and Environment has the task to coordinate Suriname's Environmental Policy. The National Climate Change Policy, Strategy and Action Plan (NCCPSAP), is an important step by the Government towards delivering climate change compatible development in our country. This document reflects on key elements of our efforts to adapt to and mitigate the adverse effects of climate change. For reference the Climate Action Plan 2008-2013, Second National Communication, Netherlands Climate Assistance Programme Phase I & II are the baseline documents.

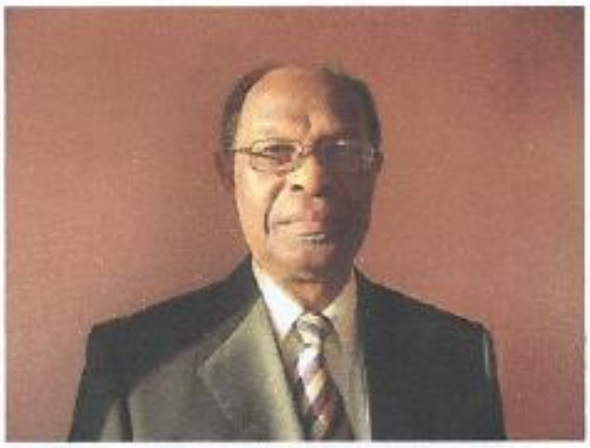
The Government of Suriname is committed to use the information, strategies and options supplied herein for the implementation of its Environmental Policy.

I wish to acknowledge and thank all those who have participated in the preparation of this document. I call upon the nation, private and public sectors to work in close partnership towards a climate compatible development of the country.

Zijne Excellentie Michael Miskin

Minister van Arbeid, Technologische Ontwikkeling en Milieu

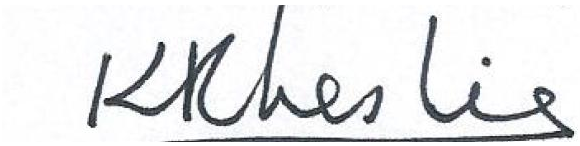
Executive Director, Caribbean Community Climate Change Centre, Kenrick Leslie, PhD, CBE



This National Climate Change Policy Strategy and Action Plan represents a collaborative effort between the Government of Suriname and the Caribbean Community Climate Change Centre (5Cs) to provide the policy and decision makers in the country with vital information for the consideration and adoption by the National Parliament of Suriname. This is timely since it is generally accepted that Climate Change poses a serious threat to their economic and social development. Bearing in mind that the 5Cs was established by the Caribbean Community with a mandate to coordinate the region's response to Climate Change and assist national governments to adequately prepare their adaptation and mitigation policies and measures in response to Climate Change and climate variability, and Suriname being a Member of the CARICOM it was a normal course of action for the 5Cs to play an instrumental role in the development of the National Climate Change Policy Strategy and Action Plan. It was instrumental in acquiring the services of the consulting firm Acclimatise of the United Kingdom to assist in the development and successful completion of the report. This was accomplished with support from the European Union through the African, Caribbean and Pacific framework of the Global Climate Change Alliance (GCCA) programme. For this reason our sincere appreciation goes to the European Union for their support.

Suriname's recent initiatives toward its planning and development for Climate Change include the 2012-2016 National Development Plan, the 2013 Second National Communication to the United Nations Framework Convention on Climate Change and 2012-2016 Environmental Policy Plan which recognises the significance of Climate Change impacts on Suriname and the opportunities for low carbon emission development. This National Climate Change Policy, Strategy and Action Plan (NCCPSAP) seeks to build resilience to the impacts of a changing climate, seize opportunities for climate compatible development, and attract climate finance.

The National Climate Change Policy Strategy and Action Plan for Suriname is integrally linked to the Regional Strategic Framework and Implementation Plan. The NCCPSAP is intended to be a key policy of the Environmental Policy Plan which will provide the legal basis for integrating Climate Change into the national development planning and resource allocation mechanisms of the country of Suriname, a first for CARICOM countries.



Kenrick Leslie, PhD, CBE
Executive Director
Caribbean Community Climate Change Centre

Acknowledgements

The National Climate Change Policy, Strategy and Action Plan (2014-2021) is an important step forward in integrating climate change into decision making in Suriname. A wide range of individuals and institutions from across government, civil society, academia and the private sector participated in its development. Their advice and interventions have been invaluable and the project team would like to place on record its appreciation of the many contributions they made. A full list of all those involved in this process can be found in Annex A to this document. The project team also wishes to thank the staff from the Directorate of Environment, Ministry of Labour, Technological Development and Environment for their leadership, guidance and support.

Reaching this significant milestone in Suriname's response to climate change would also not have been possible without the generous financial support provided by the European Union Global Climate Change Alliance (GCCA). This allowed the Caribbean Community Climate Change Centre (CCCCC) to appoint Acclimatise as lead project consultants (John Firth, Olivia Palin and Jennifer Steeves) supported by Sheila Bhairo-Marhé, Nancy del Prado and Renée Gift.

Contents

List of Tables and Figures

Abbreviations and Acronyms

ABS	General Bureau for Statistics (Stichting Algemeen Bureau voor de Statistiek)
AdeKUS	Anton de Kom University of Suriname
ADRON	Anne van Dijk Rice Institute Nickerie (Anne van Dijk Rijstonderzoekcentrum Nickerie)
AFOLU	Agriculture Forestry and Other Land Use
ATM	Ministry of Labour, Technological Development and Environment (Ministerie van Arbeid, Technologische Ontwikkeling en Milieu)
BIS	Bauxite Institute of Suriname (Bauxiet Instituut Suriname)
BOG	Bureau of Public Health Service (Bureau Openbare Gezondheidszorg)
BUZA	Ministry of Foreign Affairs (Ministerie van Buitenlandse Zaken)
CCCCC	Caribbean Community Climate Change Centre
CCD	Climate Compatible Development
CCDU	Climate Compatible Development Unit
CCORAL	Caribbean Climate Online Risk and Adaptation TooL
CDM	Clean Development Mechanism
CELOS	Centre for Agricultural Research in Suriname (Centrum voor Agrarisch Onderzoek in Suriname)
CI	Conservation International Suriname (NGO)
CZM	Coastal Zone Management
DC	District Commissioner (District Commissaris)
DNA	Designated National Authority
E(S)IA	Environmental (& Social) Impact Assessment
EBS	Energy Company Suriname (NV Energiebedrijven Suriname)
EWS	Early Warning System
FOB	Development Fund for the Interior (Fonds Ontwikkeling Binnenland)
FNC	Initial National Communication to the UNFCCC
GCCA	Global Climate Change Alliance
GEF	Global Environment Facility
Gg	Gigagram
GHG	Greenhouse Gas
GHFS	Green Heritage Fund Suriname
GIS	Geographical Information System
GLIS	Land registration and Land Information System (Grondregistratie en Land Informatie Systeem)
GLOBE	Global Learning and Observations to Benefit the Environment
GoS	Government of Suriname
Ha	Hectare
HBO	Institute for Higher Education (Hoger Beroep Onderwijs)
HI	Ministry of Trade and Industry (Ministerie van Handel en Industrie)
IADB	Inter-American Development Bank
IADB-ConSoc	IADB Civil Society Consulting Groups
ICZM	Integrated Coastal Zone Management
IDCS	Investment Development Corporation Suriname

IGSR	Institute for Graduate Studies and Research (AdeKUS)
IOL	Institute for Training Teachers (Instituut voor de Opleiding van Leraren)
IPCC	Inter-Governmental Panel on Climate Change
ITCZ	Inter-Tropical Convergence Zone
JusPol	Ministry of Justice and Police (Ministerie van Justitie en Politie)
KKF	Chamber of Commerce and Industry (Kamer van Koophandel en Fabrieken)
KPS	Suriname Police Corps (Korps Politie Suriname)
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 (Meteorologische Dienst van Suriname)
MinFin	Ministry of Finance (Ministerie van Financiën)
MINOV	Ministry of Education (Ministerie van Onderwijs en Volksontwikkeling)
MSL	Mean Sea Level
MW	Megawatt
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 Centre for Emergency (Nationaal Coördinatie Centrum voor Rampenbeheersing)
NCSA	National Capacity Self-Assessment
NH	Ministry of Natural Resources (Ministerie van Natuurlijkehulpbronnen)
NIMOS	National Institute for Environment and Development in Suriname (Nationaal Instituut voor Milieu en Ontwikkelingin Suriname)
NGO	Non-governmental organisation
KAP	Climate Action Plan 2008 – 2013 (Klimaat Actie Plan 2008-2013)
NMR	National Council for the Environment (Nationale Milieu Raad)
OAS	Organization of American States
ODRO	Under Directorate Spatial Planning (OnderDirectoraat Ruimtelijke Ordening)
OGS	Planning Commission Gold Sector (Ordening Goudsector)
OP	National Development Plan (Nationaal Ontwikkelingsplan)
OW	Ministry of Public Works (Ministerie van Openbare Werken)
PAHO	Pan-American Health Organisation
PRECIS	Providing Regional Climates for Impact Studies (Regional climate modelling system)
REDD+	Reduced Emissions from Deforestation and Forest Degradation
RGD	Regional Health Service (Regionale Gezondheidsdienst)
RIL	Reduced Impact Logging
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)
RPP	Readiness Preparation Proposal
RVM	Council of Ministers (Raad van Ministers)

SBB	Foundation for Forest Management and Production Control (Stichting voor Bosbeheer en Bostoezicht)
SBF	Suriname Business Forum
SCF	Suriname Conservation Foundation
SER	State of the Environment Report
SLR	Sea Level Rise
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)
SPS	National Planning Office (Stichting Planbureau Suriname)
SRD	Surinamese Dollar
SSB	Suriname Bureau of Standards (Suriname Standaarden Bureau)
Suralco	Suriname Aluminium Company
SWM	Suriname Water Company (Surinaamsche Waterleiding Maatschappij)
TCT	Ministry of Transport, Communication and Tourism (Ministerie van Transport, Communicatie en Toerisme)
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WLA	Hydraulic Research Division (Waterloopkundige Dienst)

Key terms

Afforestation: Planting of new forest on lands that historically have not contained forest (IPCC, 2014).

Agriculture, Forestry and Other Land Use (AFOLU): Agriculture, Forestry and Other Land Use is a term generated by the Intergovernmental Panel on Climate Change (IPCC) to describe a category of activities which contribute to anthropogenic greenhouse gas emissions. Conversely, there are various methods for mitigating emissions in this 'sector', including preventing emissions by conserving existing carbon pools in soils or vegetation or by reducing emissions of methane (CH_4) and nitrous oxide (N_2O); sequestration— increasing the size of existing carbon pools, and thereby extracting carbon dioxide (CO_2) from the atmosphere; and substitution—substituting biological products for fossil fuels or energy-intensive products, thereby reducing CO_2 emissions (IPCC, 2014).

Biofuel: A fuel produced from dry organic matter or combustible oils produced by plants. These fuels are considered renewable as long as the vegetation producing them is maintained or replanted, such as firewood, alcohol fermented from sugar, and combustible oils extracted from soy beans. Their use in place of fossil fuels cuts greenhouse gas emissions because the plants that are the fuel sources capture carbon dioxide from the atmosphere (UNFCCC, 2014).

Biomass: The total mass of living organisms in a given area or volume; recently dead plant material is often included as dead biomass. The quantity of biomass is expressed in either terms of dry weight or of energy, carbon or nitrogen content (IPCC, 2014).

Carbon sequestration: The uptake (i.e. the addition of a substance of concern to a reservoir) of carbon containing substances, in particular carbon dioxide (CO_2), in terrestrial or marine reservoirs. Biological sequestration includes direct removal of CO_2 from the atmosphere through land-use change (LUC), afforestation, reforestation, re-vegetation, carbon storage in landfills, and practices that enhance soil carbon in agriculture (cropland management, grazing land management) (IPCC, 2014).

CO_2 Equivalent (CO_2 eq): The concentration of carbon dioxide that would cause the same amount of radiative forcing as a given mixture of carbon dioxide and other greenhouse gases (IPCC, 2014).

Climate compatible development: Development that minimises the harm caused by climate impacts, while maximising human development opportunities. It employs goals and strategies that result in low emissions and/or build resilience and promote development simultaneously (adapted from Mitchell and Maxwell, 2010).

Climate change: Climate change refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use (IPCC, 2013).

Climate resilience: The capacity of an individual, community, or institution to dynamically and effectively respond to shifting climate impact circumstances while continuing to function at an acceptable level. Simply put, it is the ability to survive and recover from the effects of climate change. It includes the ability to understand potential impacts and to take appropriate action before, during, and after a particular consequence to minimise negative effects and maintain the ability to respond to variable and changing conditions (adapted from Rockefeller Foundation, 2009).

Climate variability: Refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate on all spatial and temporal scales beyond that of individual weather events. Variability may be due to natural internal processes within the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability) (IPCC, 2013).

Emissions: The release of greenhouse gases and/or their precursors into the atmosphere over a specified area and period of time.

Greenhouse gases: Gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere and clouds. This property causes the greenhouse effect. Water vapour (H_2O), carbon dioxide (CO2), nitrous oxide (N2O), methane (CH4) and ozone (O3) are the primary greenhouse gases in the Earth's atmosphere (IPCC, 2014).

Kyoto Protocol: The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) was adopted at the Third Session of the Conference of the Parties to the UNFCCC in 1997 in Kyoto, Japan. It contains legally binding commitments, in addition to those included in the UNFCCC. Countries included in Annex B of the Protocol (most countries in the Organisation for Economic Cooperation and Development, and countries with economies in transition) agreed to reduce their anthropogenic greenhouse gas emissions (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride) by at least 5% below 1990 levels in the commitment period 2008 to 2012.

Low regret: A low regret option is one for which the implementation costs are low, while the benefits under projected climate changes are potentially large (Willows & Connell, 2003)

Maladaption: Resilience building actions which inadvertently increase vulnerability to climatic stimuli or involve spending a disproportionate amount of effort and investment focussed on resilience beyond what is required (Adaptation Sub-Committee, 2010).

Mitigation: Human intervention to reduce the sources or enhance the sinks of greenhouse gases (IPCC, 2013).

No regret: A no regrets option is one which would be justified under all plausible future scenarios, even in the absence of climate change (Willows & Connell, 2003).

Reducing Emissions from Deforestation and Forest Degradation (REDD): An effort to create financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. It is therefore a mechanism for mitigation that results from avoiding deforestation. REDD+ goes beyond reforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks (IPCC, 2014).

Reforestation: Planting of forests on lands that have previously sustained forests but that have been converted to some other use. Under the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, reforestation is the direct human-induced conversion of non-forested land to forested land through planting, seeding, and/or human-induced promotion of natural seed sources, on land that was previously forested but converted to non-forested land (IPCC, 2014).

Renewable energy: Any form of energy from solar, geophysical, or biological sources that is replenished by natural processes at a rate that equals or exceeds its rate of use (IPCC, 2014).

Shifting cultivation: Agricultural production system in which small plots of land, often less than one hectare, are cleared and burned, then cultivated for one to three years and subsequently left in fallow for the soil fertility to recuperate. The system is typical for the hinterlands of Suriname and characterised by low external inputs such as fertilisers and agrochemicals. The main reasons for abandoning the land are decrease in soil fertility, and high incidences of weed, pests and diseases (Voorstel R. Van Kanter, Agroforester, Tropenbos International – Suriname, Pers. Comm., August 2014).

Sibibusi: Local storm events in Suriname characterised by strong winds and heavy rainfall (SNC, 2013).

Sink: Any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas from the atmosphere. Forests and other vegetation are considered sinks because they remove carbon dioxide through photosynthesis (UNFCCC, 2014).

Vulnerability: The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (IPCC, 2013).

Win-win: An action that reduces the impacts of climate change/ greenhouse gas emissions and has other environmental, social or economic benefits (Willows & Connell, 2003).

1 Summary

Climate change is one of the greatest challenges of our time. Suriname's people, society, economy and environment are already affected by extreme weather and climate events, and are under increasing risk from the impacts associated with climate change. The May 2006 floods, for example, affected over 13,000 households in Suriname, particularly in Brokopondo and Sipaliwini districts, and caused damage and loss valued at approximately SRD$111 million[1] across the housing, health, education, energy, transport, communications, agriculture, tourism, commerce and trade sectors. The best available science projects that in future, temperature will increase, sea level will rise and the proportion of total rainfall that falls in heavy events will increase, while average rainfall will decrease. Where there is high vulnerability and exposure to these types of climatic change, the risk of similar or more severe impacts in future is high. Action is already being taken to address climate impacts, but more needs to be done.

Suriname's contribution to global greenhouse gas (GHG) emissions which drive climate change is very small and it acts as a net sink when absorptions from the Agriculture, Forestry and Other Land Use (AFOLU) sector are taken into account. Suriname is pursuing a climate compatible development (CCD) approach, seizing opportunities for low carbon emission development which can also attract climate finance. Staatsolie Maatschappij Suriname N.V., for example, is currently developing a sugarcane plantation and sugar and ethanol processing facility for the production of sugar, ethanol and electricity from sugarcane bagasse in the Wageningen area of Nickerie district. This is helping to drive Suriname's development of clean, sustainable energy sources providing reliable green energy to Nickerie district and new job opportunities. The project is also pioneering the attraction of voluntary carbon market payments to Suriname as it reduces GHG emissions and generates carbon credits which will be traded on the voluntary market.

Suriname's 2012-2016 National Development Plan, the 2013 Second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) and the 2012-2016 Environmental Policy Plan all recognise the significance of climate change impacts on Suriname and the opportunities for low carbon emission development. This National Climate Change Policy, Strategy and Action Plan (NCCPSAP) is the logical next step in enabling Suriname to build resilience to the impacts of a changing climate, providing a clear roadmap to respond to the challenges of a changing climate, seize opportunities for climate compatible development and attract climate finance.

The NCCPSAP provides the following:

1. A National Climate Change Policy consistent with Suriname's National Development Plan.
2. A National Climate Change Strategy detailing:
   - Suriname's climate compatible development roadmap.
   - Sector and cross-sector climate resilience and low carbon emission development approaches.
   - Capacity building needs and opportunities.
   - Where technology transfer is required.
   - Opportunities to attract investment and finance.

[1] USD$40.43 million at 2006 exchange rate of SRD$2.745

- Monitoring, evaluation, reporting and verification requirements.

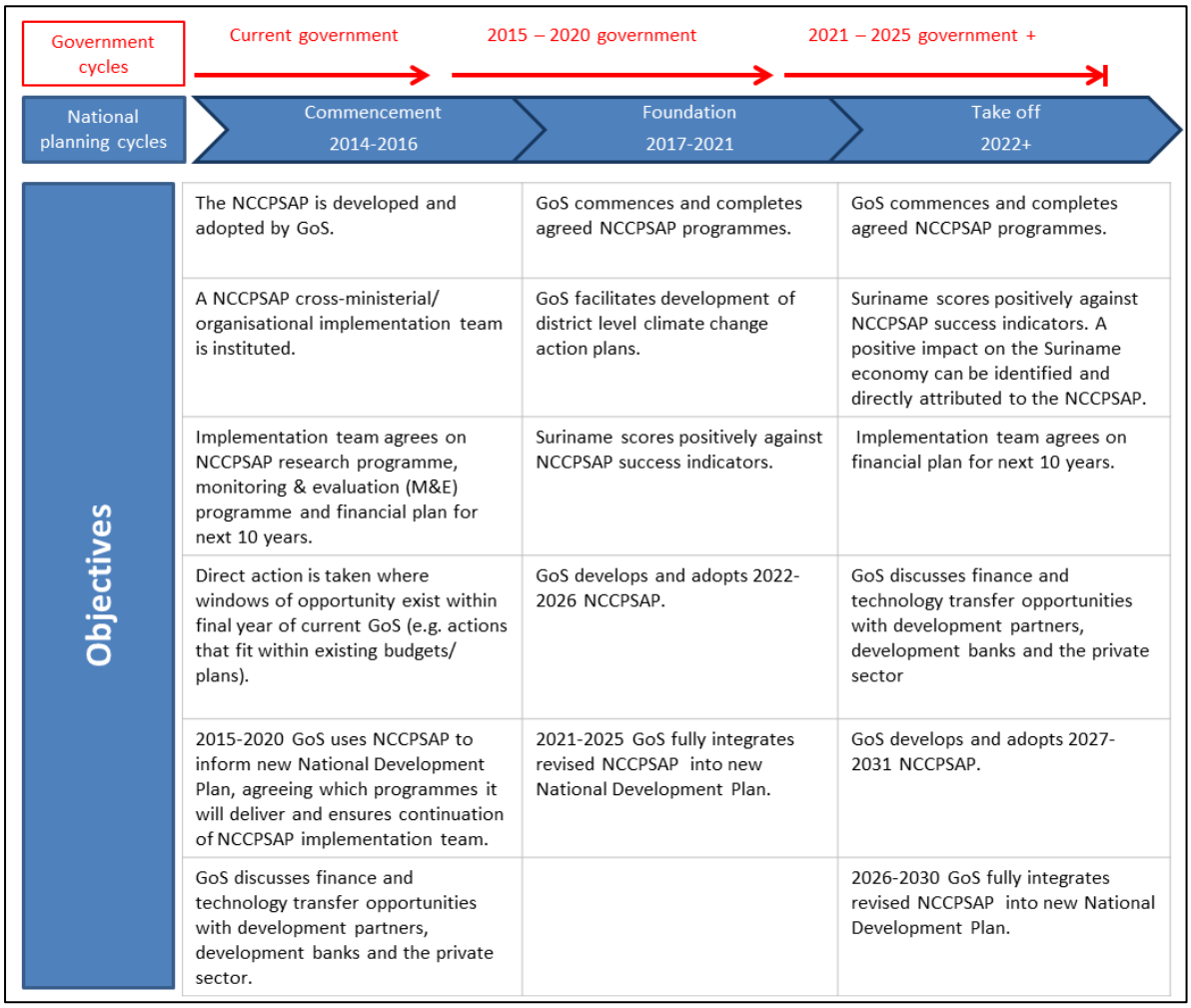
3. A National Climate Change Action Plan describing programmes and actions to be undertaken under each national development planning theme.

The Climate Change Policy articulates the focus of Suriname's response to climate change as follows:

- generating data and information on Suriname's vulnerability;
- reducing vulnerability through the implementation of climate resilience measures in the coastal and interior regions and across different sectors;
- pursuing low carbon emission development through the application of sustainable and clean technology;
- raising awareness across the country about the impacts and opportunities associated with climate change;
- accessing international sources of climate finance;
- integrating climate compatible development into national development planning; and
- recommends integrating climate compatible development into national budgeting processes.

The Climate Change Strategy presents Suriname's CCD roadmap (see Figure 1resenting all key stakeholders.

) for the current and forthcoming national planning cycles: 2014-2016, 2017-2021 and 2022+. The roadmap illustrates overarching objectives that should be achieved at these three different stages corresponding to the planning cycles, each of which has been given a name: 'Commencement', 'Foundation' and 'Take-off'. The Ministry of Labour, Technological Development and Environment (ATM) will be responsible for driving and delivering this roadmap in full consultation and cooperation with a multidisciplinary NCCSPAP Implementation Team, representing all key stakeholders.



Government cycles	Current government	2015 – 2020 government	2021 – 2025 government +
National planning cycles	Commencement 2014-2016	Foundation 2017-2021	Take off 2022+
Objectives	The NCCPSAP is developed and adopted by GoS.	GoS commences and completes agreed NCCPSAP programmes.	GoS commences and completes agreed NCCPSAP programmes.
	A NCCPSAP cross-ministerial/ organisational implementation team is instituted.	GoS facilitates development of district level climate change action plans.	Suriname scores positively against NCCPSAP success indicators. A positive impact on the Suriname economy can be identified and directly attributed to the NCCPSAP.
	Implementation team agrees on NCCPSAP research programme, monitoring & evaluation (M&E) programme and financial plan for next 10 years.	Suriname scores positively against NCCPSAP success indicators.	Implementation team agrees on financial plan for next 10 years.
	Direct action is taken where windows of opportunity exist within final year of current GoS (e.g. actions that fit within existing budgets/ plans).	GoS develops and adopts 2022-2026 NCCPSAP.	GoS discusses finance and technology transfer opportunities with development partners, development banks and the private sector
	2015-2020 GoS uses NCCPSAP to inform new National Development Plan, agreeing which programmes it will deliver and ensures continuation of NCCPSAP implementation team.	2021-2025 GoS fully integrates revised NCCPSAP into new National Development Plan.	GoS develops and adopts 2027-2031 NCCPSAP.
	GoS discusses finance and technology transfer opportunities with development partners, development banks and the private sector.		2026-2030 GoS fully integrates revised NCCPSAP into new National Development Plan.

Figure 1 Suriname's climate compatible development roadmap

In order to integrate climate resilience and low carbon emission development into Suriname's national development planning process, specific programmes and actions have been developed corresponding to national planning themes. This will allow Suriname's government ministries to understand their responsibilities quickly and easily. It is however important that government ministries, departments, agencies and non-governmental organisations work together to understand cross-sector linkages, and build on and learn from each other's activities. Cross-sector cooperation on climate compatible development will be supported through the structure of the NCCPSAP Implementation Team.

One of the key enablers of climate compatible development is capacity. Suriname's Climate Change Strategy identifies capacity building priorities as follows:

- Formation of the NCCPSAP Implementation Team to aid interdepartmental cooperation.
- Conducting an in-depth institutional assessment to clarify mandates and responsibilities with respect to climate change governance.
- Development of a comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management.

- Expediting the enactment of the Environmental Framework Bill which addresses integration of climate change across multiple planning themes.
- Amendment of existing sectoral legislation or draft laws (e.g. the Electricity Bill, Water Bill) to incorporate climate change considerations where windows of opportunity exist to do so.
- Conducting awareness-raising campaigns on climate change.

In addition to this, technology and finance are critical. The Strategy therefore stresses the importance of developing partnerships with foreign governments and foreign/domestic private sector companies, NGOs and research institutes, inter-governmental organisations and development partners to enable technology transfer. The Strategy links development planning and climate change, promoting alternative financing sources for climate compatible development and the creation of a fiscal environment that attracts relevant investment from overseas and domestically.

The Climate Change Action Plan captures all programmes and associated actions under the following national development planning themes:

- Infrastructure
- Energy
- Drinking water
- Housing
- Mining
- Agriculture, livestock and fisheries
- Tourism
- Education
- Health
- Disaster risk management
- Spatial planning
- Environment
- Sustainable forest management.

2 Introduction

2.1 Introduction and objectives

Climate change is one of the greatest challenges of our time. Suriname's people, society, economy and environment are already affected by extreme weather and climate events, and are under increasing risk from the impacts associated with climate change. The May 2006 floods, for example, affected over 13,000 households in Suriname, particularly in Brokopondo and Sipaliwini districts, and caused damage and loss valued at approximately SRD$111 million across the housing, health, education, energy, transport, communications, agriculture, tourism, commerce and trade sectors (Buitelaar et al. 2007). The best available science projects that in future, temperature will increase, sea level will rise and the proportion of total rainfall that falls in heavy events will increase, while average rainfall will decrease. Action is already being taken to address climate impacts, but more needs to be done.

While Suriname's contribution to global greenhouse gas (GHG) emissions which drive climate change is small, Suriname is pursuing a climate compatible development (CCD) approach, seizing opportunities for low carbon emission development and attracting climate finance (GoS, 2012; SNC, 2013). Staatsolie Maatschappij Suriname N.V. (Staatsolie), for example, is currently developing a sugarcane plantation and sugar and ethanol processing facility for the production of sugar, ethanol and electricity from sugarcane bagasse in the Wageningen area of Nickerie district. This is helping to drive Suriname's development of clean, sustainable energy sources (saving on heavy fuel oil and gasoline usage) as well as providing reliable green energy to Nickerie district and new job opportunities. (Staatsolie, 2012). The project is also pioneering the attraction of voluntary carbon market payments to Suriname as it reduces GHG emissions and generates carbon credits which will be traded on the voluntary market.

Suriname's 2012-2016 National Development Plan (GoS, 2012), the 2013 Second National Communication (SNC) to the United Nations Framework Convention on Climate Change (UNFCCC) and the 2012-2016 Environmental Policy Plan recognise the significance of climate change impacts on Suriname and the opportunities for low carbon emission development. This National Climate Change Policy, Strategy and Action Plan (NCCPSAP) is the logical next step in enabling Suriname to build resilience to the impacts of a changing climate, seize opportunities for CCD and attract climate finance. The development of the NCCPSAP has taken into account the CARICOM Liliendaal Declaration (July 2009), the Regional Framework for Achieving Development Resilient to Climate Change (July 2009)[2] and its Implementation Plan (March 2012)[3] which collectively set out the Caribbean's response to climate change grounded on a firm regional commitment, policy and strategy. These three 'foundation documents' have all been approved by the Heads of Government

[2] Caribbean Community Climate Change Centre (2009): Climate Change and the Caribbean: A Regional Framework for Achieving Development Resilient to Climate Change (2009-2015), Caribbean Community Climate Change Centre, Belmopan, Belize.

[3] Caribbean Community Climate Change Centre (2011): Delivering transformational change 2011-21: Implementing the CARICOM `Regional Framework for Achieving Development Resilient to Climate Change`, Caribbean Community Climate Change Centre, Belmopan, Belize.

of the CARICOM Member States and are key reference points providing guidance on the impacts Caribbean countries face and the policies, strategies and actions they need to consider.

The objectives of the NCCPSAP are as follows:

- To provide a policy statement on Suriname's response to climate change and commitment to achieving CCD, consistent with the objectives of the National Development Plan.
- To deliver a CCD strategy articulating:
  - Suriname's CCD roadmap
  - Sector and cross-sector climate resilience and low carbon emission development approaches
  - Capacity building needs and opportunities
  - Technology transfer
  - Opportunities to attract investment and finance for CCD
  - Monitoring, evaluation, reporting and verification requirements.

2.2 Climate vulnerability, impacts and resilience in Suriname

Suriname is "already experiencing some of the effects of climate variability and change through greater rainfall variability leading to droughts, flooding and some landslides" (Caribsave, 2012). Although records of climate trends and their impacts are limited, the best available projections indicate that future climate changes will be significant. Suriname has already begun to respond to the changes underway and is starting to build resilience to cope with its changing future, but far more is required.

Baseline climate, climate variability and existing impacts

Suriname's tropical hot and wet climate is influenced by several factors. The passage of the Inter-Tropical Convergence Zone (ITCZ) typically results in a short wet season from December to February and a long wet season from May to mid-August. In between these seasons are the short dry season (February to late April) and the long dry season (mid-August to early December). Air temperature records at the national meteorological service, Meteorologische Dienst van Suriname (MDS), indicate average daily temperatures of about 27 degrees Celsius with an annual variation of 2-3 degrees Celsius. Another key climatic influence relates to Suriname's surface conditions, characterised by rivers and swamps and vegetation cover that produce a large amount of water vapour. This, combined with convection and orographic lifting, help contribute to the country's relatively abundant precipitation. Annual rainfall varies from 1750mm/yr – 3000mm/yr across the country (SNC, 2013).

Temperature observations since 1966 in the coastal zone of Suriname show an average increase of approximately 0.016 degrees Celsius per year (SNC, 2013). No significant trends have been observed in the interior. It is important to note that these temperature observations may be affected by local conditions, such as urbanisation in the coastal zone, and land cover (such as forest) in the interior (SNC, 2013).

There are no statistically significant observations of precipitation change, and long-term trends are difficult to identify due to large inter-annual rainfall variability (Caribsave, 2012). Available data show that the highest amount of rainfall occurs in the centre and the lowest in the northwest. The highest variability in rainfall occurs in Paramaribo and Wanica (SNC, 2013). With respect to sea level rise, no past measurements are currently available (Prof. Naipal, pers. comm., May 2014), though satellite measurements could be used in due course.

Suriname has often experienced very dry or very wet conditions which are postulated as being linked to El Niño and La Niña years, and local storm events characterised by strong winds and heavy rainfall known as Sibibusi events (SNC, 2013). These events have resulted in drought, salt water intrusion (when there is a decrease in upstream river flow), flooding and landslides (Caribsave, 2012; SNC, 2013). Suriname's vulnerability to climate variability has resulted in multiple impacts. For example, salt water intrusion has decreased the productive land available for agriculture, flooding has destroyed homes in both the coastal zone and the interior, and increased temperatures and drought have reduced the amount of water available for hydropower electricity generation (see Box 1). Sibibusi events with accompanying strong winds have caused structural damage to houses (Marciano and Nurmohamed, 2013).

Figure 2 provides some examples of climate impacts across Suriname in recent years. These impacts were recorded during the consultations undertaken to inform and guide the preparation of this document.

Figure 2: Examples of climate impacts across Suriname (Map source: Google map, retrieved from: http://surinamediscoveries.com/google-map/). Figures for Brokopondo to be verified by the Ministry of Natural Resources.

Box 1: Climate impacts and Suriname's electricity sector: Energiebedrijven Suriname (EBS)

Approximately 53% of Suriname's electricity is generated by hydropower (SNC, 2013), which results in a relatively low dependence on fossil fuels as well as low GHG emissions compared to other countries in the Caribbean and globally. The country's main source of energy is the Afobaka hydropower plant at Lake Brokopondo, operated by Suralco, Suriname's primary aluminium and bauxite producer. Suriname has an installed capacity of 390 MW, 189 MW of which is produced at Afobaka (Humpert, 2013). Suriname's main supplier of energy, NV EnergiebBedrijven Suriname (EBS), purchases excess electricity from Suralco, among other sources, to distribute across the country, and is responsible for Suriname's energy security. Over the past decade, climatic factors have had a clear impact on the functioning of Suriname's electricity generation and transmission and EBS' operations. These impacts are outlined below, along with associated actions that have been implemented or recommended by EBS.

Drought:

- Severe droughts recorded in 2004-2005 and 2009 have led to less water in Lake Brokopondo and to less water being released to generate electricity.
- The 2004-2005 drought caused Lake Brokopondo's levels to drop so low that the Government and EBS in collaboration with Suralco were forced to install temporary diesel generators hired from Agrekko, Rotterdam between February and August 2005, with a base load of 25 MW, in order to avoid power outages. The rented diesel generator and the imported fuel cost USD $16 million. At USD $ 40/kwh this was eight times more expensive than hydropower and increased emissions[4].
- Low lake levels occurred again in October and November 2013, meaning that only 50 MW could be generated, of which 30 MW of this is supplied to gold mining company IAMGOLD, leaving only 20MW for domestic and other industrial consumers on this occasion.
- Reductions in discharges from the dam have an impact on river flows downstream adversely affecting domestic drinking water abstractions, river transport, and riparian ecology.
- Algal blooms in the lake have created operational problems in the cooling systems resulting in Suralco switching off the generator to remove the algae, sometimes up to two and three times per week, in turn affecting continuity of supply. Algal blooms may be caused by a combination of factors including an increase in water temperature and nutrient levels, which may be driven by changes in precipitation and temperature.

High temperatures: Suriname regularly experiences high temperatures of 33 degrees Celsius and above in the months of September and October, resulting in a number of impacts:

- Transmission and distribution losses occur as the thermal efficiency of overhead lines decreases in higher temperatures.
- Consumer demand increases during periods of high temperatures during both the day and night (for example for air-conditioning). During these hot months, EBS has to take action on load sharing.
- Increasing temperatures also affect the operating performance of electrical equipment. In order to maintain operating efficiency, cooling is often required (e.g. of transformers), in turn increasing cooling system energy demand.

Climatic factors, such as drought and increased temperatures, add to existing problems in electricity generation, transmission and distribution, which are further compounded by an increasing demand

[4] To be verified by the Ministry of Natural Resources.

from consumers.

In addition to the actions identified above EBS operates thermal power plants in Paramaribo to make up for any deficiency in hydropower generation. EBS has just recently, in July 2014, installed three new fuel efficient, relatively low emission plants with a capacity of 63 MW. They also manage one thermal power plant which is nearing its asset life and produces higher levels of GHG emissions. Operational challenges at Afobaka plant arising from low lake levels increases the relative importance of the existing thermal plants to provide security of supplies. This in turn limits the ability of EBS to temporarily decommission the older thermal plant in order to carry out upgrading measures.

Existing climate variability is having an effect on Suriname's electricity generation and supply, with a significant financial cost, which has yet to be fully determined. EBS and Suralco have already begun to respond to these impacts, by changing the operating practices at Afobaka, load management and exploring alternative energy supplies. EBS has recommended a number of future actions, including:

- Conduct further research on climate change and the energy-water nexus, given Suriname's abundant water resources and the country's dependency on hydro power.
- Encourage further exploration of the use of renewable energy, particularly solar. This includes education as to the benefits of renewables, as well as incentives to attract engineers specialised in renewable energy.
- Continue exploration of the TapaJai project, a potential new hydro power plant in the interior, which would decrease GHG emissions and contribute to energy security.
- Promote energy efficiency. An energy efficiency programme is currently under development by EBS in collaboration with the government, which would focus on raising consumer awareness of the potential associated cost savings. Furthermore, the government is running several pilot projects assessing energy efficient housing, which would use less electricity.
- Explore the use of bio-waste in generators, which would reduce the import of expensive diesel fuel. EBS is currently working with the Ministry of Public Works on a feasibility study.

Source: EBS, pers. comm., June 2014

Projected climate change impacts

Recent climate modelling projections using a General Circulation Model (GCM) ensemble of 15 models and PRECIS, a Regional Climate Model (RCM) based on HadAM3 GCM, project changes in Suriname's climate as shown in

Table 1 (Caribsave, 2012[5]). Annual air and sea surface temperature and sea level are projected to increase over time. The majority of models also project that the proportion of rainfall that falls in heavy events will increase while average annual rainfall will decrease. There is however uncertainty about the extent of changes, as well as the direction of change in the case of rainfall and wind speed.

Additional climate modelling and research has been undertaken at Anton de Kom University of his Suriname (AdeKUS) since 2010, using downscaled regional models at a 25 km resolution. New data will shortly become available for the periods 2020-2050 and 2070-2100.

[5] Using information provided by the Caribbean Community Climate Change Centre.

Table 1: Climate change scenarios for Suriname

Climate parameter	Scenarios for the 2020s, 2050s, 2080s and 2100[6]			
	2020s	*2050s*	*2080s*	*2100*
Temperature (annual)	GCM: +0.3 to 1.3 ˚C	GCM: +0.8 to 2.6 ˚C	GCM: +1.2 to 3.8 ˚C RCM: +4.8˚C	SNC (2013): + 2 to 3˚C
Precipitation (annual rainfall)	GCM: -10 to +10mm/month	GCM: -22 to + 14mm/month	GCM: -39 to +10mm/month RCM: -38mm/month	SNC (2013): -10%
Rainfall extremes (% total rainfall falling in Heavy Events, R95pct)	N/A	GCM: -1 to +8 %	GCM: -1 to +11 %	SNC (2013): 'Increased frequency of extreme weather events'
Wind speed (annual average)	GCM: -0.1 to +0.1 ms^{-1}	GCM: -0.1 to +0.3 ms^{-1}	GCM: -0.1 to +0.7 ms^{-1}	SNC (2013): 'Increased frequency of high winds'
Sea level rise	N/A	N/A	N/A	IPCC AR4, including adjustment for Caribbean: +0.13 to +1.45m SNC (2013): 1m rise

In order to understand changing vulnerabilities and impacts over time, the SNC used the 2100 scenarios to conduct a climate vulnerability assessment with respect to water resources, agriculture, ecology and geomorphology, socio-economy, tourism and human health. Identified vulnerabilities are summarised according to Suriname's national development planning themes in Table 2.

Table 2: Vulnerabilities related to Suriname's development planning themes (based on the SNC's 2100 climate vulnerability assessment)

[6] All GCM figures are based on a 15 model ensemble; on A2, A1B and B2 SRES emissions scenarios; are relative to 1970-1999 mean observed figures; and are presented as minimum to maximum figures. They are all derived from Caribsave (2012). All RCM figures are driven by the model HadAM3, based on the A2 SRES emissions scenario and are relative to 1980-1989 mean observed figures. They are derived from Caribsave (2012). All SNC (2013) figures are presented as mean annual figures.

National development planning theme	Climate vulnerabilities identified for Suriname
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.
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 (see Box 1).
Drinking 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.
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.
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.
Agriculture, livestock and 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 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.
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 the nesting grounds of various turtle species.

National development planning theme	Climate vulnerabilities identified for Suriname
Education	The majority of Suriname's population is not aware of the effects of climate change, including sea level rise. Without climate change education, the capacity of Suriname's population to adapt to changes in climate will remain low.
Health	Climate change brings an increased likelihood of disease, new pathogens, respiratory illnesses, increased incidences of diarrhoea and likelihood of cholera outbreaks. These will particularly impact populations in the low-lying coastal area, in isolated and remote areas in the hinterlands, as well as poor and elderly people and infants.
Disaster risk management	Increased frequency and intensity of extreme events, combined with the concentration of population in exposed coastal zones and lack of defence infrastructure, may lead to more climate-related disasters. These may result in physical and socio-economic damage and loss of life.
Spatial planning	Urban areas concentrated in the coastal zone and allotment projects near rivers are already susceptible to flooding due to poor drainage, mangrove deforestation and abundant rainfall. Any increase in precipitation and sea level rise due to climate change could increase the risk of flooding.
Environment	Suriname's economy and society are highly dependent on natural resources. Its four main ecosystems already face serious threats from grass and peat fires, land reclamation and clearing, engineering works, and poaching of wildlife, which may be worsened by climate change.
Sustainable forest management	Lack of legislation on land use planning already jeopardises 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.

Knowledge of climate change risk across Suriname's sectors is very limited due to limited knowledge of the likelihood of future climatic events (particularly in the near term), the rate and scale of slow-onset changes, and the magnitude of their consequences. This is an important area for further research. A better understanding of baselines in social, economic and environmental systems is also needed.

Actions taken to adapt to climate change

Suriname has already begun to take action to adapt to the effects of a changing climate. Table 3 illustrates the main enabling actions taken to date, including the development of policy, action plans and proposals including its engagement with international initiatives. Implementation and direct action on resilience building is also being conducted, however there is still much to be done.

Table 3: Climate resilience actions to date in Suriname

Programme	Action	Year	Description
Netherlands Climate Assistance Programme (NCAP) Phase I	Vulnerability assessment for the coastal zone of Suriname	1996-2005	Proposed a series of climate resilience strategies with a particular focus on sea level rise.
UNFCCC	First National Communication on Climate Change (FNC)	2006	Reporting the steps Suriname has taken to implement the UNFCCC, based on NCAP findings.
Netherlands Climate Assistance Programme (NCAP) Phase II	Vulnerability assessment and action plan for Paramaribo and Wanica	2008	Proposed a series of actions for the areas of interest.
GoS environmental policy	Climate Action Plan (KAP)	2008-2013	Includes a list of short-, medium- and long-term climate change actions, primarily for climate resilience, with some focused on mitigation. It is important to note that these are not inclusive of the interior districts.
CARICOM	Liliendaal Declaration	2009	Heads of State define the policy for the Caribbean
CARICOM	Regional Framework for Achieving Development Resilient to Climate Change	2009	Heads of State approve the Strategy to sit alongside the Liliendaal policy
CARICOM	Delivering transformational change 2011-21: Implementing the CARICOM `Regional Framework for Achieving Development	2012	Heads of State requested an Implementation Plan be developed when approving the Regional Framework. The Implementation Plan was approved by the Heads of State when they met in Suriname in March 2012.

Programme	Action	Year	Description
	Resilient to Climate Change		
GoS national development planning	National Development Plan (OP)	2012-2016	States that the government will make efforts to take all necessary climate resilience measures. It articulates a clear need for climate resilience measures on the low-lying coast, and a cross-sectoral climate compatible development strategy.
UNFCCC	Second National Communication on Climate Change (SNC)	2013	Reporting the steps Suriname has taken to implement the UNFCCC.
GoS environmental policy	Environmental Policy Plan	2012 - 2016	States that the goal of national policy on climate change focuses on both climate resilience and mitigation, in addition to research to generate data about Suriname's vulnerability and GHG emissions as well as increasing awareness in society.

2.3 Low carbon emission development in Suriname

Suriname is a signatory to the UNFCCC which recognises that combating climate change is based on the principle of common but differentiated responsibilities and respective capabilities. Industrialised "Annex 1" countries are required to take the lead and reduce GHG emissions. "Non-Annex 1" (developing) countries, including Suriname, are not obliged to reduce emissions. The unfolding climate change landscape presents opportunities for Suriname with respect to low carbon emission development. Art. 4 of the UNFCCC states that industrialised countries must support developing countries, both technologically as well as financially, to adapt to and mitigate climate change. The climate finance opportunities available to Suriname to invest in GHG emission reductions using a variety of bilateral, multi-lateral and commercial mechanisms are extensive. Suriname has an opportunity to take advantage of these mechanisms with the objective of delivering its national development planning objectives using low carbon emission development principles and actions.

Baseline

Data from the latest GHG inventory of Suriname, the SNC in 2013, demonstrates that Suriname is a net sink for global GHG emissions. GHG emissions from the inventory year 2008 are calculated at 6,366 Gg CO_2 eq, while absorptions from the AFOLU sector equals 8,243 Gg CO_2 eq. The level of GHG emissions from Suriname is also extremely low on a global scale. The challenge is to keep GHG emissions at this level while striving for sustainable economic development. The main GHG emission sources are presented in Table 4.

Table 4: Main greenhouse gas emissions sources in Suriname, source SNC 2013.

SECTOR	GHG EMISSIONS IN Gg CO_2 eq
1 Energy	**3798**
Electricity generation	121
Industries	2922
Transport	622
Other sector	133
2 Emissions from industrial processes	53
3 Agriculture, Forestry and Other Land Use (AFOLU)	-5770
Livestock	89
Forest land remaining Forest land	-1007
Crop land remaining cropland	-7242
Grassland remaining grassland	81
Forest land converted to Other Land (in Suriname this refers to mining areas)	1740
Rice cultivation and rice husk burning	569

The energy sector is the major contributor to Suriname's GHG emissions (as is the case of most countries), contributing around 60% of all GHG emissions in the country. The majority of the emissions are the result of the utilisation of fossil fuel in the manufacturing industries and construction. Additionally, road and water transportation depend on the use of fossil fuels.

In terms of emissions from electricity generation, Paramaribo and the coastal districts rely in part on thermal power stations (Elizalde et al., 2013). While total expenditure to run this was not available, with current high fossil fuel prices and the policy of subsidised electricity supplies, it is clear that the cost of imported fossil fuels places a burden on the governmental, investor and consumer budget, with implications for national development.

Electricity generation in the hinterland is also a source of GHG emissions as it relies on diesel generators. This is due to the hinterland having no connection to the electricity grid. The government spends approximately USD 3.66 million a year[7] (Elizalde et al., 2013) to provide and fully subsidise diesel generation in the hinterland. There is currently a total installed thermal capacity of 4.5 MW, serving approximately 30,000 people. The electricity service is limited to a certain amount of hours per day and depends on fuel supply (via land vehicle, airplane or boat) from Paramaribo. However there are approximately 75,000 people who do not have access to national electricity generation.

While the AFOLU sector establishes Suriname as a CO_2-negative country due to Surinamese forests sequestering enormous quantities of CO_2, the sector also contributes to GHG emissions through exploitation of tropical forests for logging, forest clearing for shifting cultivation and deforestation for gold mining.

Projections

Table 5 describes the current and expected future projections of GHG emissions, as stated in the SNC and based on recent developments from other sources.

[7] 18.3% of Suriname's overall imports (2009), about 264 million USD, were fuel imports (IADB http://blogs.iadb.org/caribbean-dev-trends/2013/11/20/surinames-energy-market/)

Table 5 : Current and future greenhouse gas emission contributions related to Suriname's development planning themes

National development planning theme	GHG Current emissions	GHG Projected emissions
Infrastructure	All transportation activities (water and road) depend on fossil fuels. The transport sector contributes approximately 16% to total GHG emissions of the energy sector and around 10% of total GHG emissions in Suriname (SNC, 2013). Another emission source is asphalt paving, which releases non-methane Volatile Organic Compounds (SNC, 2013).	Emissions will increase due to increased transportation movements and increased asphalt paving. Staatsolie is building a bioethanol plant, which will be in full production in 2020. Expectations are that biofuel will replace between 6% to 30% of the fossil fuels used in the transport sector by 2025 (E. Fränkel, Staatsolie, pers. comm., 2014; SNC, 2013).
Energy	While the energy sector is the largest GHG emissions source (66% of total GHG emissions), electricity generation contribution is only 2% (SNC, 2013). Electricity is provided by hydropower and thermal power stations. Hydropower capacity is 189 MW, 65% of the total installed power capacity of 390 MW. Electricity in the interior is provided by diesel generators with a total capacity of 4.5 MW, but it is limited to around 30% of the population living in the interior (Elizalde et al., 2013).	Electricity demand is expected to increase and so will GHG emissions. Near future supply will be met by expanded thermal generation, solar power and biomass usage. There are long term projections for hydropower expansion. Staatsolie plans are to increase their thermal generation from 62 MW to 100 MW in the next year. Within the next 5 years the increase of electricity generation from hydropower from 93 MW to 157 MW will be possible (E. Fränkel, pers. comm., June 5 2014).

National development planning theme	GHG Current emissions	GHG Projected emissions
Housing	One of the main sources of emissions from domestic housing is electricity use, a subset of the 'energy sector' GHG emissions total. Domestic electricity subsidies limit interest in promoting energy efficiency.	While electricity demand is expected to increase in line with economic development, this may be countered to some extent by increased consumer awareness and green energy initiatives. For example, EBS has started an energy efficiency programme and is promoting energy efficiency in housing and building design (S. Mehairjan, pers. comm., June 5 2014).
Mining	Within the mining sector it is the bauxite industry that is the largest contributor to Suriname's overall GHG emissions, caused by the Bayer process (SNC, 2013). Suralco, the only bauxite company in Suriname, operates on hydropower and thermal power and uses heavy fuel oil. Besides the hydropower plant at Afobaka, it owns a 73.5 MW thermal power plant. It should be noted that 650 ha of mined-out bauxite areas have been re-vegetated, thus sequestering carbon, though trees have not yet reached maturity (SNC, 2013). Mining and quarrying of other products are also contributors of emissions.	It is government policy to continue expanding the mining industry and its contribution to GDP. As such, emissions will continue from this sector unless action is taken to mitigate them. The Bauxite Institute of Suriname (BIS) notes that ALCOA (Suralco's parent company) has a policy to reduce GHG emissions, which should in turn inform Suralco.

National development planning theme	GHG Current emissions	GHG Projected emissions
Agriculture and Sustainable Forest Management	The forest area covers more than 80% of the total land area of Suriname, establishing Suriname as a net sink country for GHG emissions with a total of 5770 Gg Co2 eq sequestered. Reforestation of mined out bauxite areas and changes in unproductive agricultural land contribute to carbon sequestration. Agriculture contributes 12% to total GHG emissions (SNC, 2013).	The SNC (2013) projects that emissions in the forestry sector will decrease from 832 Gg CO2 eq in 2008 to -1,433 Gg CO2 eq (net sequestration) in 2025 based on the projected balance of deforestation for construction of infrastructure, forest exploitation, wood processing, and forest and swamp protection. However, the SNC (2013) also projects that if historical trends continue and activities take place as planned, emissions from agriculture will increase from 953 Gg CO2 eq in 2008 to 3,788 Gg CO2 eq in 2025, an increase of 400%. The overall projection is thus one of net increase under this planning theme, in the absence of mitigation action.

Action to reduce emissions

With the nation's current and near-future reliance on GHG emitting fossil fuels, an innovative approach is needed to respond to the threat of climate change. As the population continues to grow, energy demand is expected to increase, as well as the need for food and drinking water and the energy to produce it. A warming climate is also likely to increase the demand for energy.

Fortunately, there is an enormous opportunity for energy generation using alternative fuel and renewable energy sources in Suriname. Several renewable resources such as hydropower, biomass, solar and wind are technically feasible. Some initiatives are already at advanced stages of development such as in-depth research on the Tapa-Jai hydropower project and solar energy for communities in the interior. Energy efficiency improvements also provide an enormous opportunity which has been picked up by EBS. EBS has started an energy efficiency programme, providing awareness to consumers and is also in consultation with the Association of Architects to promote energy efficiency in building design. EBS also has a strategic plan for the period from 2014 to 2024 to establish a zero CO_2 grid within 10 years. The abovementioned efforts clearly indicate the Government's willingness to mitigate climate change. However the development and implementation of a national energy policy, describing a long-term vision and pragmatic sustainable, economically and technically feasible programmes, has still to be developed. The responsible

ministry, the Ministry of Natural Resources (NH), has prepared an Electricity Bill which dictates the formulation of an energy sector plan and the establishment of an Energy Authority. This plan will be formulated with technical assistance from the Inter-American Development Bank (IADB).

2.4 Collaboration across the Caribbean

As stated in section 2.1, development of the NCCPSAP has taken into account the CARICOM Liliendaal Declaration, Regional Framework[8] and Implementation Plan[9] as key reference points. These documents have been approved by CARICOM Heads of State, with the Implementation Plan being approved in Paramaribo under the Chair of his Excellency President Bouterse. Recognising existing significant resource and capacity challenges that hold back the Caribbean region's sustainable development and growth, the CARICOM Implementation Plan adopts the 'three-ones' approach to sustainable resource mobilisation and co-ordination of actions in the context of climate change. This approach promotes three core elements being set up at the regional and national levels:

- 'One Plan' that provides the framework for co-ordinated action on climate change by all partners. (Note that 'One Plan' means one agreed set of shared and common goals and objectives which can be contained within various individual documents);
- 'One Co-ordinating Mechanism' to manage the process; and
- 'One Monitoring and Evaluation (M&E) Framework' to measure progress, transparency and value for money.

At the regional level, the CCCCC is currently finalising the establishment of these 'three ones' in the form of the Regional Framework implemented through the Implementation Plan and CARICOM regional strategies and policies ('One Plan'), the new sub-committee of the Heads of Government to be known as the Liliendaal Bureau on Climate Change ('One Co-ordinating Mechanism') and the Monitoring and Evaluation Instrument and Reporting Framework for the Caribbean ('One M&E Framework').

The Implementation Plan recommends that each national government is informed by the 'three-ones' approach and makes its own decision on how best to mobilise it. Suriname's NCCPSAP in turn presents a plan and a co-ordinating mechanism, and lays the ground for an M&E framework.

2.5 Methodology

The development of Suriname's NCCPSAP was led by the Environment Directorate of the Ministry of ATM. The NCCPSAP was prepared in four stages:

[8] Caribbean Community Climate Change Centre (2009): Climate Change and the Caribbean: A Regional Framework for Achieving Development Resilient to Climate Change (2009-2015), Caribbean Community Climate Change Centre, Belmopan, Belize.

[9] Caribbean Community Climate Change Centre (2011): Delivering transformational change 2011-21: Implementing the CARICOM `Regional Framework for Achieving Development Resilient to Climate Change`, Caribbean Community Climate Change Centre, Belmopan, Belize.

- Stakeholder engagement
- Literature review
- Development of policy, strategy and actions
- Validation

Stakeholder engagement

The NCCPSAP development process commenced with a Ministry of ATM-hosted national inception roundtable and three district roundtables. The purpose of these one-day events was to introduce key stakeholders to the project, engage with them on the issues of climate impacts and low emission development in Suriname, and to understand and record their views on the following:

- Key objectives, success criteria and best practice relevant to the project.
- Laws, policy and national/ district development targets that are affected by climate change.
- Actions that should be taken now to address climate impacts, reduce GHG emissions and seize opportunities.

68 persons attended these roundtables (representing 43 organisations). One-to-one meetings were also conducted with key institutions where possible. As well as allowing the project team to listen to views, the stakeholder engagement process also facilitated the collection of relevant data and information.

Literature review

The project team reviewed legislation, policies and institutional arrangements in Suriname relevant to climate change management, as well as existing regional and national information on climate impacts, climate resilience and low emission development. It is noted that more information on these themes is available for the coastal districts than for the interior.

Development of policy, strategy and actions

The climate change policy, strategy and actions were developed based on outputs from stakeholder engagement, the literature review process and a pragmatic approach to build on existing policies and strategies including for example, structuring actions around Suriname's national development planning themes in order to assist national planning and implementation.

Validation

The draft NCCPSAP was circulated to all consulted stakeholder institutions for review and comments, and presented for validation at a one-day national roundtable event.

Annex A contains a complete list of all stakeholders who were invited to take part in the engagement process.

3 Policy

3.1 Policy

In accordance with Article 40 of the Constitution, a Development Plan shall be determined by law, taking into consideration the national and socioeconomic goals of the State. This plan is intended to be no more than a guideline for government policy (OP 2012-2016 p. 7).

Suriname's 2012-2016 Development Plan (OP) explicitly makes reference to the challenge of climate change, stating the Government of Suriname's intention to develop a Climate Compatible Development Strategy. This report is evidence of having achieved this first target. Suriname's 2012-2016 Environmental Policy Plan, a policy document of the Ministry of ATM, states that climate vulnerability analyses will be integrated into national policy implementation. The first analysis is underway, as part of the EU GCCA Project, with a sector based vulnerability assessment for the agriculture sector in the district of Nickerie (Setrowidjojo-Karijodrono, pers. comm., July 2014).

To address climate vulnerabilities, the OP also states the Government's intention to deliver the following climate resilience measures (GoS, 2012):

- Construction of dikes to protect the coastal zone (where the majority of the population lives and most of the economic activity take place) from sea-level rise and to prevent coastal erosion.
- Drainage of urban and non-urban areas. The construction of pumping stations and drainage pumps, as well as the cleaning and excavation of main drainage channels will take place. A ring channel will be constructed for the urban area to assure adequate drainage of different areas.
- Improvement of water resources management. Priorities include addressing flooding in Paramaribo, Wanica, Commewijne, Para, Saramacca, Coronie, Nickerie and several agricultural and riparian areas in the interior.
- Protection of freshwater resources in ground aquifers and rivers (threatened by pollution and climate change).
- Promotion of sustainable land management to protect the coastal area against erosion, sea level rise and uncontrolled allotment/ land degradation.

In line with Suriname's Environmental Policy Plan 2012-2016, the aim of Suriname's National Climate Change Policy is to reduce the country's vulnerability through the implementation of climate resilience measures in the coastal area as well as in the interior while bringing development through sustainable and clean technology. In addition emphasis will be placed on research to generate data on the vulnerability of Suriname, on awareness-raising campaigns and on delivering climate resilience measures cross-sectorally.

Although Suriname is not responsible for high GHG e: and has no reduction targets under the UNFCCC, the Environmental Policy is aimed at the application of green technology. The Government will support studies on the use of alternative energy sources in Suriname such as wind, solar, biomass and hydropower (GoS, 2012). In addition, emphasis is placed on research to generate data on the vulnerability of Suriname and on greenhouse gas emissions, on capacity building for

implementation of climate resilience and mitigation measures, on increasing awareness of civil society on effects of climate change and last but not least on getting access to international financial mechanisms related to climate change.

It is essential that resilience-building measures and mitigation opportunities are integrated into the National Development Policy of the Government. At the same time awareness campaigns should be implemented to make the country as a whole aware of the challenges and opportunities arising from a changing climate.

3.2 Policy statement

It is recommended that the Government of Suriname commits to integrate climate change considerations into national development planning and budget setting recognising 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 realised 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 institutionalising climate change.

Suriname's climate change policy is based on the following principles developed in discussions with stakeholders and by reference to existing policies:

- Suriname will take a pragmatic and positive position towards climate resilience and mitigation recognising 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.
- Suriname shall enact effective legislation reflecting the climate compatible development context referred to in the OP. Legislation as an instrument has both a regulating and guiding function binding the State to implement policy.
- The government will 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 take into account the interests of stakeholders and affected parties.
- 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.
- 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.
- The government will take steps to ensure a long-term commitment to technical, financial and institutional support in order to better anticipate and respond to complex issues regarding climate change.

- Suriname through government policies, strategies and actions, and in dialogue with the private sector will ensure that energy generation, transmission and supply, and energy efficiency investments take advantage of the best available or best practicable technology.
- The government will ensure the elevation of monitoring and scientific research to a level required for effective planning and decision-making. The government will take action to ensure that Suriname is provided with a scientifically robust evidence base on which to base decisions.

3.3 Links to other policies

The OP is an overarching document and provides development direction for the country. It forms the base for the national sectoral policies developed by the respective ministries and the yearly district plans. The district plans are derived from resort plans which contain the requirements and needs of the population of each district. District plans cover infrastructure, health, education, utilities and spatial planning.

The National Climate Change Policy which derives from the OP should build on and support the objectives of the national sectoral policies such as those on water, energy, transport, etc. and with district plans.

4 Strategy

In order to deliver on Suriname's Climate Change Policy, a strategy is required to articulate the following:

- Suriname's CCD roadmap.
- Sector and cross-sector climate resilience and low carbon emission development approaches.
- Capacity building needs and opportunities.
- Technology transfer.
- Opportunities to attract investment and finance for CCD.
- Monitoring, reporting and evaluation requirements.

This is presented in sections 4.1 to 4.6 below.

4.1 A climate compatible development roadmap

Figure 3 presents the CCD roadmap for Suriname for the current and forthcoming national planning cycles: 2014-2016, 2017-2021 and 2022+. The roadmap illustrates overarching objectives that should be achieved at different stages across this timeline in order to deliver the Climate Change Policy. The stages of the roadmap are synchronised with national planning cycles, with each stage having a name to describe the focus of activities: 'Commencement', 'Foundation' and 'Take-off'. The Ministry of ATM, leading the development of this NCCPSAP, will be responsible for adoption of the NCCPSAP by the GoS, and for driving and delivering this roadmap. Delivery of the roadmap will be in full consultation and cooperation with a multidisciplinary NCCSPAP Implementation Team, representing all key stakeholders. The Implementation Team provides a coordinating body for the Plan, and thus responds to the CARICOM Implementation Plan's recommendation of building 'One Plan' and 'One Coordinating Mechanism' at the national level.

Government cycles	Current government	2015 – 2020 government	2021 – 2025 government +
National planning cycles	Commencement 2014-2016	Foundation 2017-2021	Take off 2022+
Objectives	The NCCPSAP is developed and adopted by GoS.	GoS commences and completes agreed NCCPSAP programmes.	GoS commences and completes agreed NCCPSAP programmes.
	A NCCPSAP cross-ministerial/ organisational implementation team is instituted.	GoS facilitates development of district level climate change action plans.	Suriname scores positively against NCCPSAP success indicators. A positive impact on the Suriname economy can be identified and directly attributed to the NCCPSAP.
	Implementation team agrees on NCCPSAP research programme, monitoring & evaluation (M&E) programme and financial plan for next 10 years.	Suriname scores positively against NCCPSAP success indicators.	Implementation team agrees on financial plan for next 10 years.
	Direct action is taken where windows of opportunity exist within final year of current GoS (e.g. actions that fit within existing budgets/ plans).	GoS develops and adopts 2022-2026 NCCPSAP.	GoS discusses finance and technology transfer opportunities with development partners, development banks and the private sector
	2015-2020 GoS uses NCCPSAP to inform new National Development Plan, agreeing which programmes it will deliver and ensures continuation of NCCPSAP implementation team.	2021-2025 GoS fully integrates revised NCCPSAP into new National Development Plan.	GoS develops and adopts 2027-2031 NCCPSAP.
	GoS discusses finance and technology transfer opportunities with development partners, development banks and the private sector.		2026-2030 GoS fully integrates revised NCCPSAP into new National Development Plan.

Figure 3: Suriname's climate compatible development roadmap

Achieving the roadmap's objectives is dependent upon the following assumptions:

- There is a clear Ministerial responsibility and ownership (currently the Ministry of ATM) committed to the development and adoption of the 2014-2021 NCCPSAP.
- The current and future Governments of Suriname will remain committed to the principles and objectives of CCD.
- The NCCPSAP Implementation Team will have cross-Ministerial and cross-organisational representation.
- The GoS identifies internal and external financial resources to fund delivery of the NCCPSAP.

Specific programmes and actions to deliver CCD, along with associated information on examples of similar actions recommended/underway, timeline, implementation lead and partners, and challenges, are articulated in section 5.

4.2 Sector and cross-sector climate resilience and low carbon emission development approaches

As stated in the Climate Change Policy, it is recommended that climate change considerations are integrated into national development planning and budget setting, with CCD featuring as a core deliverable of national development plans, cascading into ministerial and departmental planning. Further to this, Suriname's 2012-2016 national development vision has been used to guide the development of longer-term climate change objectives against each national planning theme. The longer-term climate change objectives describe the position Suriname would like to achieve in each sector over the longer term with respect to management of climate change. Programmes and associated actions have been developed that correspond to national planning themes, and build towards these objectives. Organisation by planning theme and sector will allow sector focused entities (such as government ministries) to understand their responsibilities quickly and easily to facilitate implementation. A full list of themed longer term climate change objectives and programmes, as well as a detailed description of how they have been developed, is provided in section 5. Detailed actions are presented in Annex B.

While there is significant value in organising CCD programmes and actions according to sector, it is also important to understand the inter-linkages between sectors to enable inter-Ministerial and organisational coordination. Figure 4 demonstrates how key national planning sectors, in this case energy, agriculture and drinking water, interrelate in the context of managing climate change. Figure 4 illustrates that water resource management connects these three sectors: the Afobaka hydropower (energy generation) facility regulates water supply to Suriname's rivers; the agricultural sector relies on a strong and reliable downstream river flow for irrigation and the avoidance of salt water intrusion; and state water company SWM relies in part on river water (as well as ground water) as a source of drinking water (SWM, Pers. Comm., June 2014). In turn, management of these issues in the context of a changing climate (demonstrated by the CCD programme cited in each circle) requires coordination across and within government ministries and other key stakeholder organisations.

Additionally, whether working sectorally or cross sectorally, it is necessary to consider and address climate change in the context of larger developmental objectives. This will ensure a proportional response to climate change in the context of broader issues and challenges in Suriname. An example of the need for this broad view is in the context of working with indigenous and Maroon communities. In many of these communities, formalising land rights is a priority which is currently at the attention of the GoS. Responses to climate change in these communities may be impacted by their understanding of land rights.

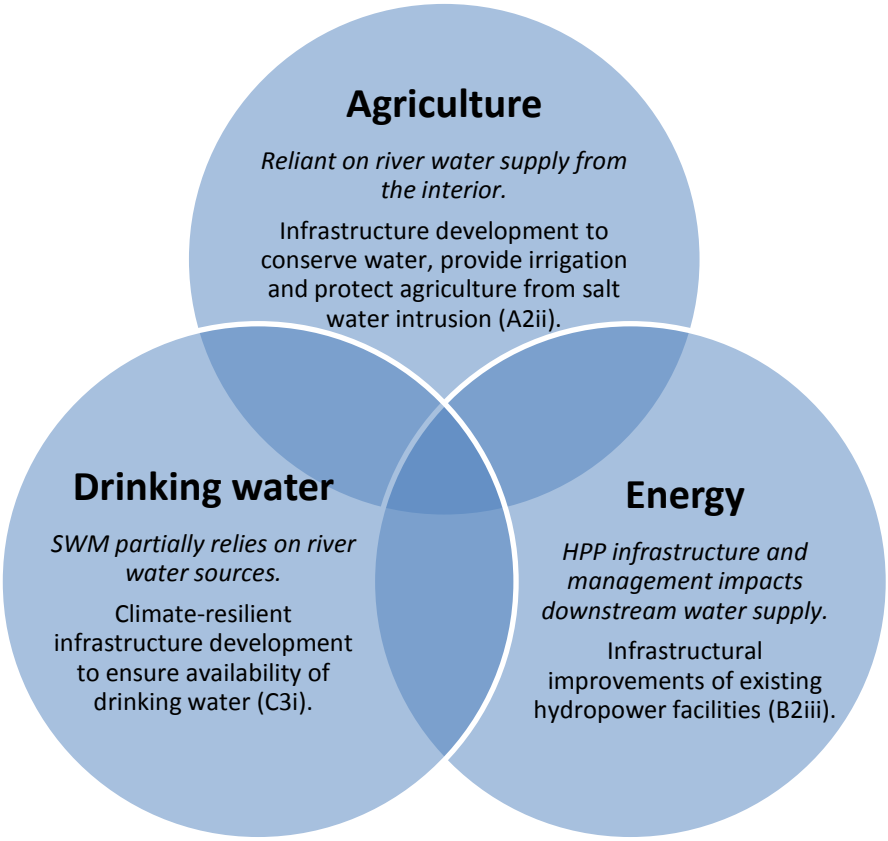


Figure 4: Demonstration of the links between national planning sectors in Suriname and associated climate compatible development programmes. A2ii, B2iii and C3i are CCD programmes presented in full in section 5.

4.3 Capacity building needs and opportunities

Underpinning the CCD roadmap and the various NCCPSAP programmes and actions is the need for additional and strengthened capacity in all sectors of society to be able to respond to the challenges. A 2014 UNDP report on environmental management capacity needs in Suriname (including of climate change) reflects current priorities for cross-sectoral capacity development are as follows:

- Public reform and physical planning
  - Interdepartmental cooperation
  - Clear mandates and responsbility
- Capacity improvement and research
  - Improved natural resource management
  - Data gathering
  - National inventories and databases
- Systematic level
  - Environmental Framework Bill
- Communication
  - Cross sector commuication

- Coordination of awareness activities and public awareness.

A description of how each priority will be addressed in the context of the NCCPSAP is described below.

Interdepartmental cooperation, clear mandates and responsibility

As described in sections 4.1 and 4.2, the Ministry of ATM will be responsible for driving and delivering the overarching CCD roadmap., The Ministry of ATM will identify key government ministries, departments, agencies and non-governmental institutions that should be involved in the NCCPSAP Implementation Team, and will request that these organisations nominate a climate change focal point (and alternate) who will be a member of the team. One factor which will drive the development of the Implementation Team will be the NCCPSAP CCD national development planning theme programmes. In order to ensure inter-organisational cooperation, it is important that the lead implementer for each theme is represented in the NCCPSAP Implementation Team.

Effective implementation of the NCCPSAP will also rely on organisations having clear mandates and responsibility with respect to climate change management. The current institutional framework for climate change governance in Suriname is described in Table 6. The legal mandate of the ministries is based on the State Order Task description of the Ministries (S.B. 1991 no. 58 as lastly amended by S.B 2010 no. 124). Existing mandates have in turn informed the identification of lead implementers for the CCD national planning theme programmes.

Table 6: Institutional framework for climate change governance in Suriname in 2014, based on stakeholder discussions

Ministry/ department/ agency	Climate change-related mandates
Ministries	
Ministry of Labour, Technological Development and Environment (ATM)	Coordination of the preparation of environmental policy and monitoring of its implementation. Promotion of enactment of national environmental legislation. Development of cooperation mechanism(s) to effectively and efficiently implement national and international environmental tasks. Promotion of the implementation of ratified environmental treaties. Promotion of the use of environmentally friendly technologies. Awareness-raising.
Ministry of Physical Planning Land and Forest Management (RGB)	Land use planning. Forest management and nature conservation.
Ministry of Natural Resources (NH)	Management and exploitation of mineral resources, water and energy. Regulation of domestic, public and commercial energy use.
Ministry of Agriculture, Animal Husbandry and Fisheries(LVV)	Regulation of agrarian sector and proper use of agricultural land and waters. Management, rational exploitation and protection of fishery resources.

Ministry/ department/ agency	Climate change-related mandates
Ministry of Public Works(OW)	Planning and implementation of civil engineering and infrastructural works. Water management and drainage. Hydrological and meteorological services. Waste management and spatial planning.
Ministry of Regional Development (RO)	Administers Suriname's rural districts, coordinating development activities and governance in these areas.
Departments/ agencies	
Climate Compatible Development Unit (CCDU) – housed in the Cabinet of the President	- International forest carbon market analyses. - Financial management systems and incentives related to climate change. - International REDD+ and climate change negotiations. - Climate change programme development and development of a carbon credit mechanism.
National Institute for Environment and Development (NIMOS)	- Environmental management/pollution control. - Environmental and Social Impact Assessment (ESIA)
National Council for the Environment (NMR)	- Support the Government by advising on national environmental policy and serving as an advisory body for the Ministry of ATM
Planning Office (SPS)	- Preparation of national development plans.
National Coordination Centre For Disaster Relief (NCCR)	- Coordinator and facilitator for crisis and disaster management.
The Foundation for Forest Management and Production Control (SBB)	- Enforcement of the Forest Management Act.
Meteorological Service	- Collection, analysis and distribution of meteorological information.
Hydraulic Research Division	- Hydraulic observations.
UNFCCC Focal Point	- Co-ordinate communications with UNFCCC and, along with various other government officials, represent Suriname.

As shown in Table 6, the current institutional framework for climate change governance in Suriname is fragmented with responsibilities shared between stakeholders. The SNC (2013) notes that "the coordinating tasks of the CCD(U) sometimes overlap with the climate-related efforts of the ATM and NIMOS, and this can sometimes create tension between these entities" (SNC, 2013, p141). It is advisable to conduct an "in-depth institutional assessment" (SNC, 2013, p141) to further clarify

mandates and responsibilities. This will in turn facilitate the effective functioning of the NCCPSAP Implementation Team.

Improved natural resource management, data gathering, national inventories and databases

There are significant data and information gaps on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management (Van Dijk & de Wolf, 2008). This is particularly the case with respect to the interior districts of Suriname. As such, a comprehensive national research programme is recommended in the NCCPSPAP programmes and actions.

Environmental Framework Bill

An analysis of existing legislation in Suriname in the context of climate change management (del Prado, 2014) indicates that the current legislative environment does not adequately support climate change governance. Sectoral laws are fragmented and do not address climate change, and there is no standalone climate change law.

It is noteworthy to mention that in 2008 the Environmental Framework Bill, prepared by the Ministry of ATM in collaboration with NIMOS and with the participation of a broad group of stakeholders, was presented to the Council of Ministers but was not formally approved. In this instance, the formal procedure for submission to Parliament was not initiated. In 2013, various organisations including a climate expert group led by Professor Naipal of AdeKUS were invited to make presentations to Parliament on climate change. At the end of their presentation the climate expert group presented an amended version of the 2010 Bill to Parliament, making specific reference to climate change and addressing the integration of climate change across multiple planning themes. The revised Bill details a number of key provisions which would support climate resilient and low carbon emission development.

First, the Bill details an Environmental Fund which would finance measures relating to environmental conservation, management and protection, as well as environmental awareness-raising measures and climate change related research. The Bill proposed that this Fund would also create immediate access to financial resources to cover the costs incurred by undertaking urgent measures required in the event of an emergency or incident.

Second, the Bill stipulated that the Environmental Policy Plan should rountinely include the risks of climate change in the national planning process and in policy plans, as well as precautions required to adjust for the effects of climate change, including appropriate and integrated plans for managing and protecting coastal areas. The climate expert group's amended Bill extended to the current ESIA process (which is established under Suriname's ESIA Guidelines), and included recommendations that the process should contain criteria and procedures for determining whether a proposed project could contribute to GHG or potentially be impacted by climate change. The 2012 - 2016 Environmental Policy Plan has since also recommended the integration of climate change into the national planning process.

Further to this, the Bill recommends that specific regulations are developed relating to GHG emissions, their invenotry and their control. This builds on the existing authority that NIMOS (to be renamed the Environmental Authority in due course) has to regulate and enforce pollution norms

and set standards relating to machinery, equipment and products that release contaminants into the environment. Based on the above, it is recommended that a 'two-track' approach is adopted. The first track is to expedite the enactment of the Environmental Framework Bill (draft Act), presented to Parliament in 2013, as this Environmental Framework Bill already addresses integration of climate change across multiple planning themes. The revised version of the Bill has not been discussed with the Ministry of ATM or a wider group of stakeholders, and it is recommended that additional discussions are held before the Bill is submitted to Parliament.

The second track is to amend existing sectoral legislation or draft laws (e.g. the Electricity Bill, Water Bill) to incorporate climate change considerations where windows of opportunity exist to do so. Specific recommendations for this second track are provided in Annex B where all national planning theme actions are listed.

Communication and awareness-raising

As noted in the SNC (2013) and during NCCPSAP consultations, awareness of climate change impacts and low carbon emission development opportunities across Suriname is limited. Following this, a series of awareness raising campaigns has been proposed under selected national planning themes, for example, an awareness raising programme on how to integrate climate resilience into the infrastructure programme and projects cycle at the Ministry of OW, and a programme to promote energy conservation and efficiency for domestic and commercial users. These programmes should build on existing initiatives such as the energy efficiency programme currently under development at EBS which will focus on raising consumer awareness of efficiency-related cost savings. It is also recommended that these programmes are complementary and learn from one another through collaborative forums on climate change, including the NCCPSAP Implementation Team.

4.4 Technology transfer

The Intergovernmental Panel on Climate Change (IPCC) defines technology transfer as:

'a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, non-governmental organisations and research/ education institutions...' (IPCC, 2000).

The exploitation and application of technology is an important component of building climate resilience and low carbon emission development and is further considered in Annex B. For example, in the energy sector, wind, solar and biomass present alternative sources of energy which are unfamiliar technologies in Suriname.

In order to access and apply new technologies in Suriname, technology transfer should be pursued by the government through developing partnerships and transfer mechanisms with foreign governments and foreign and domestic private sector companies, NGOs and research institutes. With respect to foreign entities, Art. 4.5 of the UNFCCC articulates that developed countries and

other developed parties should take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other parties, particularly to developing countries to enable them to implement the provisions of the UNFCCC. As indicated in the CCD roadmap, the GoS should take advantage of this opportunity and discuss technology transfer opportunities with development partners, development banks and the private sector at the earliest opportunity. It would be useful for the Ministry of ATM to undertake a UNFCCC recommended 'Technology Needs Assessment' to draw out and identify priority resilience and low emission technologies required, which could be used to strengthen discussion and as a basis for a portfolio of environmentally sustainable technology (EST) projects and programmes. Additionally, as articulated across a range of national development planning theme programmes, the GoS should develop an enabling environment for technology transfer. This could include the introduction and/or application of fair trade policies, removal of technical, legal and administrative barriers to technology transfer, sound economic policy, regulatory frameworks and transparency, all of which create an environment conducive to private and public sector technology transfer (SNC, 2013).

With respect to technology transfer within Suriname, there are also opportunities for learning between government, the private sector, NGOs and the research community. For example, learning and upscaling from Staatsoilie's new sugar and ethanol processing project in Nickerie District.

4.5 Opportunities to attract investment and finance for climate compatible development

As stated in Suriname's 2012-2016 National Development Plan (OP), the GoS should utilise 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 during the period of this NCCPSAP and beyond is not currently known, it is expected that these sources will be insufficient to address all investment needs, and that new climate finance focussed sources will need to be accessed.

As stated in the CCD roadmap, the Commencement stage (2014-2016) priority for the Ministry of ATM and the NCCPSAP Implementation Team is to agree a financing and investment plan for the next 10 years and to discuss finance and investment opportunities with development partners, development banks and the private sector. This will require costing work to be conducted for programmes and actions in the NCCPSAP, and a pipeline of bankable projects to be developed.

Accordingly, it is important to consider the changing features of the climate finance landscape, with the advent of 'direct access' modalities by which funding decisions (approval, evaluation etc.) are devolved to the national level, resulting in greater local ownership by 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 (respectively, NIE and RIE), alongside financial intermediaries. With its initial resource mobilization phase expected later in 2014, 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. Suriname must ensure that it is an active and willing participant working with development partners to take advantage of the opportunities, including seeking an accreditation for a NIE.

With respect to potential new sources of climate finance and investment, it will be necessary for the Ministry of ATM and NCCPSAP Implementation Team, working with the Ministry of Finance (MinFin), to review options. Climate Finance Options, a joint World Bank-UNDP website that 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, with over 14 countries having already established or being in the process of establishing National Climate Funds (NCFs), such as the Indonesia Climate Change Trust Fund and the Bangladesh Climate Change Resilience Fund (BCCRF). 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 programmes and implement them.

The following clearinghouses may be consulted during the course of initial searches for potential climate finance sources:

- 'Climate Finance Options' provided by the United Nations Development Programme and the Word Bank - http://www.climatefinanceoptions.org/cfo/index.php
- 'Climate Funds Update' provided by the Overseas Development Institute (UK) and Heinrich Böll Stiftung (North America) - http://www.climatefundsupdate.org/
- UNFCCC Finance Portal - http://www3.unfccc.int/pls/apex/f?p=116:1:820614030740067
- Regional Gateway for Technology Transfer and Climate Change Action in Latin American and the Caribbean (REGATTA) provided by the United Nations Environment Programme - http://www.cambioclimatico-regatta.org/index.php/en/financing-opportunities.

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 GoS should create an environment which attracts investment in 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. For example, in Suriname's energy sector, there has been limited investment in and adoption of alternative (non-hydropower based) renewable energy sources. This is due to the state electricity company EBS being required to sell electricity below cost price to consumers (electricity is subsidised in Suriname), EBS suffering consistent net operational losses (as demand increases and EBS has had to rely on expensive thermal powered energy) combined with the current high generation costs of alternative energy. EBS has therefore not been able to purchase or generate non-hydropower based renewable energy, which is currently more expensive to generate. This highlights the importance of looking to private sources of climate finance. 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 facility aimed in particular at supporting activities to enable private sector involvement in Small Island Developing States (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 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 focussed fiscal measures are presented in selected NCCPSAP planning theme programmes and actions (see section 5).

4.6 Monitoring, evaluation, reporting and verification

As stated in the CCD roadmap, the NCCPSAP Implementation Team working with the MinFin will agree a monitoring and evaluation (M&E) programme during Commencement stage (2014-2016), which should also provide guidance on a results verification process and reporting protocol. This is crucial for the GoS to assess the effectiveness of investment in climate resilience and low carbon emission development programmes and actions, to determine if finances are being spent prudently and to guide future investments. In this context it is important that the Implementation Team considers how actions in the NCCPSAP relate to actions in other GoS policy documents and action plans, for example the 2014 National Plan for Forest Cover Monitoring. This will ensure efficiencies in terms of data collection and in documenting 'win-win' investments.

The M&E programme will also assist or continue to assist with international reporting obligations (e.g. by assisting with required GHG inventories submitted to the UNFCCC), and demonstrate Suriname's climate finance readiness, providing a strong platform for attracting international climate finance.

A useful source of guidance for developing the M&E programme is the CCCCC's Monitoring and Evaluation Instrument and Reporting Framework for the Caribbean. The NCCPSAP Implementation Team should consider aligning the Suriname M&E programme with the regional reporting framework.

5 Action Plan

5.1 Introduction and methodology

Building on the Climate Change Policy's requirement that CCD is integrated into national development planning, actions to build climate resilience and low carbon emission development have been defined according to national planning themes. Figure 5 presents the process used to define programmes and actions.

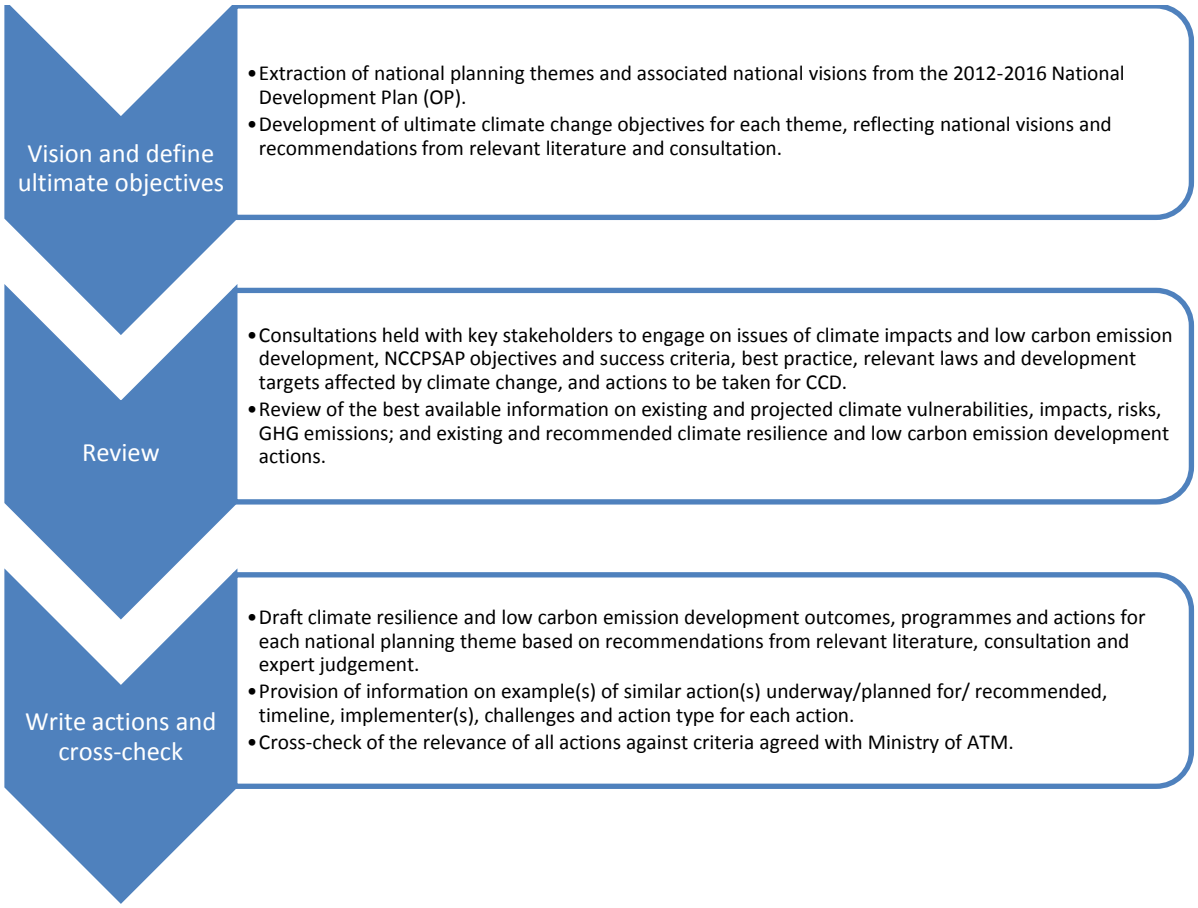


Figure 5: Process followed to define climate compatible development actions for Suriname

As described in the Strategy, Suriname's 2012-2016 national development vision has been used to guide the development of longer-term climate change objectives against each national planning theme. The longer-term climate change objectives describe the position Suriname should aim to achieve in each sector. Programmes and actions for the NCCPSAP have then been defined at the national level with the Action Plan focussed on government taking direct action to build climate resilience and low carbon emission development and on providing an enabling environment for individuals, companies, NGOs, research institutions and others to build resilience and low carbon emission development autonomously. Once the NCCPSAP implementing architecture is firmly in place, the CCD roadmap indicates that central government should facilitate the development of district level climate change action plans during the Foundation stage (2017-2021).

Actions have also been categorised according to their type of approach: “Structural/ Physical”; “Institutional” and “Knowledge & Behaviour” (adapted from IPCC, 2014). These categories were agreed by the project team as being relevant to differentiating climate resilience and low carbon emission development actions. The breakdown of components of this typology is presented in Table 7. In the detailed action plans in Annex B, this typology is represented by colour coding. Structural/Physical actions are in light green, Institutional actions are light blue, and Knowledge & Behaviour actions are in orange.

Table 7: A typology of climate resilience and low carbon emission development actions with examples. Adapted from IPCC (2014). Note: the categories are not mutually exclusive.

Structural/ Physical	Engineered & built environment options	Sea walls & coastal protection structures, flood levees, water storage, improved drainage, flood & cyclone shelters, building codes & practices, storm & wastewater management, transport & road infrastructure improvements, floating houses, power plant and electricity grid adjustments.
	Technological options	New crop & animal varieties; indigenous, traditional& local knowledge, tech & methods; efficient irrigation, water-saving technologies, desalinisation, conservation agriculture, food storage & preservation techniques, hazard &vulnerability mapping and monitoring, building insulation, transfer & diffusion.
	Ecosystem-based options	Ecological restoration, soil conservation, afforestation & reforestation, mangrove conservation & replanting, green infrastructure, controlling overfishing, fisheries co-management, assisted species migration & dispersal, ecological corridors, seed banks, gene banks & other ex situ conservation.
	Services	Social safety nets & social protection, food banks & distribution of food surplus, municipal services including water & sanitation, vaccination programmes, essential public health services, enhanced emergency medical services.
Institutional	Economic options	Financial incentives, insurance, catastrophe bonds, payments for Ecosystem Services, pricing water to encourage universal provision and careful use, microfinance, disaster contingency funds, cash transfers, PPPs.
	Laws & regulations	Land zoning laws, building standards and practices, easements, water regulations & agreements, laws to support DRR, emissions standards, laws to encourage insurance purchasing, defined property rights & land tenure security, protected areas, fishing quotas, patent pools and tech transfer.
	National & government policies & programmes	National & regional climate resilience plans including mainstreaming, sub-national & local climate resilience plans, economic diversification, urban upgrading programmes, municipal water management programmes, disaster planning & preparedness, Integrated Water Resources Management, Integrated Coastal Zone Management.
Knowledge & Behaviour	Educational options	Awareness raising & integrating into education, gender equality in education, extension services, sharing indigenous, traditional and local knowledge, participatory action research& social learning, knowledge sharing & learning platforms.
	Informational options	Hazard & vulnerability mapping, early warning & response systems, systematic monitoring and remote sensing, climate services, use of indigenous climate observations, participatory scenario development, integrated assessments.
	Behavioural options	Household preparation & evacuation planning, migration, soil & water conservation, storm drainage clearance, livelihood diversification, changed cropping, livestock & aquaculture practices, reliance on social networks.

The programmes and actions have been developed to deliver against the objectives of the Commencement and Foundation stages of the roadmap (2014-2016 and 2017-2021), through the application of basic principles of good climate change management. These include identification of actions that fulfil all following criteria:

- address Suriname's existing priorities,
- are ‘no-/low-regrets',
- are 'win-win',
- are timely,
- avoid maladaptation,
- avoid lock-in and promote a flexible approach to managing uncertainty.

A cross-check of actions confirmed that all actions articulated for this time period fulfilled these criteria, which were agreed with the Ministry of ATM.

Table 8 8 presents the four criteria used and how each criterion was assessed for climate resilience-focussed actions, while Table 9 presents this information with regard to low carbon emission development-focussed actions. It should be noted that there is currently no climate projection data and associated assessment of climate risks that pertains to the same time periods as the Commencement and Foundation stages. As such it was not possible to tailor actions to specific projections/ risks over these timescales.

Table 8: Climate resilience criteria. Only actions scoring positively against each criterion remain in the NCCPSAP.

Cross-check criteria	How assessed
Does this action address Suriname's national development planning priorities?	Against 2012-2016 OP text
Does this action respond to and manage existing adverse climate impacts (e.g. flooding)? *The action is no-/low-regrets.*	Using SNC Ch3 & expert judgement
Does the action have the potential to deliver co-benefits, i.e. building resilience to a variable and changing climate, the action also offers additional social, economic or environmental opportunities such as creating jobs and protecting biodiversity? *The action is win-win*.	Expert judgement
Is this action required because there is a long lead-in decision timeline with action needed to be taken now to prepare us for the future, OR is this action required because there is a danger of lock-in to an unsustainable development pathway if action is not taken now (e.g. this action could inform the sustainability of long lived infrastructure)? *The action is timely, avoids lock in and maladaptation and promotes a flexible approach to manage uncertainty.*	Expert judgement

Table 9: Low carbon emission development criteria. Only actions scoring positively against each criterion remain in the NCCPSAP.

Cross-check criteria	How assessed
Does this action address Suriname's national development planning priorities?	Against 2012-2016 OP text, using SNC Chapter 4 mitigation measures
Does this action addresses the key sources of GHG emissions in Suriname; and/or is no/low-regrets?	Expert judgement
N Does the action have the potential to deliver co-benefits, i.e. as well as delivering low carbon development, the action also offers additional social, economic or environmental opportunities such as creating jobs and protecting biodiversity? *The action is 'win-win'.*	Expert judgement
Is this action required because there is a long lead-in decision timeline with action needed to be taken now to prepare us for the future, OR is this action required because there is a danger of lock-in to an unsustainable development pathway if action is not taken now (e.g. this action could inform the sustainability of long lived infrastructure)? *The action is timely, avoids lock in and promotes a flexible approach to manage uncertainty.*	Expert judgement

The NCCPSAP Action Plan is presented in sections 5.2 to 5.14 . For each of the 13 national planning themes, a series of outcomes and programmes has been defined. It is recommended that the programmes under each theme are led by the Government Ministry primarily responsible for that sector. Suggested lead ministries for each programme are provided in the Action Plan. This oversight is aimed at ensuring that related programmes feed into each other, for example an information generation/research activity informing the design and implementation of projects. Annex B provides more detail, breaking programmes down into specific actions, and providing supplementary information on where similar action(s) are underway, planned for or recommended in Suriname, the timeline for implementation, implementation partners and challenges, and the typology for each action. This Annex will be useful for implementation, helping identify where implementers can draw on and build on existing actions or literature. It should be noted however that specific roles to be played by each implementation partner should be discussed at the inception of each included sectoral programme.

5.2 Infrastructure

National vision

Expand accessibility to communities; connect with road systems of neighbouring countries; increase resiliency of the coastal zone; improve drainage of urban and non-urban areas; work towards urban development of suitable areas; modernise waste collection and waste processing.

Longer-term climate change objective

Infrastructure is designed, built and operated to be climate resilient and produce minimal GHG emissions. Infrastructure development increases the adaptive capacity of Suriname's population through increased access to markets and social services.

Lead: OW

Outcomes		**Programmes**	
A1	Improved knowledge across Suriname about the risks of climate change to infrastructure and how to manage climate impacts.	i	Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management.
		ii	Awareness raising programme on how to integrate climate change resilience into the infrastructure programme and projects cycle.
A2	Infrastructure has greater resilience to direct and indirect impacts of climate change.	i	Develop and implement law, policy and regulation to integrate climate change resilience into infrastructure planning and development.
		ii	Infrastructure development to improve drainage, storm surge and flood management and prevent saltwater intrusion in “at risk” areas.
		iii	Incorporate climate resilience into roads development and maintenance.
A3	Decreased GHG emissions from transport and roads.	i	Incorporate measures to reduce GHG emissions into road infrastructure.
A4	Decreased GHG emissions from waste.	i	Develop and implement law, policy and regulation to minimise waste.
		ii	Waste management incentivisation.
		iii	Awareness programme for minimising waste.

5.3 Energy

National vision

Provide access to affordable electricity for all households; provide energy to meet energy demand for accelerated development of the country; study alternative energy resources and expansion possibilities of renewable and alternative energy resources; improve generation mix of thermal power and hydropower for affordability of electricity; extend and improve electricity grid (in particular connecting the southern part of the country to the grid).

Ultimate climate change objective

Energy generation, transmission and distribution systems are designed, built and operated to be climate resilient. Diversification of energy generation sources towards renewables increases access to, reliability and affordability of electricity, while reducing Suriname's GHG emissions.

Lead: NH

Outcomes		**Programmes**	
B1	Improved knowledge about how climate change will impact energy generation, transmission, and distribution, and development of options to increase energy security and decrease emissions.	i	Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management.
		ii	Awareness raising and capacity building programme to encourage energy conservation, energy efficiency and use of renewable energy.
B2	Energy generation, transmission and distribution systems are climate resilient and low-emitting, contributing to energy security and accessible, reliable and affordable electricity.	i	Develop and implement law, policy and regulation to encourage energy efficiency and use of renewables.
		ii	Financial incentives to influence energy use and decrease emissions.
		iii	Infrastructural improvements of existing (and new) hydropower facilities.
		iv	Increase access to climate finance.

5.4 Drinking water

National vision

Improve availability of safe, clean and affordable drinking water for all households (in 2015: 85% of all households in coastal region and 75% of all households in interior); protect freshwater resources in groundwater aquifers and surface water; perform hydro-geological research to locate future freshwater resources; promote efficient use of freshwater; export of freshwater.

Ultimate climate change objective

Sustainable and secure water supplies are available across the country in the face of a variable and changing climate.

Lead: NH

Outcomes		**Programmes**	
C1	Improved knowledge of climate impacts on water resources and how to manage climate impacts.	i	Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management.
C2	Water resources and supply have greater resilience to climate change.	i	Develop and implement law, policy and regulation to ensure sustainable exploitation and use of drinking water resources.
		ii	Water management programme to ensure resilience of water supply.
C3	Clean, safe and affordable drinking water is available to households at all times.	i	Climate-resilient infrastructure development to ensure availability of drinking water.
		ii	Awareness raising programme on avoiding contaminated water post-disaster.

5.5 Housing

National vision

Make available high quality and affordable housing for all citizens; establish enabling environment for citizens to purchase and rent housing; and facilitate housing initiatives.

Ultimate climate change objective

Existing and new build housing is retrofitted, designed and/or built to be climate resilient and takes advantage of potential future green growth opportunities such as feed-in tariffs.

Lead: SoZaVo

Outcomes		**Programmes**	
D1	Improved knowledge of climate change impacts on housing provides evidence base for informed decision making.	i	Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management.
D2	Increased resilience and energy efficiency of new housing from effective zoning and development control.	i	Develop and implement law, policy and regulation for climate resilient housing development planning.
D3	Increased resilience and energy efficiency from new building design.	i	Develop and implement law, policy and regulation for climate resilient building design.
		Ii	Financial incentives to build climate resilient homes.

5.6 Mining

National vision

Introduce environmental friendly technologies for mining; rehabilitate mining areas; stimulate sustainable land use.

Ultimate climate change objective

Mining infrastructure and operations are climate resilient and produce minimal GHG emissions.

Lead: NH

Outcomes		**Programmes**	
E1	Improved knowledge of how climate change will impact mining activities in Suriname and how to manage climate impacts and GHG emissions.	i	Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management.
		ii	Awareness raising and capacity building programme on climate resilient and low emissions mining techniques.
E2	Mining operations have greater resilience to direct and indirect impacts of climate change.	i	Develop and implement law, policy and regulation to integrate climate resilience into mining operations
E3	Decreased GHG emissions from mining operations.	i	Implement forest rehabilitation programme to sequester carbon dioxide.

5.7 Agriculture, livestock and fisheries

National vision

Ensure food security and food safety; establish Suriname as leader in food security in the region; promote sustainable agricultural production; establish Suriname as food producer and food supplier of the Caribbean region.

Ultimate climate change objective

Food security, safety and export is maintained and expanded in the context of a variable and changing climate. More efficient production systems are implemented, reducing energy consumption and incorporating the reuse of already exploited or abandoned fields. Opportunities are seized for the production of renewable energy in the agricultural sector, attracting climate finance.

Lead: LVV

Outcomes		Programmes	
F1	Improved knowledge of how climate change will impact on Suriname's agriculture, livestock and fisheries sectors and development of climate resilient products/techniques.	i	Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management.
		ii	Integration of climate resilience into agricultural extension services (raising awareness of farmers, pastoralists and fisherfolk on the impacts of climate change, and building capacity on how to manage impacts).
F2	Agricultural crops, livestock and fisheries are protected from water shortages, flooding and salt water intrusion.	i	Develop and implement law, policy and regulation to incorporate climate resilience into agriculture, livestock and fisheries management.
		ii	Infrastructure development to conserve water, provide irrigation and protect agriculture from salt water intrusion.
		iii	Financial support to farmers, pastoralists and fisherfolk to build climate resilience.
F3	Decreased GHG emissions from agriculture.	i	Technological transfer programme on sustainable and environmental friendly agricultural practices.

5.8 Tourism

National vision

Develop tourism sector to increase its contribution to national economy; promote Suriname as a nature tourism destination, with attractions in the interior in particular

Ultimate climate change objective

Tourist infrastructure, attractions and suppliers are protected from negative climatic impacts to ensure a strong, reliable service to visitors. Benefits from low carbon branding and carbon taxes are exploited.

Lead: TCT

Outcomes		**Programmes**	
G1	Improved knowledge on how climate change will impact the tourism industry and how to manage climate impacts.	i	Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management.
		ii	Engagement and awareness raising programme on climate impacts and climate resilient decision-making.
G2	Tourist infrastructure, attractions and suppliers are protected from negative climatic impacts and produce minimal GHG emissions.	i	Develop and implement law, policy and regulation to integrate climate resilience into tourism operations and decrease GHG emissions.
		ii	Conservation, protection and monitoring of ecotourism.
		iii	Integration of measures to protect tourism attractions, operators, and tourists from climate impacts.

5.9 Education

National vision

Access to basic education for all; improve quality of basic education.

Ultimate climate change objective

Early childhood, primary, secondary, tertiary and vocational education institutions provide the information needed by the current and next generations to respond to climate change.

Lead: MINOV

Outcomes		**Programmes**	
H1	Current and future generations have the information they need to respond to climate change.	i	Provide climate change information at all levels of formal education.
		ii	Public awareness raising programme on climate change mitigation and climate resilience.
H2	The educational system's infrastructure is protected from climate impacts and education programmes run interrupted.	i	Develop climate resilient infrastructure in the education sector.

5.10 Health

National vision

Improve availability, accessibility and affordability of health services for all.

Ultimate climate change objective

Health services and infrastructure are equipped to provide support to those impacted by a variable and changing climate and its effects on health (for example impacts on vector borne diseases).

Lead: Ministry of Health

Outcomes		**Programmes**	
I1	Improved knowledge across Suriname about climate-related diseases and appropriate prevention/treatment.	i	Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management.
		ii	Capacity building programme for public health sector on climate resilient health practices.
		iii	Awareness raising programme on climate-related health impacts, prevention and treatment.
I2	People are protected from the negative health impacts of a variable and changing climate.	i	Development of climate resilient health infrastructure and initiatives.
		ii	Integration of new technology and procedures in the health sector to enhance disease control.

5.11 Disaster risk management

National vision

Safeguard national security of nation's territory and livelihoods of all.

Ultimate climate change objective

Disaster risk management services collaborate with institutions responsible for climate change management to ensure improved knowledge and management across Suriname of climatic impacts.

Lead: NCCR

Outcomes		**Programmes**	
J1	Improved knowledge of how climate change may influence disaster occurrences and disaster risk management.	i	Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management.
		ii	Awareness raising programme on the impacts of climate change on disaster occurrence and methods of seeking assistance and staying safe.
J2	Disaster risk management considers climatic impacts.	i	Develop and implement law, policy and regulation to integrate climate resilience into disaster risk management.
		ii	Integration of climate resilience into disaster risk management infrastructure and operations.
J3	People are protected from the negative health impacts of climate-related disasters.	i	Financial measures to increase resilience in the wake of disaster.

5.12 Spatial planning

National vision

Organise land and natural resources within relevant master plan and zoning plan; stimulate responsible utilisation of nation's territory; formally anchor agricultural production in zoning plan.

Ultimate climate change objective

Sustainable land management in Suriname takes into account the impacts of a changing climate and the need for low carbon development.

Lead: ROGB

Outcomes		**Programmes**	
K1	Improved knowledge of how climate change may impact land use and spatial planning.	i	Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management.
K2	Urban and rural areas are resilient to a variable and changing climate.	i	Develop and implement law, policy and regulation for climate resilient spatial planning and management.
K3	Increased natural resiliency along coastline.	i	Implement measures to increase resilience of coastline to a variable and changing climate.

5.13 Environment

National vision

Sustainably utilise natural potential through protective measures and mitigation of environmental damage; protect and restore natural environment particularly to preserve carbon fixation, biodiversity, soil and water; establish adequate sanitary facilities; increase environmental awareness; give priority to legislation, capacity building, monitoring and information; apply climate resilience measures.

Ultimate climate change objective

Environmental protection measures take account of the impacts of a variable and changing climate, low carbon growth opportunities.

Lead: ATM

Outcomes		**Programmes**	
L1	Improved knowledge of how climate change will impact the natural environment and ecosystems.	i	Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management.
		ii	GHG emissions monitoring programme.
		iii.	Capacity building programme on climate change mitigation and climate resilience.
L2	Natural environment and ecosystems are resilient to a variable and changing climate.	i	Develop and implement law, policy and regulation to protect natural environment and build climate resilience
		ii	Environmental and biodiversity management programme.
L3	GHG emissions are reduced.	i	Develop and implement law, policy and regulation to reduce GHG emissions.

5.14 Sustainable forest management

National vision

Improve sustainability of forest exploitation and conservation of tropical rainforest.

Ultimate climate change objective

Sustainable forest management in Suriname takes into account the impacts of a changing climate and the need for low carbon development.

Lead: SBB

Outcomes		**Programmes**	
M1	Improved knowledge across Suriname of how climate change will impact forests and forest management practices.	i	Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management.
		ii	Awareness raising and capacity building programme on SFM, carbon accounting and carbon monitoring.
M2	Sustainable management of forest resources taking into account climate impacts and increased carbon sequestration.	i	Develop and implement law, policy and regulation to incorporate climate resilience and mitigation in forestry.
		ii	Increase access to climate finance for sustainable forest management.
		iii	Implement forest resources management programme.

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Annex A: List of stakeholders[10]

This the list of stakeholders who were invited to take part in the engagement process. Those who were active participants through attendance at workshops, one-to-one meetings or telephone/email exchanges are marked with 'Y' for Yes in the right hand column.

Name	Organisation	Role/position/designation	Active participant
Robert Tjien Fooh	Anton de Kom Universiteit van Suriname (AdeKUS)	Consultant SNC Agriculture	N
Lydia Orie	AdeKUS-Agricultural Production	Consultant SNC Agriculture GHG	Y
Max Huisden	AdeKUS-Environmental Science	Professor, Consultant Health SNC	Y
Gwendolyn Emanuels-Smith	Attune Development	Gaps & Constraints SNC	N
Dirk Noordam	Consultant	Consultant SNC Ecology	N
Ria Jharap	Consultant	Consultant Energy GHG SNC	Y
Karin Spong	Consultant	Consultant SNC Industry/waste	N
Ivan Apapoe	Financial consultant	Consultant SNC Finance Mitigation Assessment	N
Helyante MacDonald	Crossed Lines Advisory Services	Managing Director	Y
Selvin Bisschop	General Bureau for Statistics (ABS)	Stafmedewerker Research & Planning	Y
Gerrit A. Breinburg	Ministry of Agriculture, Animal Husbandry & Fisheries	Director	N

[10] Stakeholder names are listed in the form they were provided to the team during project engagement.

Name	Organisation	Role/position/designation	Active participant
Karmen Kromoreso	Ministry of Agriculture, Animal Husbandry & Fisheries	Deputy Head Culture Technical Planning and Development	Y
Minu Parahoe	Amazon Conservation Team	Program Director	N
Raisa Abendanon	AdeKUS	Student Environmental Sciences	Y
Dr. ir. Ryan Sidin	AdeKUS	Chairman AdeKUS	N
Jimmy Narain	AdeKUS	Consultant SNC GHG Mitigation Assessment	N
Nuravni Sallons	AdeKUS	Student Environmental Sciences	Y
DrRiad Nurmohamed	AdeKUS	Head Dept. of Infrastructure, Climate Science Specialist	Y
Professor Sieuwnath Naipal	AdeKUS		Y
Marie-Josee Artist	Association of Indigenous Village Leaders in Suriname (Vereniging Inheemse Dorpshoofden in Suriname)		Y
Stiefen Petrusie	Association of Saamaka Traditional Authorities (Vereniging van Saramacaanse Gezagsdragers)	Chair	N
Henna Uiterloo	Min ATM - Directorate Environment	Director	Y
Haidy Aroma	Min ATM - Directorate Environment	Sr. Environmental Policy Officer	Y
Mariska Riedewald	Min ATM - Directorate Environment	Deputy Director Regulations & Conventions	Y

Name	Organisation	Role/position/designation	Active participant
Priscilla Setrowidjojo-Karijodrono	Min ATM - Directorate Environment	Environmental Policy Officer	Y
Rachelle Bong A Jan	Attune Development	Consultant	Y
Natalie Accord-Liu	Bauxite Institute Suriname	Dept. Communication & Information	Y
Drs. Rita I. Vaseur-Madhoeban	Bauxite Institute Suriname	Director	N
Raymondo Emanuels	Bauxite Institute Suriname	Jr. Staf medewerker (afd. Controle & Monitoring)	Y
Lesley Resida	Bureau of Public Health (Bureau Openbare Gezondheidszorg)	Director	N
Mayra Esseboom	Center for Agricultural Research in Suriname (CELOS)	Researcher non-timber forest products	Y
Inez Demon	CELOS	Director	N
Maria Callebaut	CELOS	Head Department Agricultural research	Y
Maureen Playfair	CELOS	Coordinator Forest research	Y
Franklin Vreden	Chamber of Commerce (Kamer van Koophandel en Fabrieken)	Policy Advisor	Y
Ir. Henk Naarendorp	Chamber of Commerce (Kamer van Koophandel en Fabrieken)	Chair	N
Theresa Castillion-Elder	Climate Compatible Development Unit	Environmental Policy Officer	N
ir. Harrold Sijlbing	Commissariat Coronie	DC Coronie	N

Name	Organisation	Role/position/designation	Active participant
Sonodikromo	Commissariat Wanica		Y
John Goedschalk	Conservation International Suriname	Executive Director	N
S. Sardjoe	DC Administrative Jurisdiction Paramacca		Y
Yvonne Pinas	DC Brokopondo	Brokopondo	N
Paulus	DC Commewijne		Y
Joyce Toelsie	DC Nickerie	Head of Dept MGD (Environment, Health)	N
Pawankumarsing Abhelakh	DC Saramacca	Administrative Dept MGD	Y
Albert Barron	Ministry of Defence	Head Internal Control	Y
John A. Achong	Ministry of Defence	Director	N
Loes Trustfall	Development Radio and Television	Chair	Y
Marlon Hofwijk	District Commission of Brokopondo		N
Remy Pollack	District Commission of Commewijne	DC	N
Sandra Kabeli	District Commission of Commewijne		Y
Aroenkoemar Ramdhani	District Commission of Coronie	MGD	N
Lucie Doorson	District Commission of Coronie		Y
Theodorus Sondrejoe	District Commission of Marowijne		N

Name	Organisation	Role/position/designation	Active participant
Clyde Hunswijk	District Commission of Marowijne		Y
Wedprekash Joeloemsingh	District Commission of Nickerie	DC	Y
Freddy Daniel	District Commission of Para		Y
Jerry Miranda	District Commission of Para	DC	N
Mohamad Kasto	District Commission of Par'bo Noord/Oost	DC	Y
Fred Aarti Bouterse	District Commission of Par'bo Noord/Oost		Y
Rogelio Hoelen	District Commission of Par'bo Noord/Oost		Y
Mike Nerkust	District Commission of Par'bo Zuid-West	DC	N
Lorenzo Tjoen-A-Choy	District Commission of Par'bo Zuid-West		Y
Lalita Bhairo	District Commission of Saramacca	MGD	Y
Ravin Jiawan	District Commission of Saramacca		N
Margretha Malontie	District Commission of Sipaliwini		N
Naltus Naana	District Commission of Sipaliwini		N
Gracia Emanuel	District Commission of Sipaliwini	DC	N
Ch.Houthakker	District Commission of Sipaliwini		Y

Name	Organisation	Role/position/designation	Active participant
Jacobus Asaiti	District Commission of Sipaliwini		Y
Mavirick Boejoekoe	District Commission of Sipaliwini		N
Armand Jurel	District Commission of Sipaliwini		N
Dewanand Moesai	District Commission of Wanica	District secretary	Y
Roline Samsoedien	District Commission of Wanica/Deken v/d DC's	DC	N
Chiquita Resomardono	Energy Company Suriname / EnergieBedrijven Suriname (EBS)	Environmental Supervisor Dept.	Y
Samuel Mehairjan	Energy Company Suriname / Energie Bedrijven Suriname (EBS)		Y
Ricky October	Min. of Finance	Coordinator	N
Chairmè Konigferander	Min. of Finance	Senior Legal Officer	Y
Ellen Naarendorp	Min. of Foreign Affairs	Director	N
Reshma Janikpersad	Foundation for Forest Management and Production Control	Junior Manager Forest arrangement	Y
Seth Panka	Foundation for Forest Management and Production Control		N
Pearl Jules	Foundation for Forest Management and Production Control	Managing Director	N

Name	Organisation	Role/position/designation	Active participant
Drs. Ivan Sno	General Bureau for Statistics (ABS)	Director	N
Anjali DeAbreu-Kisoensingh	General Statistical Office (Algemeen Bureau voor de Statistiek)	Dept. Research& Planning	Y
Monique Pool	Green Heritage Fund Suriname	Chair	N
Rischmie Jhari	Green Heritage Fund Suriname	Project administration/coordination	Y
Wynne Minkes	Green Heritage Fund Suriname	Volunteer	Y
Dunja Burkhard	Green Heritage Fund Suriname	Volunteer	Y
drs. Marthelise Eersel	Min. of Health	Director	N
Adley Breeveld	Min. of Health	Policy Officer (FP Human & Environmental Health)	Y
Kenneth Codrington	Min. of Trade and Industry		Y
Marco Carlo Nicola	IADB	Representative	N
Radjiskumar Mohan	Institute for Graduate Studies and Research (IGSR)	Deputy Director Research	Y
Karishma Harnam-Kishna	IGSR	Research Assistant	Y
Martin Schalkwijk	Institute for Graduate Studies and Research	Director	N
Rahid Doekhie	Manufacturers Association Suriname (Associatie van Surinaamse Fabrikanten)	Chair	N

Name	Organisation	Role/position/designation	Active participant
Sandra Jubitana	Environment andHealth Service of the District Commission (MGD)		N
Artie Autar-Mathoera	Min. of Spatial Planning, Land and Forest Management (RGB)	Legal staff (juridisch medewerker)	Y
Moejinga Aboikoni-Linga	Min. of Regional Development (RO)	ex OD	Y
A. Schoonland	Min. RO		Y
drs. Liane Pinas-Halfhide	Min. of Finance	Director	N
Sagita Lakhisaran-Jaggan	Min. of Finance	Senior Actor Coordinator	Y
Tjiene Cheung	Min. van HI (Min of Trade and Industry)	Policy Officer	N
Guido van der Kooye	Min. LVV (Ministry of Agriculture, Animal Husbandry & Fisheries)	Coordinator Region West	Y
Angelique Yorks	Min. NH (Ministry of Natural Resources)		N
Anwar Hassankhan	Min. OW (Ministry of Public Works)	Director (Building Works & Services)	N
Rashni Soerdjlal	Min. OW	Under directorate Spatial Planning	Y
S. Soman	Min. OW	Deputy Director Dry Civil Engineering Works	N
Astracia Warner	Min. Health	Bureau of Public Health (Openbare Gezondheidzorg)	Y
Bianca de Bats	Min. OW		Y

Name	Organisation	Role/position/designation	Active participant
A. Koenjbihare	Min. OW		Y
P. Punwasi	Min. OW		Y
Tony Anoewaritja	Min. RO	Dept. Village Development	Y
Mujenca Pinas	Min. RO	Policy Officer	Y
Robert Peneux	MINOV (Ministry of Education)	Director Department Education	N
René Bilkerdijk	MINOV	Coordinator General Forming Subjects (Algemeen Vormende Vakken - Hoofdafdeling Beroepsgericht Onderwijs)	N
Faye Graanoogst	N.V. EBS Energy Company Suriname	Unknown	Y
Lt. Col. Jerry Slijngard	National Coordination Centre for Emergency (NCCR)	Director	Y
Gaitrie Usha Satnarain	National Zoological Collection of Suriname	Natural Resource Manager/Environmentalist CC	Y
Angelique Mackintosh	Ministry of Natural Resources	Policy Officer	Y
Rudi Schillevoort MSc.	Ministry of Natural Resources	Director	N
Cedric Nelom	National Institute for Environment and Development (NIMOS)	Acting Director	N
Farzia Hausil	NIMOS	Legal Officer	N
Christine Naarden	Pater Albrinck Foundation	Chair	N
Andre Misiekaba	Permanent Commission Min. ATM	Chairman	N

Name	Organisation	Role/position/designation	Active participant
Hesdy Olmskerk	Planbureau	Director	N
Henk van Dams	Planbureau	Staff Officer, Dept. Social Planning & Research	N
Suleta Monsels	Planbureau	Policy Officer, Environment Dept.	N
Cor Becker Dipl. Met.	Ministry of Public Works	Head Meteorological Services (MDS)	N
Sukarni Sallons-Mitro	Min. OW (Ministry of Public Works)	Head Climatology MDS	Y
Ritesh Sardjoe	Min. OW	Senior Technical Employee	Y
Moekiran A. Amatali	Min. OW	Head Hydraulics Dept.	Y
Satish Mohan	Min. OW	Directorate CTW	N
Ir. Ing. D. Mungra	Min. OW	Deputy Director Engineering Works	N
Lilian Krishnadath	Min. OW	Deputy Director Spatial Planning	N
Urmie Vrede	Min. RO	Director	N
Mayra Sumter MSc.	Min. RO	Rural Development Sociologist	N
Thanya Soké-Fonkel	Min. RO	Under Directorate Development Interior	N
Reshma Jankipersad	Foundation for Forest Management and Production Control (SBB)	Junior Manager Forest Arrangement	N
Sarah Crabbe	Foundation for Forest Management and Production Control (SBB)		Y

Name	Organisation	Role/position/designation	Active participant
Andre Goeptar	SBI / SBC		Y
Claudine Sakimin	Spatial Planning, Land and Forest Management	Coordinator Nature Management	Y
Saeid Talaei Kamalabad	Spatial Planning, Land and Forest Management	Intern	Y
Marie Drakenstein	Spatial Planning, Land and Forest Management	Deputy Director Forest Management	Y
Artie Autur-Mathoera	Spatial Planning, Land and Forest Management	Legal employee	Y
Sohrabali Kadirbaks	Spatial Planning, Land and Forest Management	Deputy Director Spatial Planning	N
Dr. ir. Joy I. Themen	Staatsolie	ESIA Consultant	Y
Eddy P. Fränkel	Staatsolie	Overall Manager Suriname Ethanol & Sugar Project	Y
Soeraya Mangalsing	Staatsolie N.V.	Jr. Environmental Engineer	Y
M. C. H. Waaldijk	Staatsolie N.V.	Managing Director	N
Gloria Saakie	Stg Bureau VSG (Saramacca)		Y
Frank Groenenberg	Stg. Bureau NGO's		Y
Sheila Ketwaru-Nurmohamed	Stg. Bureau NGO's	Director	N
Wilgo Koster	Stg. Buurtwerk Latour	Coordinator Centrum	Y
Eugenia Velland-Uiterloo	Stg. Nationale Vrouwenbeweging	Director	Y
Cheryl Sastro	Stg. Nationale Vrouwenbeweging	Project coordinator, Water and Sanitation	Y

Name	Organisation	Role/position/designation	Active participant
Robby Dragman	stg. STINASU	wnd. Director	N
Christine de Rooy	Stg. Suriname Conservation Foundation		Y
Stan Malone	Stg. Suriname Conservation Foundation		Y
Nardi Johanns	Stg. Suriname Conservation Foundation	Executive Director	Y
Cylene France	Stichting Fonds Ontwikkeling Binnenland		Y
Ciefranie Abiamofo-Menig	Stichting Fonds Ontwikkeling Binnenland		N
Hariette Vreedzaam	Stichting Sanomaro Esa		Y
Drs. F. Remy Grauwde	Suriname Bureau of Standards	Director	N
Oedairaj Goeptar	Suriname Business Forum	Managing Accounting & Finance	N
Ferdinand Welzijn	Suriname Business Forum	Chair	N
Govind Panchoe	Suriname Environmental Movement		N
Humphrey Blinker	Suriname Red Cross (Het Surinaamse Rode Kruis	Disaster Management Officer	Y
Ashwini Boedhoe	Suriname Water Company / Surinaamsche Waterleiding Maatschappij (SWM)		Y
Harold Telgt	Suriname Water Company / Surinaamsche Waterleiding Maatschappij (SWM)		Y

Name	Organisation	Role/position/designation	Active participant
Ir. S. Sjauw Koen Fa	SWM (Suriname Water Company)	Director	N
drs. J. Simons	The National Assembly	Chairman	N
Mauro Tuur MBA	Ministry of Trade & Industry	Director	N
Simone Haridat	Ministry of Trade & Industry	Jr. Official	Y
drs. Th. Douglas - Pinas	Ministry of Transport, Communication and Tourism	Director	N
Rudi van Kanten	Tropenbos International Suriname	Programme Director	Y
Anuradha Khoenkhoen	UNDP	PA Energy and Environment	N
A. M. Alexis	UNDP	Deputy Resident Representative	N
Kenneth Woei-A-Tsoi	Vereniging Surinaams Bedrijfsleven	Director	Y
Marcel Meyer	Vereniging Surinaams Bedrijfsleven	Chair	N
Dominiek Plouvier	World Wide Fund Suriname	Regional Director	N

Annex B: Actions

Detailed action plans are presented below. The lead implementer for each programme is indicated in parentheses next to the relevant programme title. Based on project consultations, those actions that can be undertaken during the Government term at the time of writing are indicated with a circle mark ( ) in the 2014-2016 timeline columns.

Infrastructure

Infrastructure (OW)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
A1i Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management (OW)							
Expand climate data monitoring network (number of stations and climate variables collected).	MDS has a network of about sixty posts, down from 180 posts of the early 1980s. At present, observations are made at 21 stations, 5 synoptic stations, 11 climate stations and 2 automatic stations (NIMOS, 2005). MDS has received in 2013 seven hydro-meteostations from the EU GCCA project component 2 “Improved climate monitoring, data retrieval and space-based	SNC (2013), p133	●			MDS, RO, WLA, private sector	Financial resources; Human capital

Infrastructure (OW)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
	tools for disaster risk reduction". WLA has a hydrometric basic network consisting of around 140 measuring stations in operation till 1986. From these stations water levels, water discharges and water quality data were collected. At present, only 15 stations in the coastal area are in operation, and 5 stations are not in operation temporarily. The use of digital telemetric recorders and standalone data loggers for water level recording has successfully been introduced and a number of these instruments has been ordered as part of the planned modernization of WLA.						
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)		SNC (2013), p. 91				AdeKUS, MAS, WLA	Human capital

Infrastructure (OW)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Undertake research to assess the role of mangrove forests and coastal dikes/drainage systems to provide protection against storm surge and flooding	Prof Dr. Naipal does research on combination of hard/soft solutions in Coronie	ICZM Plan	●			AdeKUS, consultants,	Human capital
A1ii Awareness raising programme on how to integrate climate change resilience into the infrastructure programme and projects cycle (OW)							
Develop specific infrastructure guidance on the appraisal, design and operation of assets under conditions of a changing climate.	CCORAL training was conducted by the CCCCC for GoS representatives in October 2013 in Barbados (MinFin is the focal point). CCORAL training being conducted in August 2014 in Suriname by CCCCC.					MinFin; ATM; SPS; CCCCC, RO	Institutional capacity
Conduct an awareness raising programme to inform the general public about climate resilient building and its importance.			●			ATM, RO, Ministry of Social Affairs, AdeKUS, publicity service of OW	Institutional capacity, enabling policy/regulatory environment
A2i Develop and implement law, policy and regulation to integrate climate change resilience into infrastructure planning and development (OW)							
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).		SNC (2013), p. 93				OW Under Directorate Wet Civil Engineering Works, NH, RGB, RO	Enabling policy/regulatory environment

Infrastructure (OW)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Design and implement measures to protect existing assets located in flood risk areas.						OW Under Directorate Wet Civil Engineering Works, NH, RGB, LVV, RO	Financial resources
Establish building codes that incorporate new, appropriate and affordable technologies to improve the resilience of physical infrastructure to climate change	Existing legislation on building guidelines (but no climate resilience component)	SNC (2013), p. 93, Climate Action Plan p. 45-46 (minimising use of air conditioning through building design)				OW Under Directorate Architectural Works, RO/DCs, AdeKUS, SSB	Enabling policy/regulatory environment
Provide incentives to encourage the implementation of building codes.						ATM, MinFin, private sector (banks), DC	Financial resources, enabling policy/regulatory environment
Establish a monitoring programme to ensure compliance with building codes and to enforce regulations.						OW Under Directorate Architectural Works, RGB, DC,	Financial resources, enabling policy/regulatory environment

Infrastructure (OW)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
A2ii Increase access to finance for climate-resilient infrastructure development (OW)							
Identify sources of funding for climate resilient infrastructure and train stakeholders in how to access.						RO, DC, MinFin, CCDU	Human capital, institutional capacity
A2iii Infrastructure development to improve drainage, storm surge and flood management and prevent saltwater intrusion in "at risk areas" (OW)							
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). Conduct regular maintenance and frequent inspection of infrastructure and identify areas which require investment for improvements.	Preliminary studies and dike construction ongoing (Coronie, Commewijne, Weg naar Zee, Waterkant, New Nickerie, Paradise); Infrastructure plans of OW. Communities are putting up earthen dams to protect from flooding in coastal areas (Prof. Naipal, pers. comm., June 2014). NCCR has an overview of areas where disasters have hit in the previous period. WLA has historical data on water levels for several locations.	SNC (2013), p. 93, 94; Caribsave (2012) p. 172 recommends similar action in interior communities. Climate Action OP p.12; At the district workshops in June 2014, these specific interventions were recommended as actions: Build dikes and maintain waterways in Paramaribo and	●			AdeKUS, RO, DCs, RGB, LVV, TCT, ATM, SFOB, private sector, NCCR, WLA	Human capital, financial resources

Infrastructure (OW)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
		Nickerie, extend existing dike in Coronie, build dikes in Wanica near Domburg and Houttuin					
A2iv Incorporate climate change considerations into roads development and maintenance (OW)							
Assess and adjust the coordination of the main transport infrastructure, currently located in the vulnerable coastal zone. Develop roads that are climate-proof (ie. resilient to heavy rainfall) and hydrologically sensitive (that do not disrupt the hydrological processes essential to preserve ecosystems).	Rehabilitation of East-to-West Road. Plans of RO and OW to connect Boven Suriname with Tapanahony. (OW also has in the pipeline a project to relieve the busy traffic in Wanica (a second road) and are doing research on building a second bridge over the Suriname river.	SNC (2013), p. 93, 97; Development of roads noted in Sipaliwini district plan of RO.				RO, DCs, RGB, Road Authority, local communities	Enabling policy/regulatory environment, financial resources
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.						Road Authority	Human capital, institutional capacity; financial resources
Evaluate current surcharge on motor fuels and determine the economic feasibility to incorporate a system of investing the revenue in building climate resilient roads.						Road Authority	Institutional capacity, financial resources

Infrastructure (OW)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
A3i Incorporate measures to reduce GHG emissions in road infrastructure (OW)							
Assess options to re-design infrastructure, traffic management actions, construct new roads to avoid traffic congestion.	Infrastructure plans of OW, as noted above, for projects for a second road in Wanica and research on the feasibility of a second bridge over the Suriname river					Private sector, TCT, DC	Human capital, financial resources
Assess feasibility of options for innovative road construction technology (for example recycling of road materials), including financial incentives.						Private sector, consultants, contractors	Human capital, financial resources
A4i Develop and implement law, policy and regulation to minimise waste (OW)							
Review and adopt Waste Management Act.	Draft Act on Waste and Waste management	National Environmental Policy Suriname p. 26	●			Board of Ministers and DNA	Institutional capacity
A4ii Waste management incentivisation (OW)							
Evaluate and assess financial mechanisms to incentivise waste minimisation.	ATM with Finance and the private sector has done some work on this already, for PET-bottles. Companies which collected their PET-bottle waste for recycling purposes would be exempt from tax.					Min Fin; civil society; private sector	Human capital, institutional capacity

Infrastructure (OW)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
A4iii Awareness program for minimising waste (OW)							
Develop and implement awareness activities on prevention, recycling and minimisation of waste, in collaboration with civil society and private sector.	Actions by private companies on plastic recycling, scrap recycling	Climate Action plan p63, National Environmental Policy Suriname p. 26				ATM; private sector; AdeKUS; civil society	Institutional capacity

Energy

Energy (NH)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
B1i Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management (NH)							
Undertake analysis of and collect data on past climate impacts (including but not limited to salinisation, erosion, water levels, river dynamics, natural ecosystems) on energy sector (operational, performance, maintenance, financial impacts).	Water level measurements by Staatsoilie in the Saramacca river Studies by Prof. Naipal, studies by WLA, and studies by Suralco regarding the water level of the hydro lake.	SNC (2013), p. 91	●			EBS, AdeKUS, consultants, NIMOS, OW (WLA), MDS, Staatsolie, ABS	Human capital, financial resources, institutional capacity
Conduct research on feasibility of new energy sources, such as wind, solar, biomass and hydropower, as well as electricity generation methods, for example generation from waste.	Staatolie bio fuel project at Wageningen; IAMGOLD solar power project; Elephant grass project- a drought tolerant grass (SIDS-DOCK). Within the CD4CDM project (2008-2010) an analysis was done and an investor's guide was developed of the potential CDM projects that could be implemented. IGSR held a symposium on renewable energy. A	Climate Action Plan, p. 41, 42, 45 and 63; National Environmental Policy Suriname p. 31; TapaJai research recommended by EBS	●			AdeKUS, EBS, IAMGOLD, Staatsolie, private sector, CRADLE CROPS, UNDP, LVV, ATM, OW, ADRON, CELOS, IGSR, NIMOS, FOB, IADB	Human capital, financial resources

Energy (NH)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
	feasibility has already been done on new energy sources. A feasibility study on waste to energy has been conducted by EBS and OW.						
B1ii Awareness and capacity building programme to encourage energy conservation, energy efficiency and use of renewable energy (EBS)							
Encourage training of new professionals in energy research and development; facilitate technical and university education that focuses on the use of new technologies and research into alternative technologies. Establish access to international training facilities (incl. of the international private sector).	MSc study on Sustainable Management of Natural Resources by AdeKUS and VLIR Scholarships on energy efficiency by Organization of American States	SNC p124	●			NH, AdeKUS; Staatsolie, IGSR, OAS, Japan International Cooperation Agency (JICA), IADB-Consoc, Organization of American States, MINOV	Human capital, institutional capacity, financial resources
Develop and implement an awareness raising programme to promote energy conservation and efficiency for domestic and commercial users.	An energy efficiency programme is currently under development by EBS, with a focus on raising		●			NH, media, MINOV, IADB – Consoc,	Human capital, institutional capacity,

Energy (NH)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
	consumer awareness of the potential associated cost savings.					OAS, NGOs, CBOs, religious organisations, KKF, SBF, DC's (decentralisation program)	financial resources
B2i Financial incentives to influence energy use and decrease emissions (NH)							
Design 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-Tariffs policy for renewable energy to encourage private investment).		Caribsave (2012), p. 166, SNC (2013), p.97				MinFin; EBS; private sector; financial institutes, NH, insurance companies	Human capital, institutional capacity
Remove fossil fuel subsidies for the energy sector.	Increase in energy tariff.	SNC (2013), p. 94				NH, MinFin	Enabling policy/regulatory environment

Energy (NH)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Identify and inform stakeholders about sources of funding for research and innovation in alternative and renewable energy.		National Environmental Policy Suriname p. 39	●			Financing institutions; multilateral organisations; OAS, KKF, SBF	Human capital
B2ii Develop and implement law, policy and regulation to encourage energy efficiency and use of renewables (NH)							
Conduct assessment and baseline for the development of the national energy strategy.						EBS, Staatsolie, Suralco, private sector, ATM, SSB	
Develop national energy policy, strategy and regulatory framework that minimises energy use, increases efficiency and enables renewable energy development (e.g. broaden the scope of the Electricity Bill towards an Energy Bill or develop a separate overarching Energy Bill covering all sources of energy while mainstreaming climate and energy policy).	Concept Electricity Bill/ Act. Energy management guidelines and standards according to ISO. Concept law for an energy authority of Suriname. Concept national energy policy.	Caribsave (2012), p.166. EBS recommends exploration of solar energy in particular, which will help reduce losses in transmission (if decentralised, off-grid)	●			EBS, Staatsolie, Suralco, private sector, ATM, SSB	Institutional capacity, enabling policy/regulatory environment

Energy (NH)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Amend the Act on Import Duty 1996 to include other sources of renewable energy than solar systems to qualify for an exemption from import duty.						MinFin (Customs), energy companies, relevant business, KKF, SBF, HI.	Human capital, institutional capacity, enabling policy/regulatory environment
Incorporate into the national energy policy electricity availability for the interior to safeguard food storage possibilities for people living in the hinterland. Consider a fund for rural electrification which could be used to reduce the costs of start-up renewable energy operations and provide capacity-building support to implement small scale power projects.		SNC (2013), p. 94				District councils, NGOs, CBOs, LVV, international institutions (FAO, WHO), EBS, private sector, NGOs, CBOs.	Institutional capacity, enabling policy/regulatory environment
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 (co-lead implementer: OW)	The government is running several pilot projects assessing energy efficient housing. Light Emitting Diode (LED) public lighting in a housing project area (Lake Land).	SNC (2013), p. 94	●			EBS, building companies, electricity installation companies, SSB, Association of Architects	Human capital, institutional capacity

Energy (NH)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
						in Suriname, ADEK-faculty of Infrastructure (CarEnTrain project)	
Amend the Driving State Order to provide the opportunity to regulate carbon dioxide levels in exhaust gases by ministerial order. Develop a ministerial order to regulate carbon dioxide and monoxide (lead implementer: Ministry of Justice and Police).						NIMOS, ATM, SSB, KPS	Human capital, enabling policy/regulatory environment
B2iii Infrastructural improvements of existing hydropower facilities (OW)							
Assess feasibility of artificially increasing water level in van Blommenstein Lake using water from neighbouring rivers and creeks (Tapa-Jai project)	Tapa Jai study completed.	OP, SNC p. 96				Staatsolie, NH, EBS, RO, AdeKUS,	Human capital, institutional capacity, financial resources

B2iv Increase access to climate finance (NH)							
Assess climate finance options for energy sustainability through UNFCCC mechanisms and other related funding avenues.	IADB soft loans to EBS: 'Support to improve sustainability of the electricity service' and 'Support to institutional and operational strengthening of the energy sector'					EBS; Staatsolie; private sector, Finance, UNDP, IADB	Human capital, institutional capacity, financial resources
Develop NAMAs for renewable energy and use NAMA to explore opportunities for climate finance	EBS strategy energy plan 2014-2024 towards a zero CO2 grid; EBS' latest procurement of thermal power plants are best environmentally available					EBS; Staatsolie; private sector	Human capital, institutional capacity, financial resources
Promote procurement of energy efficient goods and services by public and private sector; explore provision of incentives for using energy goods and services						EBS, private sector, KKF, SBF, SSB	Financial resources

Drinking Water

Drinking Water (NH)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
C1i Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management (NH)							
Undertake in-depth studies (including water-balance and aquifer replenishment studies) and establish an observation network and monitoring system, in order to enhance water management and sustainable use of water resources.	BOG performs water quality monitoring in Paramaribo, Commewijne, Nickerie and in near future also in Coronie.	SNC (2013), p.90, 96; Climate Action Plan p. 34				AdeKUS, BOG	Human capital, financial resources
Assess vulnerabilities and risk from climate change to drinking water infrastructure (lead implementer: SWM).	SWM conducted a climate change risk assessment in 2014 for proposed water pipe extensions in the south of Suriname, for IADB project. Water Master Plan (NH)		●			AdeKUS, Suriname Red Cross, SWM, NCCR	Human capital, financial resources, poor infrastructural conditions in the hinterland
Develop pilot projects to assess artificial recharge of aquifers and conduct feasibility studies to explore the possibility of additional groundwater projects, as well as alternative freshwater resources, to buffer the effects of saltwater intrusion.		Caribsave (2012), p. 165				AdeKUS, SWM, RGB, OW (WLA),	Human capital, financial resources

Drinking Water (NH)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
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 (lead implementer: SWM).	Ongoing regional project: Amazon River Basin Considering Climate Variability and Climate Change (ACTO), based on IWRM principles. CI performs research in South-western part of Suriname	Caribsave (2012), p. 165				AdeKUS, CBO's	Human capital, institutional capacity, poor infrastructural conditions in the hinterland
Undertake an assessment of water needs and sources, identify and appraise options for new sources.	FOB performs research on the need for freshwater sources	SNC (2013), p.90	●			AdeKUS, SWM, NGO's, CBO's	Human capital
Awareness raising programme on the impacts of climate change on water resources and management of these impacts.	Awareness activities performed by FOB. Private initiatives on rainwater storage.		●			ATM, UNDP/SGP, NGO's, CBO's	Human capital, financial resources, poor infrastructural conditions in the hinterland
C2i Develop and implement law, policy and regulation to ensure sustainable exploitation and use of drinking water resources and waste water management							

Drinking Water (NH)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
(NH)							
Review and amend draft legislation to ensure that climate change is taken into account. Include provisions for 1) the protection of water resources 2) the promotion of their sustainable use and 3) for water quality standards and wastewater discharge	Three draft laws have been prepared: Groundwater Extraction act, Act on Groundwater protection and Drinking Water Quality Supervision Act	SNC (2013), p.90. CARIBSAVE p166; SNC, SWM staff (Pers. Comm. June 2014)	●			NIMOS, BOG, SWM, ATM, VG, SSB	Human capital, institutional capacity
Assess options for the establishment of an institutional organisation for the enhancement of water management, for example water boards and a water authority.	FOB has established water committees in villages in the hinterland.	SNC (2013), p.90				SWM, BOG, AdeKUS, CBO's	Institutional capacity, poor infrastructural conditions in the hinterland
Develop robust land management and waste management policies to reduce the discharge of pollutants including sediments, sewage, agro-chemicals and mining pollutants into water systems, and to protect aquifers from surface contamination.	OW has some activities on-going with regards to waste management at the site. (incinerations on the land fill) Strategic Approach for Integrated Chemical Management (SAICM)	SNC (2013), p.90; NIMOS guidelines				RGB,OW, LVV, ATM, SCF, private sector	Enabling policy/regulatory environment, poor infrastructural conditions in the hinterland

Drinking Water (NH)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Develop policy and guidance for the construction of drinking water storage mechanisms for use in times of drought; possibilities include artificial controlled ground reservoirs, water towers, or bottled water reserves in strategic locations throughout the country.		SNC (2013), p. 95	●			SWM	Institutional capacity; enabling policy/regulatory environment
Develop policy to increase efficiency of drinking water supply mechanisms (for example improving infrastructure, capacity building and raising awareness)	Water Master Plan (NH)	SNC (2013), p.90, Caribsave (2012), p. 165	●			SWM, media, OW (WLA)	Institutional capacity; enabling policy/regulatory environment
C2ii Water management programme to increase resilience of water supply (NH							
Develop and implement land and waste management solutions to reduce discharge of pollutants into water resources	OW waste management Strategic Approach for Integrated Chemical Management (SAICM)	NIMOS guidelines				SWM,OW, RGB, private sector	Institutional capacity, poor infrastructural conditions in the hinterland
Develop, implement and monitor drinking water storage mechanisms for use in times of drought and flooding			●			SWM	Institutional capacity

Drinking Water (NH)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Identify and implement waste water recycling schemes, including mining and forestry sector. Waste water from domestic and tourism use can be re-used, for example for agricultural irrigation, reducing demand for drinking water		Caribsave (2012), p. 165				SWM, TCT, DC, private sector	Human capital, institutional capacity, financial resources, poor infrastructural conditions in the hinterland
C3i Climate-resilient infrastructure development to ensure availability of drinking water (SWM)							
Construct an emergency network of agricultural irrigation pipes and pumps connected to reliable water sources, such as nearby larger fresh water rivers or controlled reservoirs.	Strategic waste and water management plan (IADB, ir. Singh)	SNC (2013), p. 95				NCCR, NH, OW (WLA), LVV, private sector, international organizations	Institutional capacity; enabling policy/regulatory environment
Develop and upgrade infrastructure for water supply, irrigation, drainage and flood protection, in order to increase the efficiency of water use, including storage and distribution, without compromising sanitation systems.		SNC (2013), p.90, Caribsave (2012), p.166 NIMOS guidelines	●			NH, OW (WLA), LVV, private sector, BOG, NIMOS	Institutional capacity; enabling policy/regulatory environment

Drinking Water (NH)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Develop and implement leakage management programme, including mains rehabilitation, to reduce water leakage from distribution and supply networks.		CARIBSAVE p166				NH, OW (WLA), financing institutions, multilateral organisations	Institutional capacity; enabling policy/regulatory environment
C3ii Awareness raising programme on avoiding contaminated water post-disaster (NCCR)							
Develop printed materials or other means of imparting clear instructions to disaster victims on how to handle potentially contaminated water sources during disaster in order to prevent illness.	Media	SNC (2013), p. 95				NH, private sector	Human capital, institutional capacity

Housing

Housing (SoZaVo)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
D1i Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management (SoZaVo)							
Undertake a vulnerability assessment of housing and assess physical, social and economic impacts of recent events on housing, and to identify flood risk areas.		Study by Marciano and Nurmohamed (2013) on the impact of strong winds and climate resilience of building roofs. UNDP (2006) Case Study on the Impact of Climate Change on Agriculture and Housing on Indigenous Communities in Suriname.	●			AdeKUS, Suriname Red Cross	Human capital

Housing (SoZaVo)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Conduct an awareness raising programme for the public on potential climate change impacts on housing and ways of managing such impacts.			●			ATM	Human capital, financial resources
D2i Develop and implement law, policy and regulation for climate resilient housing development planning (SoZaVo)							
Establish a legal framework for housing (through Act Housing Plan 2012-2017) and include provisions for climate resilience and energy efficiency in future housing regulations with respect to zoning, as well as consideration of good access to public transport networks	OW has ToR for zoning plan and allotment plan.	SNC (2013), p. 97				OW, NH, RO/DCs, AdeKUS, TCT, JusPol, CCDU.	Human capital, financial resources, enabling policy/regulatory environment
Design housing development processes to control development in flood risk areas, using information from climate change impact studies. (Lead implementer: RGB)		SNC (2013), p. 91	●			OW, ATM	Human capital, enabling policy/regulatory environment

Housing (SoZaVo)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Review and assess land tenure and property rights. Establish flexible and appropriate land tenure systems that allow for long term decision making on the part of land owners, tenants or other users. (Lead implementer: RBG)		SNC (2013), p. 93	●			RO/DCs, GLIS	Enabling policy/regulatory environment
D3i Develop and implement law, policy and regulation for climate resilient building design (OW)							
Amend Building State Order with conditions addressing energy efficiency and promoting clean energy practices (e.g. through incentives for household and commercial appliances)	EBS has regular meetings with the Association of Architects to establish energy efficiency in building design	SNC (2013), p. 93	●			ATM, SoZaVo, EBS, HI, Finance, OW, DNA, RVM	Human capital, enabling policy/regulatory environment
Amend Building State Order to address changing climatic conditions and to protect against negative impacts from natural hazards, for example flooding and strong winds.		SNC (2013), p. 93, Caribsave (2012), p. 169				ATM, SoZaVo, Association of Architects, NCCR, RO, OW, NIMOS	Human capital, enabling policy/regulatory environment
Formulate building requirements for housing in the interior.							Human capital

Housing (SoZaVo)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
D3ii Financial incentives to build climate resilient homes (SoZaVo)							
Develop insurance schemes that provide protection for both businesses and personal property and encourage adherence to minimum standards and building codes (for example, excluding a structure from coverage if it is not climate proofed)		SNC (2013), p. 93				MinFin, private sector (incl. banks)	Human capital, institutional capacity, enabling policy/regulatory environment
Develop financial incentives to encourage energy efficiency and clean energy use for household and commercial appliances						MinFin	Human capital, institutional capacity, enabling policy/regulatory environment

Mining

Mining (NH)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
E1i Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management (NH)							
Define national research and development programme on climate impacts on and emissions from the mining sector and climate resilient, low carbon emission development, sustainable mining practices (e.g. research on climate impacts, alternative sources of freshwater, alternative mercury-free mining techniques and appropriate reforestation systems.	NIMOS has guidelines on sustainable mining operations.		●			AdeKUS, mining companies, OGS, CELOS	Human capital
Conduct high level analysis on past climate impacts on Suriname's mining sector (small and large scale) and modelling of future risks (e.g. impacts on infrastructure, operations, labour, etc.)		Workshop participant recommended this could be a BA/MA/MSc dissertation.				RGB, AdeKUS, mining companies, Planning Commission Gold Sector (OGS)	Human capital
E1ii Awareness raising and capacity building programme for climate resilient and low emission mining techniques (NH)							

Mining (NH)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Develop and implement awareness raising programmes to promote climate resilient, low emission and sustainable mining practices, such as the use of alternative mercury-free mining techniques and the closure of pits after mining	OGS has a training facility at Snesikondre (gold sector) Activities of OGS		●			NIMOS, ATM, WWF, OGS, SBB	Institutional capacity
E2i Develop and implement law, policy and regulation to integrate climate resilience into mining operations (NH)							
Update Mining Decree and standards considering climate change through State Orders. Include standards for energy efficiency and reforestation of mined out areas in all mineral agreements with national mining companies and small scale mining operations.	Suralco rehabilitates mined out areas (bauxite sector). Other multinational companies and national companies (ie. IAMGOLD, SurGold, Grassalco) have internal policies for rehabilitation and must comply with international guidelines. Small scale (mostly gold, sand, gravel) operations have no guidelines for rehabilitation.	OP p108; National Environmental Policy Suriname p 33	●			GMD, NIMOS, ATM, SBB, local community, mining companies, OGS, SSB, BIS	Institutional capacity
E3i Implement forest rehabilitation programme to sequester carbon dioxide (NH)							
Design and implement forest rehabilitation programme by mining companies.	Suralco rehabilitates mined out areas (bauxite sector).		●			RGB, ATM, SBB, local	Institutional capacity

Mining (NH)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
						community, mining companies, BIS	
Design and implement offset/compensation programmes for mined out areas						RGB, SBB, mining companies, BIS	Legal and institutional capacity

Agriculture, Livestock and Fisheries

Agriculture, Livestock and Fisheries (LVV)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
F1i Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management (LVV)							
Define and implement national research and development programme on climate resilient crops, agricultural practices, animal husbandry and fisheries.		SNC (2013), p. 92, 95.				AdeKUS; CELOS; ADRON	Human capital
Conduct analysis on past climate impacts and the impacts of climate change on Suriname's agriculture, livestock and fisheries sector (e.g. 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.	Dr R Nurmohamed and colleagues at AdeKUS. One study on climate impacts on hydropower published. Another on climate impacts on agriculture imminent.	SNC (2013), p. 92, 97; A workshop participant specifically recommended mapping agricultural lands affected by saltwater intrusion. Saltwater intrusions further upstream of rivers in extreme dry seasons, ie. Nickerie,	●			AdeKUS, CELOS, ADRON, Presidential taskforce	Human capital,

Agriculture, Livestock and Fisheries (LVV)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
		Coppename, Marowijne rivers, Regular measurements of saltwater intrusion in rivers is important for irrigation and links to climate measurements.					
Develop and trial agricultural, livestock and fishing techniques that build resilience to a variable and changing climate in a participatory way (gender specific and according to Free Prior and Informed Consent (FPIC) protocol). This includes agro-biodiversity conservation; integrated pest management and disease control; crop rotation; crops tolerant to saltwater, water logging and drought; use of appropriate greenhouse systems; minimisation of tillage and as such erosion; and traditional knowledge).	Global Environment Facility (GEF)/Small Grants Programme Strategic Project on agro- biodiversity conservation and propagation of planting material of key food crops for interior region. Source: UNDP/GEF/CELOS and partner institutes. Production of upland rice varieties by LVV, ADRON, CELOS; characterisation of cassava varieties by CELOS. LVV pilot project on greenhouses.	SNC, p. 92. MOU between CELOS, AdeKUS and LVV regarding research cooperation. CELOS research project to minimise tillage and promote direct planting on sandy and accented fields of the interior	●			CELOS; ADRON; AdeKUS, RO, ATM, Min HI, IDCS, WLA, MDS, VIDS, CBOs	Human capital, institutional capacity, enabling policy/regulator environment, financial resources

Agriculture, Livestock and Fisheries (LVV)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
F1ii Integration of climate resilience into agricultural extension services (raising awareness of farmers, pastoralists and fisherfolk on the impacts of climate change, and building capacity on how to manage impacts) (LVV)							
Provide guidance/ training on alternative growing systems such as appropriate greenhouses and hydroponic gardens, improved drainage systems, crop diversification, etc. (fruit and vegetables); climate-control systems on livestock farms, modification of livestock feed, in both the coastal area and the interior	LVV is trialling the use of greenhouses. Small farmers are already growing on hydroponic gardens. They also give guidance.	SNC. CELOS: Agro-biodiversity conservation as a source for adaptation. Sustainable cultivation systems & agribusiness chains characterised by integration of annual & perennial crops & animals, socio-economic benefits & low environmental impact practices.	●			AdeKUS, CELOS, local trained trainers	Human capital, institutional capacity

Agriculture, Livestock and Fisheries (LVV)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
F2i Develop and implement law, policy and regulation to incorporate climate resilience into agriculture, livestock and fisheries management (LVV)							
Develop and approve Sustainable Agriculture Policy	White papers produced by LVV, including "Landbouwontwikkeling binnenland" National Agricultural Development Plan in preparation by IDCS.A concept master plan for agricultural development in the coastal area was developed in August 2014.	"Protection of fish breeding waters"; "Establishment of measures that prevent further decline in the numbers of productive animals" (e.g. Regulating slaughter of female animals, import of beef cattle for a certain period). SNC, p92.				Kabinet of the President - Taskforce on Agriculture;	Enabling policy/regulatory environment (i.e. legal recognition of collective land rights)

Agriculture, Livestock and Fisheries (LVV)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Include where possible relevant climate resilience mechanisms in existing and new regulations. The existing Water Boards Act is the most relevant legislation as it deals with water management in the agricultural sector.	Currently 12 Water Boards have already been established and are operational in the western part of the country. National Agricultural Development Plan in preparation by IDCS. A concept master plan for agricultural development in the coastal area was developed in August 2014.	Protection of fish breeding waters; "Establishment of measures that prevent further decline in the numbers of productive animals" (e.g. Regulating slaughter of female animals, import of beef cattle for a certain period). SNC, p92.	●			RO/ Water Boards	Institutional capacity, financial resources, enabling policy/regulatory environment

Agriculture, Livestock and Fisheries (LVV)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
F2ii Infrastructure development to conserve water, provide irrigation and protect agriculture from salt water intrusion (OW)							
Integrate climate change considerations (including results from climate impact studies) into national dike construction programme in low-lying areas.	OW has responsibility for building dikes and dam walls.					LVV, OW	Human capital, financial resources
F2iii Financial support to farmers, pastoralist and fisherfolk to build climate resilience (LVV)							
Develop and provide a financial incentives scheme for farmers, appropriate to each region and ecotype, to implement climate resilient farming techniques/actions (e.g. planting of arboreal hedgerows to protect crops from strong winds, moving cattle from vulnerable coastal areas to higher ground, using appropriate machinery to minimise tillage and promoting direct planting to reduce erosion on hilly landscapes of the interior.)	IDCS has created a forum for national and international entities to invest in sustainable agricultural systems.					Kabinet of the President - Taskforce on Agriculture; Finance, private sector (banks)	Human capital, institutional capacity
Develop and provide a financial incentives scheme for fishermen to engage in aquaculture.		SNC (2013), p. 92				MinFin, private sector (banks)	Human capital, institutional capacity

Agriculture, Livestock and Fisheries (LVV)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Evaluate opportunities for parametric insurance schemes to compensate farmers/pastoralists/ fisherfolk whose agricultural production suffers damage from climatic events		SNC (2013), p. 92				MinFin, private sector	Human capital, financial resources
Develop and finance parametric insurance schemes		SNC (2013), p. 92				MinFin, private sector	Human capital, financial resources, enabling policy/regulatory environment
F3i Technological transfer programme on sustainable and environmental friendly agricultural practices (LVV)							
Introduce modern technology and practices to reduce GHG emissions caused by rice production or by other potential, expected and developing large scale and mechanised cultivated crops.		SNC (2013) p. 119; Climate Action Plan p. 61				CELOS; AdeKUS; private sector	Human capital, financial resources

Tourism

Tourism (TCT)

Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
G1i Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management (TCT)							
Conduct analysis on past and current climate impacts on tourism.	Economic evaluation of climate impacts at Bigi Pan has been conducted, as noted by workshop participant.					AdeKUS, RGB, ATM, RO/DC, WWF, SCF, MDS, NIMOS	Financial resources, human capital, lack of decisive action
G1ii Engagement and awareness raising programme (TCT)							
Engage communities dependent on eco-tourism (for example Maroon and indigenous communities in the interior) on effective management of a variable and changing climate, including climate resilient development in community level decision making		SNC (2013), p. 85, 94				RO, DCs, MINOV (specifically schools in the hinterland) NCCR, MDS, AdeKUS, NIMOS, ATM	Institutional capacity, enabling policy/regulatory environment
Assess the viability of requiring all tour operators to be certified having undertaken an awareness raising and capacity building programme on climate change.		SNC (2013), p. 94				STS	Institutional capacity, enabling policy/regulatory

Tourism (TCT)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
							environment
Raise awareness and build capacity on the issue of biodiversity conservation		SNC (2013), p. 94				ROGB, ATM, MINOV	Human capital, institutional capacity
G2i Conservation, protection and monitoring of ecotourism (TCT)							
Assess the economic importance of eco-tourism and explore the value of a tourism climate tax, revenues from which would contribute to climate compatible development.						AdeKUS, STS, Finance	Human capital, enabling policy/regulatory environment
G2ii Develop and implement law, policy and regulation to integrate climate resilience into tourism operations and decrease GHG emissions (TCT)							
Amend the draft Tourism Act (given the current window of opportunity) to include requirements for actors in the tourist industry to develop effective planning for climate resilience and mitigation.						MinFin; STS, ATM, NIMOS, CCDU	Human capital, institutional capacity, financial resources, enabling policy/regulatory environment
Develop national tourism policy, strategy and regulatory framework that enables payments for environmental services.						MinFin, STS	Human capital, institutional capacity, enabling

Tourism (TCT)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
							policy/regulatory environment
G2iii Programme to protect tourism attractions, operators, and tourists from climate impacts (NCCR)							
Establish a response system during floods.		SNC (2013), p. 94				TCT, NCCR	Financial resources, enabling policy/regulatory environment
Create appropriate insurance schemes to cover losses and damages from flooding, extreme drought, Sibibusi events, and mudslides.		SNC (2013), p. 94				TCT, MinFin	Enabling policy/regulatory environment

Education

Education (MINOV)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
H1i Provide climate change information at all levels of formal education (MINOV)							
Incorporate climate change into curricula for primary, secondary, tertiary and vocational educational institutions, for example discussion about what one can do personally to respond to climate change and how climate change can affect where one lives.	MINOV has developed curricula, with material provided by ATM/NIMOS that include environmental awareness projects (including climate change) implemented at various primary schools. GHFS introduced the GLOBE program, which is an international hands-on, primary and secondary school-based science and education programme. In August 2014, GLOBE was introduced to Boy Scouts in Latour. WWF provides educational books on environmental themes to primary school libraries.	SNC (2013), p. 135; Climate Action Plan p. 49; National Environmental Policy Suriname p. 31, Caribsave (2012) p. 165.	●			ATM, NIMOS, AdeKUS, WWF, SoZaVo, Ministerie van Sport-en Jeugdzaken	Human capital, institutional capacity, financial resources

Education (MINOV)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Develop advanced research capacity by offering academic courses at the HBO and IOL curricula level on sustainability topics to train scientists and engineers.	AdeKUS has offered a two-year Master of Science programme in Sustainable Management of Natural Resources (SMNR) since 2009. A Master of Educational Research Sustainable Development (MERSD) has been on offer for 4 years, as well as a Master Conservation Biology for 2 years. There is also a MSC on Renewable Energy in preparation by IGSR.	SNC (2013), p. 136		●		AdeKUS, IGSR	Human capital
H1ii Public awareness raising and capacity building programme on climate resilience and mitigation (ATM)							
Provide training to ministerial staff on climate change, including an intermediate level climate change course and CCORAL training to all relevant ministries to raise awareness on how to integrate climate change resilience into programme and project cycles.	CCCCC ran a basic training course on climate change for this stakeholder group in 2013. CCORAL training was conducted by the Caribbean Community Climate Change Centre for GoS representatives in October 2013 in Barbados (MinFin is the focal point). CCORAL training being conducted in August 2014 in Suriname by	Recommended by Dr. Riad Nurmohamed (Pers. Comm. June 2014)	●			CCCCC; MinFin, NGOs, ROGB, LVV, NIMOS	Human capital, institutional capacity

Education (MINOV)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
	CCCCC.						
Establish a country-wide strategic programme to conduct awareness raising initiatives, including in all interior communities (for example media campaigns, exhibitions, conferences).	VIDS project activities	SNC (2013), p. 136, 137				NIMOS, VIDS, Verenigin g Saramacc aanse Gezagsdr agers and others	Enabling policy/regulatory environment
H2i Develop climate resilient infrastructure in the education sector (OW)							
Require schools to be built on higher ground or on stilts to avoid disruption/closure from flooding	NCCR have an overview of the areas hit by previous disasters, which can help identify “at risk” schools.	SNC p. 97	●			MINOV, RGB, MINOV, donors/N GOs, local villages, NCCR	Institutional capacity, financial resources

Health

Health (Ministry of Health)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
I1i Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management (Ministry of Health)							
Track international research on newly emerging pathogens relevant to Suriname's future and keep abreast of preventative measures such as new vaccination protocols, new antibiotics and health related precautions.		SNC (2013), p. 95	●			AdeKUS (Biomedical researchers), BOG	Human capital
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.		Caribsave Risk Atlas (2012), p.168	●			BOG, Medical Missions around Suriname	Human capital
I1ii Capacity building programme for public health sector on climate resilient health practices (Ministry of Health)							
Build up a supply of public health resources for the surveillance, prevention and control of vector borne diseases, with the aim of implementing the WHO Integrated Vector Management (IVM).		Caribsave Risk Atlas (2012), p.168					Human capital, institutional capacity

Health (Ministry of Health)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
I1iii Awareness raising programme on climate-related health impacts, prevention and treatment (BOG)							
Conduct a public-awareness campaign on climate-related health impacts, such as dangers of prolonged and unprotected exposure to sunlight, including encouragement of protective measures.	TV programmes; Sessions with the Parliament on environment/climate change	SNC (2013), p.95				RGD, PAHO, AdeKUS, NGO's, BOG	Enabling policy/regulatory environment
Provide information to the public on climate-related vector-borne diseases	BOG provides brochures	SNC p. 98; Climate Action Plan p. 38-39	●			MZ, RGD, PAHO,	Human capital, financial resources
I2i Development of climate resilient health infrastructure and initiatives (Ministry of Health)							
Identify potential risk zones and locations vulnerable to climate change health impacts			●				
Establish medical centres near potential risk zones and hospitals in areas that are not vulnerable to climate-change impacts.		SNC (2013), p.95				Surinam e Red Cross	Financial resources
I2ii Integration of new technology and procedures in the health sector to enhance disease control (Ministry of Health)							
Introduce Early Disease Warning Systems that consider temperature signatures for vector borne diseases and other diseases.		Caribsave Risk Atlas (2012), p.168				NCCR, AdeKUS	Institutional capacity, financial resources

Health (Ministry of Health)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Implement WHO Integrated Vector Management (IVM)		Caribsave Risk Atlas (2012), p.168					Institutional capacity, enabling policy/regulatory environment
Establish a pilot project to distribute eco-toilets to avoid groundwater contamination from open latrines, which worsens with increased rainfall			●			NGOs, CBOs, SGP/UNDP, PAS, Buro Forum, FOB	Human capital

Disaster Risk Management

Disaster Risk Management (NCCR)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
J1i Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management (NCCR)							
Conduct research into past Sibibusi trends, and relationship with regional climatic events (such as Caribbean hurricane season), and climate change.		Recommended by Lt. Col. Slijngard, Director NCCR (Pers.Comm. June 2014)				AdeKUS, MDS, CDEMA, CCCCC	Human capital, financial resources, Institutional capacity, enabling policy/regulatory environment
Conduct research into past hurricane trends and interaction with Suriname's Exclusive Economic Zone (EEZ), and potential links to climate change.		Recommended by Lt. Col. Slijngard, Director NCCR (Pers.Comm. June 2014)				AdeKUS; LVV; Staatsolie	Human capital, financial resources, Institutional capacity, enabling policy/regulatory environment
Strengthen existing monitoring of hurricanes in Suriname's EEZ.	NCCR are starting this research with Caribbean Disaster and Emergency Management Agency (CDEMA). Lt. Col. Slijngard	Recommended by Lt. Col. Slijngard, Director NCCR (Pers.Comm.				CDEMA, CCCCC, MDS	Human capital, financial resources, Institutional capacity,

Disaster Risk Management (NCCR)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
	indicates that additional support would be helpful.	June 2014)					enabling policy/regulatory environment
J1ii Awareness raising programme on the impacts of climate change on disaster occurrence and methods of seeking assistance and staying safe (NCCR)							
Develop printed materials or other awareness raising measures to clearly show disaster victims how to handle potentially contaminated water sources in order to prevent illness.		SNC (2012), p. 95				SWM, NH, RO, OW, Ministry of Health	Human capital, institutional capacity, financial resources
Increase awareness on preventative measures, regarding operating procedures for an emergency response plan that is activated before a natural disaster strikes Suriname.	Suriname Red Cross has already done some work on this: 1. awareness of the general public on how to prepare for a disaster (house to house and media), 2. Sessions with communities on how to act in emergencies (fire, etc.)	SNC (2012), p. 95				Suriname Red Cross, RO/DCs	Human capital, institutional capacity
Provide psychological guidance and physical relief measures to victims		SNC (2012), p. 95				Suriname Red Cross, SoZaVo, DCs, Ministry	Human capital, financial resources

Disaster Risk Management (NCCR)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
						of Health	
J2i Develop and implement law, policy and regulation to integrate climate resilience into disaster risk management (NCCR)							
Develop specific legislation with regards to disaster management, incorporating climate change						ATM	Institutional capacity, enabling policy/regulatory environment
Incorporate forest fire measures into the national disaster plan		SNC (2013), p. 92				ATM, fire department, RO/DCs,	Institutional capacity, enabling policy/regulatory environment
J2ii Integration of climate resilience into disaster risk management infrastructure and operations (NCCR)							
Expand and improve equipment of the existing NCCR infrastructure		SNC (2013), p.95					Institutional capacity, financial resources

Disaster Risk Management (NCCR)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Implement a National Early Warning System (EWS)	EWS implemented in the coastal zone by OW and in the interior by NCCR.	SNC (2013), p. 150				MDS, AdeKUS, OW (MDS, WLA), RO/DCs, Red Cross	Human capital, institutional capacity, enabling policy/regulatory environment
J2iii Financial measures to increase resilience in the wake of disaster (Ministry of Health)							
Establish a disaster relief fund		SNC (2013), p.95				MinFin, private sector	Financial resources, enabling policy/regulatory environment
Establish health insurance coverage for extreme weather conditions.		SNC (2013), p.95				NCCR, MinFin, private sector (banks, insurance companies)	Financial resources, enabling policy/regulatory environment

Spatial Planning

Spatial Planning (ROGB)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
K1i Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management (ROGB)							
Conduct mapping of land titles of total surface area of Suriname	GLIS conducts mapping of land titles of coastal area		●				Human capital, financial resources
Conduct research on vulnerability of land under various uses to climate change		SNC (2013) suggests research on community and tribal land tenure systems and how the adoption of formal land rights would affect the adaptive capacity of these communities					Human capital, financial resources

Spatial Planning (ROGB)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Undertake hazard and vulnerability mapping of land conditions and identify risks for vulnerable areas.							Human capital, financial resources
Conduct an awareness raising programme on the impacts of climate change on land use planning.						ATM	Human capital, financial resources
K2i Develop and implement law, policy and regulation for climate resilient spatial planning and management (ROGB and OW)							
Review the current legal framework for spatial planning (Planning Act 1973, Urban Planning Act 1972, and the Decree on Issuance of Domain land) and incorporate potential climate change into future spatial planning legislation	RGB is currently developing a roadmap to support sound land use planning, which provides an opportunity to consider climate change. ICZM plan has been formulated.	SNC (2013), p. 93	●			LVV	Institutional capacity, enabling policy/regulatory environment
Implement land-use planning, such as through the creation of a single land-use authority that considers vulnerability, land availability and location, and the suitability of land to industrial, agricultural or human settlement purposes	GIS project done by IDCS regarding mapping of suitable agricultural lands	SNC (2013), p. 93				RO, ATM, LVV, AdeKUS, HI	Institutional capacity, enabling policy/regulatory environment

Spatial Planning (ROGB)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Establish agro-ecosystem zoning based on vulnerability and risk assessment of land						Soil survey institution	
Implement spatial planning and zoning by a central authority in order to promote appropriate urban growth	OW is working on zoning (currently in draft), which will result in modification of the Urban Planning Act. There is an opportunity here to create 'flood sensitive areas'.					RO, LVV	Collaboration of all ministries; land rights issues
Assess natural waterways and streamline with land allocation policy to mitigate flooding and drainage problems	Participant at national inception stated District of Para is likely already working on regulation proposal.					DCs, RO, Ministry of Justice	Enabling policy/regulatory environment
Require drainage plan for allotment and housing projects.						Public Works	
Update master plan of Greater Paramaribo to integrate climate change considerations		Master plan for coastal and river bank protection, as noted in district	●			NCCR, AdeKUS, NH, RO, LVV,	Human capital, financial resources, enabling policy/regulatory

Spatial Planning (ROGB)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
		roundtable				(WLA, MDS, Waterkering)	environment
Establish flexible and appropriate land tenure systems that allow for long-term decision making on the part of land owners, tenants or other users.		SNC (2013), p. 93				RO, DCs	Enabling policy/regulatory environment
K3i Implement measures to increase resilience of coastline to a variable and changing climate (ROGB and OW)							
Regulate activities such as sand and shell mining and the issuance of land rights in the estuarine zone		SNC (2013), p. 91 advises prohibiting these activities				NH, JusPol	Enabling policy/regulatory environment
Establish protected area and buffer zone along coastline and along other water objects such as rivers and lakes	ICZM plan	Climate Action Plan p. 12	●			DNA	Institutional capacity, enabling policy/regulatory environment
Protect mangrove forests; regulate and enforce regulations on tree removal.	ICZM plan	Climate Action Plan p. 12	●			DNA, SBB,	Enabling policy/regulatory environment

Spatial Planning (ROGB)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Forbid new development initiatives in vulnerable zones and gradually reduce existing activities in vulnerable zones and in potential future buffer zones	ROGB provided written notice in 2014 that no development activities are allowed in coastal nature reserves. This leads to biodiversity conservation and conservation of forest in nature reserves along the coast.	Climate Action Plan p. 12	●			DCs	Human capital, institutional capacity, financial resources

Environment

Environment (ATM)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
L1i Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management (ATM)							
Conduct analysis of past climate impacts on the natural environment			●			AdeKUS, MDS, NCCR, Red Cross, RO, CELOS, local and international environmental NGO's	Human capital, financial resources
Research into natural ecosystems and the natural protection they provide from extreme weather events, and how these will be impacted by climate change		SNC (2013), p. 93	●			AdeKUS, CELOS, local and international environmental NGO's	Human capital, financial resources

Environment (ATM)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Assess engineering measures to increase sedimentation rates along severely encroached coastal stretches in order to support mangrove growth		SNC (2013), p. 91	●			AdeKUS, CELOS	Human capital, financial resources
'Technology Needs Assessment' to draw out and identify priority resilience and low emission technologies required, which could be used to strengthen discussed and as a basis for a portfolio of environmentally sustainable technology (EST) projects and programmes. (Lead implementer: ATM)		Recommended by UNFCCC				AdeKUS	Human capital
Continue development of climate change projections, including general circulation model (GCM) statistical downscaling to 25-50 km resolution	General circulation model (GCM) projections are available but not downscaled. Regional circulation model (RCM), PRECIS, projections will be available from AdeKUS from August 2014.	There is a need for continued exploration of relative value of expensive regional climate model vs. general climate model projections, recommended by Dr Riad Nurmohamed (Pers. Comm June 2014)	●			AdeKUS, Carib. Climate Modelling Group, local and international environmental NGO's	Human capital, financial resources

Environment (ATM)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
L1ii GHG emissions monitoring programme (ATM)							
Establish database on energy and GHG emissions, making use of current available data		CARIBSAVE p176; National Environmental Policy Suriname				ABS,TCT; Staatsolie; MDS; local and international environmental NGO's	Human capital, financial resources, lack of enabling environment
Establish monitoring stations across the country, including for monitoring GHG emissions	Meteorological Service has several climate monitoring stations throughout the country	Climate Action plan p52				ATM, MDS/OW, SBB, CELOS local and international environmental NGO's,	Human capital, institutional capacity, financial resources
L1iii Capacity building programme on climate resilience and mitigation (ATM)							
Organise venues and trainings for knowledge and best practices sharing, for exchange of expertise and for dissemination of technological knowledge.		None known	RPP dictates capacit			NIMOS; ministries; Private sector;	Human capital, institutional capacity, financial

Environment (ATM)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
			y buildin g of local commu nities living in the interior			civil society; AdeKUS; MINOV local and internati onal environ mental NGO's	resources
L2i Develop and implement law, policy and regulation to protect natural environment and build climate resilience (ATM)							
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.	NIMOS has developed the Environmental Framework Act in 2000, ATM has updated this Act and it was presented to the Minister to be approved within the board of Ministers. To date the Act has not been discussed.		●			NIMOS, Cabinet of the President (Climate Expert Group)	Human capital, institutional capacity, financial resources, enabling policy/regulatory environment
Require environmental impact assessments when developing long-term projects		SNC (2013), p. 90	●			NIMOS	Institutional capacity, enabling policy/regulatory environment

Environment (ATM)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Implement conservation strategies designed to protect marine turtles in the face of climate change		SNC (2013), p. 92	●			CI, SCF, ROGB, WWF, CBO's, TCT	Institutional capacity, enabling policy/regulatory environment
L2ii Environmental and biodiversity management programme (ATM							
Adopt an Ecosystem-based Adaptation (EbA) approach to environmental management, to maintain and increase the resilience and reduce the vulnerability of ecosystems and people in the face of the adverse effects of climate change	Ecosystem based mangrove adaptation project has been developed by ATM with assistance from the UNDP. Currently they are looking for international funding	Caribsave (2012), p. 168				ROGB, RO, UNDP (financial partner), local and international environmental NGO's	Enabling policy/regulatory environment
Implement programme to protect biodiversity along coastline (Lead implementer: ROGB)		GEF-funded project "Suriname Coastal Protected Area Management" project (SCPAM), which seeks to	●			ATM, ROGB, RO, DCs, OW, LVV	Institutional capacity, enabling policy/regulatory environment

Environment (ATM)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
		promote the conservation of biodiversity through improved management of protected areas along the western coast of Suriname					
L3i Develop and implement law, policy and regulation to reduce GHG emissions (ATM)							
Establish basic regulations and standards for the decrease of GHG emissions	RPP; AdeKUS research	OP; National Environmental Policy Suriname				AdeKUS; NIMOS; civil society, SSB	Human capital, institutional capacity, financial resources, enabling policy/regulatory environment
Develop an enabling environment for technology transfer (e.g. introduction of fair trade policies, removal of technical, legal and administrative barriers, design of sound economic policy, regulatory frameworks and transparency)						GoS, Parliament	Institutional capacity, enabling policy/regulatory environment

Environment (ATM)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Provide alternative incentives for businesses and households to reduce GHG emissions.						MinFin, private sector	Financial resources, enabling policy/regulatory environment

Sustainable Forest Management[11]

Sustainable Forest Management (SBB)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
M1i Comprehensive national research programme on social, environmental and economic baselines, climate science, vulnerability, impacts and risk management (SBB)							
Conduct analysis on past climate impacts on forests and sustainable forest management.	National Forest Inventory done by SBB and CELOS. Growth ring analysis on Cedar wood In 2012 CELOS performed a "re-uptake" of the CELOS Management System in test beds together with Germany.		●			AdeKUS	Human capital
Conduct research on SFM options.	National Forest Inventory ongoing with SBB as lead implementer Code of Practise CELOS Management System	National Forest Policy of Suriname	●			ROGB; local communities; private sector, CELOS	Human capital, financial resources
Perform research to establish Reference Level for carbon emissions, with special attention for	RPP; REDD+ Project Document; National Forest					ADEK; CELOS;	Institutional capacity,

[11] The term forest refers to all forests in Suriname, including mangrove forests.

Sustainable Forest Management (SBB)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
mangrove forests and wetlands.	Cover Monitoring Plan					NIMOS; LVV; SBB	financial resources
M1ii Awareness raising and capacity building programme on SFM, carbon accounting and carbon monitoring (SBB)							
Perform awareness activities with regards to SFM	Awareness activities on international conventions Awareness activities on concept principles of SFM		●			ROGB; local communities; private sector, CELOS, Tropenbos International Suriname	
Perform trainings and education with a focus on SFM.	Research on SFM and biodiversity done by CELOS and ADEK; Data collection (National Forest Inventory) done by SBB and CELOS Training on SFM techniques and methods		●			ROGB; local communities; private sector, CELOS, Tropenbos Internati	Financial resources

Sustainable Forest Management (SBB)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
						onal Surinam e	
Perform awareness activities regarding the role of forest conservation, restoration and sustainable use of forests in climate change mitigation differentiated by target groups: students, local communities, decision makers on national and district level, judiciary, executive and enforcement personnel (Lead implementer: ROGB).	RPP Incorporated in curriculum of AdeKUS Faculty of Technical Science Projects have been undertaken involving local communities: 1. At Lespansi, a project to plant a botanical garden and conduct awareness activities on the conservation and protection of the environment. 2. In Brokopondo, a project on the rehabilitation of degraded forests according to a sustainable forest management plan for plotting villages, under the guidance of CELOS. 3. Sustainable use of forests in Pokigron under the guidance of CELOS, for		●			ROGB; civil society; NGO's; UNDP/SGP; GEF; SCF; CBOs	Human capital, institutional capacity, financial resources

Sustainable Forest Management (SBB)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
	sustainable utilization of palm tree reserves. 4. In Commewijne, a project for community based adaptation project biodiversity conservation.						
Improve capacity and knowledge regarding accounting of carbon stocks, emissions and carbon sequestration.	National Forest Inventory ongoing with SBB as lead implementer. Personnel from CELOS, LVV, AdeKUS and SBB have been trained in the use of an ALU software, developed to generate a GHG inventory for the ALU sector with regards to preparations for REDD+.		●			AdeKUS; CELOS; SBB; NIMOS; ABS; LVV; local communities	Human capital, institutional capacity, financial resources
Engage and involve local communities in monitoring of carbon levels.	Trainings, capacity building initiatives	RPP dictates capacity building of local communities living in the interior	●			NIMOS; NGOs	Human capital, institutional capacity, financial resources
M2i Develop and implement law, policy and regulation to incorporate climate resilience and mitigation in forestry (SBB)							

Sustainable Forest Management (SBB)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Review and update Forest Management Act to include climate change considerations.	RPP	National Forest Policy of Suriname				ROGB; DNA,	Enabling policy/regulatory environment
Develop a State Order for the protection of mangrove forests (article 7) and other relevant State Orders.			●			ROGB, ATM, AdeKUS, SCF	Human capital, enabling policy/regulatory environment
M2ii Increase access to climate finance for sustainable forest management (SBB)							
Assess options to access climate finance through UNFCCC mechanisms and other related funding avenues financing carbon sequestration by forest.	RPP					MinFin,	Human capital
Establish focal point for attraction of funding sources						MinFin, ACTO, GEF, UNDP, ITTO	
M2iii Forest resources management programme (ROGB)							

Sustainable Forest Management (SBB)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Assess options for PES						MinFin, private sector	
Provide financial incentives for SFM.						MinFin, private sector, local communities	Human capital, institutional capacity, financial resources
Continue to provide Reduced Impact Logging (RIL) training.	RIL trainings provided in the past	SNC; Code of Practice for timber production				ROGB, CELOS, Private sector, local communities	Human capital, institutional capacity, financial resources,
Implement CELOS management system for SFM and Code of Practise	Awareness folders from Tropenbos International, SBB and CELOS					ROGB, SBB, local communities,RO/DCs	Enabling policy/regulatory environment

Sustainable Forest Management (SBB)							
Action	*Example(s) of similar action(s) underway/planned for in Suriname*	*Example(s) of similar action(s) recommended for Suriname*	*2014-2016*	*2017-2021*	*2022+*	*Imp. partners*	*Challenges*
Include mangrove afforestation in REDD+ strategy and identify REDD+ readiness actions needed for mangrove carbon sequestration through mangrove planting.	RPP					ROGB, SBB, NIMOS	Human capital
Implement programme for reforestation and afforestation of mangroves along coastline.	Mangrove planting in Coronie district (pilot project). Ecosystem based mangrove adaptation project has been developed by ATM with assistance from the UNDP. Currently they are looking for international funding. The abovementioned pilot project will be implemented in various areas along the coastline.	Climate Action plan; recommended by Prof. Naipal (Pers. Comm June 2014)				OW,ODRO, ATM, NIMOS, AdeKUS, CELOS, SCF, RO, DCs, WWF Mangrove platform	Human capital, institutional capacity, financial resources

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