NATIONAL CLIMATE CHANGE ADAPTATION STRATEGY
REPUBLIC OF SOUTH AFRICA

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Strategic Focus of the NAS

Climate change is intricately linked to almost all facets of our society, particularly socio-economic progression as resources such as water, feedstock in form on food, fibre, biodiversity, amongst others determine the production potential of many sectors of the economy, which in turn affect human development aspirations of the country. For South Africa, the observed rate of warming has been 2 °C per century or even higher - more than twice the global rate of temperature increase for the western parts and the northeast. However, the recorded trends in annual average and seasonal rainfall totals are largely statistically insignificant, even though the distribution may be changing. There is evidence that extreme weather events in South Africa are increasing, with heat wave conditions found to be more likely, dry spell durations lengthening slightly and rainfall intensity increasing. The associated impacts primarily have a bearing on economic and social aspects of our development.

The National Adaptation strategy acts as a common reference point for climate change adaptation efforts in South Africa, and it provides a platform upon which national climate change adaptation objectives for the country can be articulated so as to provide overarching guidance to all sectors of the economy. The strategy help gauge the degree to which development initiatives at different levels of government and business integrate and reflect critical climate change adaptation, as such guides stronger coherence and coordination on climate change adaptation activities between different institutions and levels of government, particularly with regards to planning, implementation and reporting, as such provide inputs to the country's legal framework for adaptation. The strategy is the main vehicle for South Africa in meeting its international obligations under the UNFCCC as contained in the country's adaptation component of the Nationally Determined Contribution.

South African development context

The South African economy is dependent on primary sectors such as agriculture, particularly mineral extractives which are natural resource dependent, and energy intensive, with the energy generation being very important as it is also subject to climate variability and change. The country seeks to transition the economy into industrial and service sectors, which are crucial to job creation and reducing inequality as they benefit better from economies of scale. The relationship of such industrial opportunities, with climate-dependent resources, needs to be considered and integrated in development planning, as the resources define the production possibilities for the economy as a whole. The NDP's vision for the future, which includes access to affordable food, safe, and affordable and reliable water and energy services, cannot be based on an economic model or assumptions of infinite availability of these and other resources.

The reality is that there is limited water and fertile land resources, and there has been steady degradation of the environment and associated ecosystem resilience. Population growth, shifting diets and urbanisation are putting increasing pressure on food, water and energy supply. The NAS recognizes that South Africa has significant inter-dependencies with the region. For example, there is still a high reliance on South Africa's seas and roads, however, this reliance will change as infrastructure spend grows and the region's own key transport corridors are unlocked. Another example of the SADC inter-dependence is that both South Africa's agricultural and industrial sectors are dependent on regional water resources, particularly for their future development.

The NAS Framework

The NAS Framework is based on the development of 10-year plans, which are updated every 5 years along six strategic outcomes. For the 1st NAS, covering the period of 2017/18 to 2027/28 strategic interventions are identified in relation to each outcome. The approach is that of continuous improvement and focus in

order to deliver maximum impact and effective deployment of resources for each of the periods of implementation for the strategy.

Vision: To transition to a climate-resilient South Africa, which will follow a development path, guided by anticipation, adaptation and recovery to a changing climate and environment to achieve our development aspirations	Strategic Outcome 1: Achieve an effective adaptation planning regime that covers at least 80% of the South African economy by 2025
	Strategic Outcome 2: Define an adaptation vulnerability and resillience framework implemented from 2020 across 100% of key adaptation sectors
	Strategic Outcome 3: Define and legislate for adaptation governance through the Climate Change Act by 2019
	Strategic Outcome 4: Achieve a 100% coverage of climate change considerations in sectoral operational plans by 2025
	Strategic Outcome 5: Achieve 80% resourcing of national adaptation needs, primarily from national fiscus, including international sources
	Strategic Outcome 6: Development of a national M&E system to track track vulnerability, resilience, implementation and resource allocation by 2025

Strategic Intervention 1: To achieve an effective adaptation planning regime that adequately responds to climate change threats.

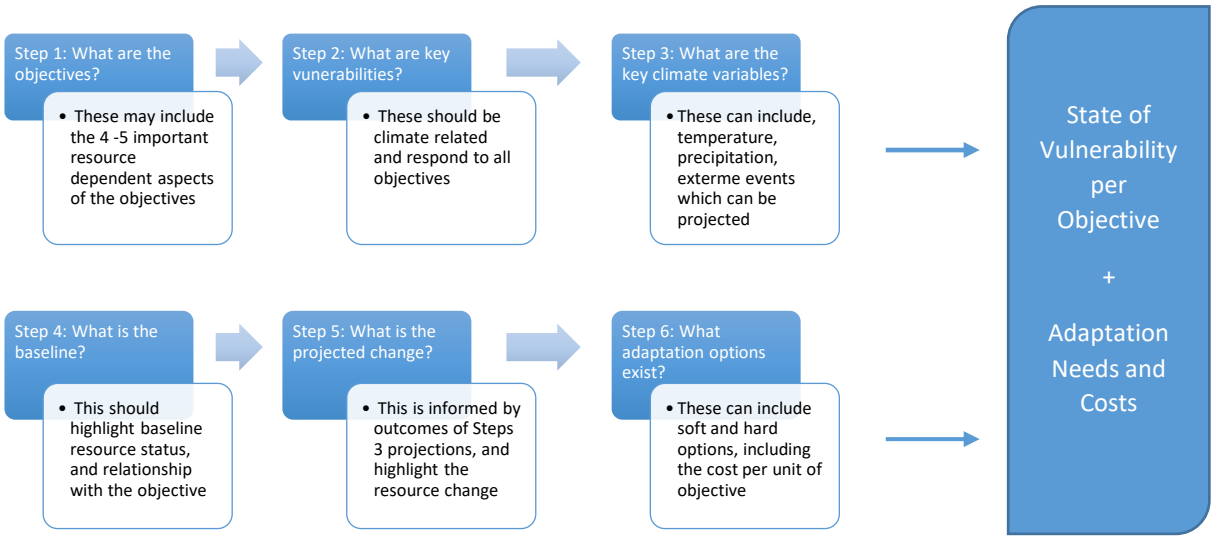
The NAS adaptation guidelines in Chapter 4 propose five-year cycles for the national strategy with a 30-year outlook, hence this first NAS planning cycle provides a 2050 vision of building climate resilience in South Africa. The NAS shall be prepared every 10 years and/or following the publication of an updated national development plan or its variant. Sector Adaptation Plans shall be prepared every 10 years with the first set concluded in the 2019/2020 financial year, with a review and update where appropriate every five years. For subnational governments, the national election cycles determine the production of the relevant planning documents such as the IDPs, Provincial Growth and Development Plan (PGDP), as such will remain on those cycles, with the next iteration expected to be concluded by 2021, then 2025.

Each sectoral or subnational adaptation strategy shall contain minimum information that includes, but not limited to the following; vulnerability of the sector which includes an understanding of vulnerabilities, including their drivers, projected and socio-economic impacts. Adaptation options for the sector covering short and medium term options; including adaptation needs and costs. Adaptation planning and governance highlighting key priorities, governance and institutional arrangements for within and interaction with other sectors. Implementation activities, indicating priority adaptation actions and targets as well as costs associated with 5, 10 and 30 year implementation schedule, and implementation timelines for the priorities. Review and M&E outlining the periodicity of reviewing the plan as well as reporting arrangements internally and nationally with a tracking matrix for relevant indicators.

Strategic Intervention 2: Define adaptation practice that integrates biophysical and socio-economic aspects of vulnerability and resilience

Globally, adaptation practise has lagged behind emission reduction both in terms of the science, planning, action, and reporting, and as a consequence even funding of actions. Chapter 5 defined the National

Vulnerability Assessment Framework whose objective is to provide a common framework for vulnerability assessment, and also informed inform research priorities by adaptation practitioners.



The information generated in the 6 steps can therefore provide a basis for a trend analysis of vulnerability/state of resilience, as well as tracking of effectiveness of interventions in achieving the desired objectives. The NAS therefore provides for the determination of such priorities by the DEA and the DST through the National System of Innovation in association with affected sectors to periodically define and resource priorities for an upcoming five-year planning period.

Strategic Intervention 3: Establish effective governance & legislative processes to integrate climate change in development planning

As the focal point to the UNFCCC, the DEA's role in climate change adaptation includes thought leadership on leading science, approaches to assessment and implementation of adaptation actions through LTAS, as well as addressing cross-cutting aspects such as resource trade-offs associated with various development options. The DEA is developing a Climate Change Act which will present a strong legal obligation for climate imperatives. The policy is to codify adaptation objectives, planning, vulnerability assessment, research and development, implementation priorities, and reporting. Chapter 6 outlines the governance and legislative aspects of the NAS.

The NAS is a further elaboration of how to achieve provisions of the Act, whilst at the same time providing inputs to the development process of the Act. The Climate Change Act provides for the development of the NAS as a legal obligation in terms of its contents, periodic update and review by the DEA. The Act further provides for regulations for other players such as sector departments, segments of business to plan, implement and report on climate change adaptation. The NAS further outlines the roles of business, civil society and the National System of Innovation in supporting the sustainable development agenda through incentives, regulation and creation of an enabling environment for a broader contribution to adaptation objectives.

Strategic Intervention 4: National and sectoral implementation of adaptation actions

The NAS further defines aspects of sectoral, subnational, industry and non-governmental organisations in the development of their adaptation plans. These include planning objectives, understanding of vulnerability, with implementation priorities and the M&E of the plan outlined.

Planning	NVAF	Implementation Priorities	M&E
• Chapter in development planning documents whethet-r national, provincial or local covering adaptation and resilience objectives for the country	• Outline of socio-economic objectives of the implementing entity • Future sectors to drive economic development	• Define resource based 'production' possibilities' of growth sectors • Define trade offs and and implications	• Define indicators to track progress on objectives

The implementation priorities for the various sectors have been identified as follows,

Water sector: Define and identify priority areas for EbA approach through a collaborative effort with DEA, DRDLR, DAFF for 2019 MTSF. Scale up of Working for Water through international funding. Define Flagship Programmes for implementation covering both water quantity and quality for 1st NAS. Collaboration with the NDMF and development of an early warning system of variable time-frames.	**Agriculture:** The sector in terms of the 1st NAS has the priorities of defining Flagship Projects to address key vulnerabilities for inclusion in the 2019 MTSF. Develop Disaster Risk Reduction Strategy and Instruments for the agricultural sector in 2020. Develop a platform for a seasonal forecast based national crop estimates, include subsistence farmers.	**Fisheries:** The priorities for the sector is to define Flagship Projects to address key vulnerabilities, in particular aquaculture as part of Operation Phakisa. Develop Disaster Risk Reduction Strategy and Instruments for the fisheries sector in 2020. Develop an early warning system for the fisheries sector, including algal bloom incidence.
Forestry: Define Flagship Projects to address key vulnerabilities through the scaling-up of Working on Forests and Working on Fire. Develop Disaster Risk Reduction Strategy and Instruments for the forestry in 2020. Develop an early warning system for the forestry sector, including incidence of fire. Adoption of EbA approached to landscape management	**Biodiversity and ecosystems:** The primary activity for this sector is the development and further operationalization of EbA Programme on multifunctional landscapes with relevant players such as LG, DAFF, DRDLR in the period of the 1st NAS.	**Human Settlements:** The priorities include the development of Guidelines for Climate Change Resilience, through updates of the National DMF, SDF, and Building Code by 2020. Implement the Disaster Risk Reduction and Management provisions, scaling up where appropriate. Develop targets with regards to provision of basic services such as water in light of climate change and implement service delivery projects.
Health: Co-design and implementation with the DAFF a food security and Health Flagship. Implement health related aspects of the Disaster Management Framework. Design a project to implement a programme for managing vector borne diseases. In association with local government implement projects related to air pollution and water services, sanitation, refuse removal. Publish resilience standards for health care infrastructure planning, design, and operation.	**Disaster Management:** The key actions include resource and operationalization of the Disaster Management Framework. Explore consolidation of Disaster Relief funds across government sector, such as agriculture, health. Expand the early-warning network, including agricultural disasters, health disasters etc	**Mining and extractives:** The sector should develop a Flagship Programme co-funded by the public-private sector for resilience in the mining sector. Develop and early -warning system for climate related disasters in the mining sector. Contribute to the Biodiversity and Ecosystem Flagship on EbA and multifunctional landscapes
Energy: Adaptation considerations should inform the next iteration of the IRP with outputs of the Climate Change Strategy. Resource and support the implementation of resilience measure by ESKOM and IPPs.	**Transportation and public infrastructure:** Develop and implement a Transport Sector Flagship Programme covering port, rail and road sectors; Develop a building infrastructure Flagship with the Green Building Council. Support implementation of the Disaster Relief efforts for the sector	

Strategic Intervention 5: Achieve adequate and predictable financial resourcing of adaptation actions and needs, from a variety of sources

The primary source for adaptation funding for implementation of NAS priorities lies with National Departments as well as local government structures as part of discharging their mandates. Appropriation for climate change should therefore be reflected in departmental Medium Term Expenditure Framework (MTEF) in line with their MTSF and Annual Performance Plans (APP) priorities. The Department of Environmental Affairs, however, should provide for coordination activities in terms of research, establishment of institutional arrangements and implementation for those sectors under its mandate.

situation where climate-relevant projects are the norm, not the exception.

ACTIVITY	2017/18	2018/19	2019/20	2020/21	2021/22
Define priorities per sector/ across	x				
Design financeable projects		x			
Resource mobilisation plan		x			
Include in MTSF			X		
Funding MTEF and International			X		
Project Implementation			X	x	x

Noting the limitations of national fiscus, especially in the tight economic environment that is foreseeable in the near future, innovative funding approaches are to be investigated and championed by the National Treasury as well as the Department of Environmental Affairs. Chapter 8 examines the climate finance landscape, and present some options of a more coherent resource mobilisation.

Strategic Intervention 6: Develop an M&E system that tracks implementation of adaptation actions and their effectiveness

Under the NAS, South Africa envisages to establish an M&E system for adaptation built on a suite of common/aggregable methodologies and metrics for tracking vulnerability, as well as methodologies for assessing impacts of adaptation projects towards achieving climate resilience and reducing vulnerability. This is reflected in Chapter 9 of document. The NAS charts a framework for reporting across sectors on vulnerability/resilience implementation and impact of implementation on vulnerability and resilience, as well as M&E of all strategic objectives of the NAS including finance.

ACRONYMS

AMCEN	African Ministerial Conference on the Environment
AMCOMET	African Ministerial Conference on Metrology
AMCOW	African Ministers' Council on Water
BUR	Biennial Update Reports
CAHOSCC	Conference of African Heads of State and Government on Climate Change
CLIMDEV	Climate for Development in Africa
CTCN	Climate Technology Centre and Network
DEA	Department of Environmental Affairs
GHG	Greenhouse gas
IDPs	Integrated Development Plans
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
IPAP	Industrial Policy Action Plan
MTSF	Mid-Term Strategic Framework
NAS	National Climate Change Adaptation Strategy
NDC	Nationally Determined Contribution
NDP	National Development Plan
NSI	National System of Innovation
NVAF	National Vulnerability Assessment Framework
ORASECOM	Orange-Senqu River Commission
SACU	Southern African Customs Union
SADC	Southern African Development Community
SAWAS	South African Weather Service
SDG	Sustainable Development Goal

1. STRATEGIC FOCUS

South Africa published its National Climate Change Response Policy in 2011, which included climate action, for both greenhouse gas (GHG) mitigation and climate change adaptation for the country. Adaptation has, however, not benefited from further policy initiatives beyond technical work in the form of the Long-Term Adaptation Scenarios in 2015. Despite the state of affairs, the country has made progress, not only in furthering technical understanding, but also the implementation of adaptation projects.

Climate change is intricately linked to almost all facets of our society, particularly socio-economic progression as resources such as water, feedstock in form on food, fibre, biodiversity, amongst others determine the production potential of many sectors of the economy, which in turn affect human development aspirations of the country. Due to the intricate link between climate change adaptation and human development, various role players - the three levels of government, i.e. national, provincial, and local, civil society, the private sector, and the National System of Innovation[i] - continue to build the country's resilience to climate change, albeit operating without a common reference point, and consideration of cross-sectoral implications on resources to support the future we want.

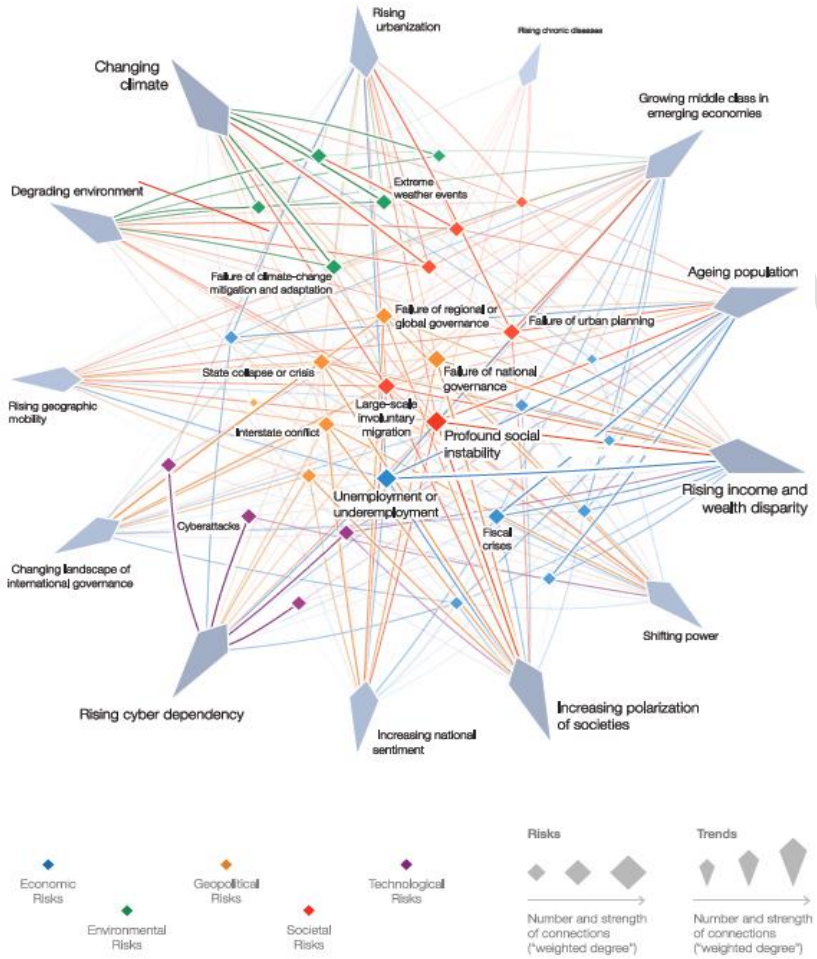


Figure 1. Global Risks Interconnections - WEF, 2017

[i] The NSI comprise of Research Councils, such as the ARC, CSIR, HSRC, MINTEK, MRC; Universities; Government through Human Capital Development; and the Private Sector

According to the 2017 World Economic Forum Global Risks Report, climate change is ranked second, behind rising wealth and income disparities, ahead of increasing polarisation of societies, rising cyber dependency, and an ageing population. Albeit second, climate change is strongly related with all top five risk interconnections[1] (WEF, 2017), as shown in **Figure 1**, meaning, climate change exacerbates each of the five interconnections, and vice versa. The climate change adaptation response by South Africa should therefore recognise that, the challenge transcends environmental concerns to include social, economic and political dimensions. As such, climate change should be at the centre of national development planning and policy.

1.1 Evidence of climate change in South Africa

There is ample evidence of national and local changes in the temperature and rainfall climatology of South Africa over at least the past five decades, based on several analyses of the weather station data of the South African Weather Service (SAWS) and the Agricultural Research Council, and internationally developed and maintained climate data sets such as those of the Climatic Research Unit in the United Kingdom. The findings described in Section 4 are based on material summarised in South Africa's Third National Communication to the UNFCCC.

Temperature Trends

Studies of historical climate trends have been steadily increasing during the last decade, given the increasing concerns about anthropogenically induced global warming and climate change. For the African continent, studies are indicative of drastic increases in surface temperature occurring over the last five decades. Warming trends across southern Africa have tended to be up to double the global average over the past four to five decades.

For South Africa, studies of historical temperature trends are indicating that South Africa has been warming significantly over the period 1931-2015. The strongest warming trends have been observed in the drier western parts of the country (North Cape and Western Cape) and in the northeast (Limpopo and Mpumalanga, extending southwards to the east coast of KwaZulu-Natal) - where the observed rate of warming has been 2 °C per century or even higher - more than twice the global rate of temperature increase.

Rainfall Patterns

The results in the trends of annual rainfall performed for the period 1921-2015 for South Africa show a positive trend in annual rainfall totals over the central southern interior, extending to some extent to the north. Negative trends in rainfall were recorded over the northern parts of the Limpopo Province. Otherwise, the recorded trends in annual average rainfall totals are largely statistically insignificant over the remainder of the country even though the distribution may be changing.

For most seasons there were no large-scale spatial coherence in statistically significant trends for seasonal rainfall totals. However, the positive trends in annual rainfall totals over the southern interior were reflected mostly in the summer rainfall trends, which is the main rainfall season for this particular region. The decreasing trends in annual rainfall over Limpopo, on the other hand, appeared to be largely the result of decreasing rainfall trends in autumn.

Extreme Events - Floods, Drought and Heat Waves

There is evidence that extreme weather events in South Africa are increasing, with heat wave conditions found to be more likely, dry spell durations lengthening slightly and rainfall intensity increasing. It must be noted that until 2015/16, South Africa had largely avoided adverse effects of El Niño conditions since 1991/92. Above-average rainfall over the past two decades has limited extreme drought conditions in

South Africa and the region. As a result, flooding and storm conditions have featured more prominently as extreme events than drought until 2014.

1.2 Broad Impacts of Climate Change on South Africa

The changes in the climatological regime and the incidence of extreme events have a direct relationship with impacts. Projected climate change and key impacts and vulnerabilities for South Africa are summarised in **Annexure 1** of this strategy. The understanding of climate projections and impacts is an important aspect in climate change adaptation, as the changes in climate by themselves do not cause harm, rather it is how those affect natural processes, social functioning and economic activity. The analysis and summary of broad impacts of climate change on the South African economy is primarily based on the 5th Assessment Report of the IPCC, and focusses primarily on primary and extractive economic sectors (see **Figure 2**).

KEY VULNERABILITY	BIOPHYSICAL	ECONOMIC	SOCIAL
Unreliable and uncertain access to water	x	x	x
Risk to agricultural productivity and livestock		x	x
Human safety from climate related extreme events			x
Poor service delivery in human settlements	x	x	x
Vulnerable energy system and infrastructure		x	x
Diminished labour force productivity through exposure and health		x	x
Supply and demand volatility of the market		x	
Carbon intensity and dependence of the economy		x	x
Ecosystem and conservation estate	x	x	x

Figure 2: Grouping of key vulnerabilities into social economic and biophysical impacts

For a better appreciation of both risks and opportunities presented by climate change, it is important not only to consider the country's development context, but also the envisaged development trajectory envisaged in the National Development Plan.

1.3 Importance of a NAS for South Africa

South Africa's response to climate change is informed by the findings of the Intergovernmental Panel on Climate Change (IPCC) findings that, the climate system's warming is unequivocal, that anthropogenic emissions are significantly responsible for this warming, and that the adverse impacts of climate change are likely to persist even with the most ambitious efforts by all countries. South Africa, as an economy that is highly dependent on primary sectors, is particularly vulnerable to climate change owing to its geographic location characterised by climate variability.

National strategic processes are critical to successful climate change adaptation planning and implementation. Adaptation strategies, sometimes referred to as frameworks at national scale, position countries to reduce their climate change risks and take advantage of economic opportunities. Although adaptation responses are implemented locally or regionally, they need overarching guidance to reduce risks of maladaptation and maximise opportunities for integration at multiple levels. These include integration of adaptation to climate change with national sustainable development aspirations, socioeconomic imperatives and identified climate risk priorities, and alignment with financial and other resources.

The NAS is an important step forward for South Africa, as it:

- Acts as a common reference point for climate change adaptation efforts in South Africa in the short- to medium-term, providing guidance across all levels of government and sectors affected by climate variability and change, as well as all stakeholders, including business, the National System of Innovation (NSI) and non-governmental organisations;
- Provides a platform upon which national climate change adaptation objectives for the country can be articulated so as to provide overarching guidance to all sectors of the economy, as such coherence in adaptation planning, implementation and reporting, including informing the trade-offs between various sectors in pursuit of national development objectives;
- Help gauge the degree to which development initiatives at different levels of government and business integrate and reflect critical climate change adaptation priorities, and thus inform resource allocation by the various stakeholders towards climate change resilience;
- Guide stronger coherence and coordination on climate change adaptation activities between different institutions and levels of government, particularly with regards to planning, implementation and reporting, as such provide inputs to the country's legal framework for adaptation; and
- Support South Africa in meeting its international obligations by defining the country's vulnerabilities, plans to reduce such vulnerabilities and leverage opportunities, outlining the required resources for such action, whilst demonstrating progress on climate change adaptation.

2. SOUTH AFRICAN DEVELOPMENT CONTEXT

South Africa's stable transition to democracy is proving to be a long-term success and the realities in South Africa, which made this transition possible, are still in place and guarantee future political stability. When viewed from a political perspective, the post-apartheid South African landscape looks markedly different from its apartheid predecessor. In South Africa, public policy has had a significant redistributive content, and has achieved real impacts.

From a developmental vantage point, however, the legacy of apartheid is still very evident. South Africa remains a dual economy with one of the highest Gini Coefficients in the world, perpetuating both inequality and exclusion. Poverty and inequality, both exacerbated by unemployment, are South Africa's most significant challenges. Lack of access to natural resources a two-tiered educational system, a dual health system, discriminatory spatial planning, and other socio-economic dimensions are some of the aspects that demonstrate inequality in the South African society. Undoing both inequality and poverty remains the major preoccupation of policymakers in the democratic South Africa.

In the discourse in South Africa today, there is a certain fatigue at referencing the past as an explanation for problems that are present-day realities and on an occasion when the referencing of the past is done, there is a tendency to do so in a cursory manner. Yet, in a country with the historic and economic characteristics of South Africa, to be relevant and effective, the NAS has taken this context of South Africa with the view to inform and outline the extent of the required transformational change towards climate-resilience.

2.1 South Africa's Economic Structure and Natural Resources

The South African economy is dependent on primary sectors such as agriculture, particularly mineral extractives which are natural resource dependent, and energy intensive, with the energy generation being very important as it is also subject to climate variability and change. The South African economy continues to have a large contribution of the primary sector - defined as those sectors that directly extract natural resources, which includes manufacturing industries that aggregate, pack, package, purify or process the raw materials close to the primary producers. As demonstrated in **Figure 3**, agriculture, mining and quarrying, manufacturing to a large degree, electricity, gas and water accounted for almost 30 per cent contribution to GDP in 2015 (South African Market Insights, 2017[2]).

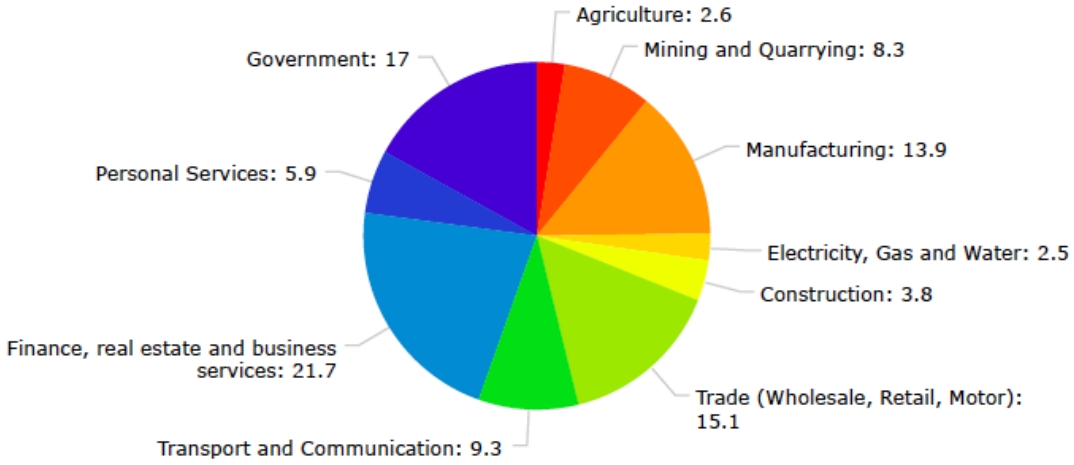


Figure 3: Current economic structure of South Africa and industrial opportunities pursued

Furthermore, the challenge of extractive primary sectors includes diminishing productivity and returns with increase in scale, as such do not fare well in addressing the challenges of unemployment, poverty and inequality. The country is on an industrialization drive through the country's Industrial Policy Action Plan IPAP and other related policies.

The country seeks to transition the economy into industrial and service sectors, which are crucial to job creation and reducing inequality as they benefit better from economies of scale. The relationship of such industrial opportunities, with climate-dependent resources, needs to be considered and integrated in development planning, as the resources define the production possibilities for the economy as a whole. Furthermore, the marginalized communities of the past, which are strongly dependent on natural resources, do not only have low adaptive capacity due to their socio-economic standing, but also continue to depend on primary and extractive sectors due to their skill levels.

The case for adaptation consideration in development planning is therefore irrefutable to understand industrial options and trade-offs with resources necessary to address unemployment, poverty and inequality through the understanding of climate futures. An example of the importance of linking climate change and resource futures is the IPAP focus on agro-processing, where increasing the agro-processing output requires increased agricultural productivity, which raises questions such as:

- Is the future rainfall and temperature regime going to continue being optimal in light of climate variability and change?
- Which sectors will forgo access to water so as to support a growing agro-processing, alternatively what will be possible to achieve with available water in light of climate change?
- What will be the increase in water demand to support energy generation for the new industries, including downstream water demand in the case of coal generation, and will available water resources in light of climate change be sufficient?

These questions can be applied to all adaptation sectors in terms of understanding the applicable trade-offs that need to be assessed in light of climate change, noting that with or without climate change, such trade-offs need to be understood, and are merely brought more to focus by the projected changes in resource availability.

2.2 Adaptation, Trade-offs and Development Options

Policy-making in South Africa in respect of environmental concerns has, in general, been focussed on conservation efforts, which aim to restore, conserve and preserve ecological functions and services. The NAS provides an opportunity for understanding and managing inter-connections of material flows and resource systems that are in operation in the South African economy at various scales, whilst considering how these can be reconfigured to ensure sustainable use of natural resources. The remainder of this section is an extract of the WWF report, as it aptly demonstrate the development trade-offs with resources.

The uneven distribution of natural resources and the location of economic development nodes in South Africa amplify the management constraints and inequality of access to these resources. A clear example is the fact that South Africa's coal deposits coincide with the country's best agricultural land and sources of some of the major inland rivers. The spatial complexity adds to the task of effective management of food, energy and water resources, making it the foremost challenge for sustainable development in South Africa.

The National Development Plan (NDP) of South Africa seeks to eliminate poverty, deliver environmental protection and promote economic development by 2030. The magnitude of this task should not be underestimated. In a country fraught with unemployment and notorious for having one of the world's highest wealth gaps between rich and poor, there is an urgent need to grow the economy in such a way that jobs are created for a largely unskilled workforce and that there is a structured redistribution and equity in access to and ownership of resources.

The NDP's vision for the future, which includes access to affordable food, safe, and affordable and reliable water and energy services, cannot be based on an economic model that assumes infinite availability of these and other resources. The reality is that there is limited water and fertile land resources, and there has been steady degradation of the environment and associated ecosystem resilience. Population growth, shifting diets and urbanisation are putting increasing pressure on food, water and energy supply. The NDP however does not test the sensitivity of achieving these goals in light of climate change and variability. The NAs should therefore provide for the development of a body of knowledge to support national development planning and responses thereof.

At the same time, many natural resources are becoming harder to access, pushing exploration into less accessible resource zones associated with greater technical, social and environmental challenges and increasing cost. Add in the likely impacts of climate change, such as rainfall variability and extreme weather events and the need for integrated planning informed by systems thinking - i.e. to think in terms of the food-energy-water nexus - becomes urgent.

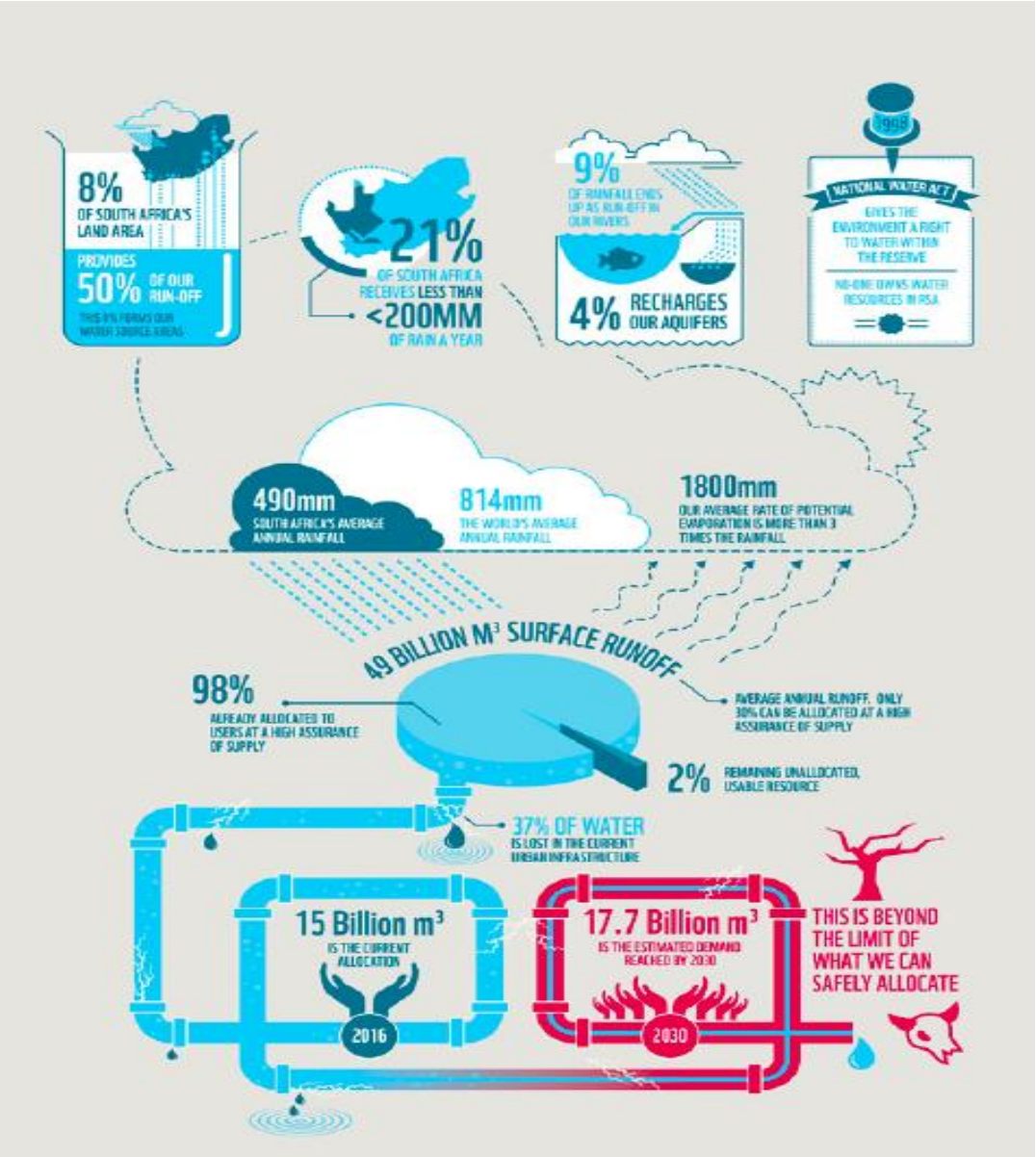


Figure 4: State of South African Water Resource (GreenCape, 2017)

Until now, there has been limited recognition of the interdependence of these three resources – water, energy and food - from a policy and sectoral perspective. Rather, all three are dealt with in silos. It is now evident that failure to accurately understand the synergies and trade-offs between these three resources will result in growing numbers - many millions - of South Africans at risk of hunger, waterborne diseases, energy shortages and increased poverty. Ultimately, the challenges posed by resource constraints point towards a coming crisis in the provision of clean water, electricity and nutritious food, which are at the heart of national security and welfare. It is important that we respond correctly to ward off this crisis. This response must be at a scale that allows for national and regional integration. It must focus on the effective management of resources, enabled by wider technology use and greater governance underpinned by an integrated approach to policy, planning, management, development and the appropriate institutional capacity.

In South Africa, fresh water is predicted to become the determining constraint on development, as shown in **Figure 4**. However, the challenge is not only an issue of water availability; it is, perhaps first and foremost, an issue of declining water quality. The quality of freshwater resources has been on a steady decline owing to increased pollution, where and 40 per cent of the freshwater systems are now in a critical condition, while 80 per cent are threatened. South Africa is a water-scarce country with 98 per cent of available water already allocated. Given the level of water scarcity in the country, water-intensive energy production and an increase in agricultural production in response to a growing demand and to support job creation, will challenge the existing balance. Water could be the critical limiting local resource for the sustained supply of both energy and food. The spectres of climate variability and changes in rainfall patterns add to the uncertainty, particularly for vulnerable farmers who lack the resilience to survive even short-term crises. These risks are exacerbated by changing consumption patterns and demographic pressures. The water adaptation options should therefore respond to these dynamics.

The country's commercial agriculture production is heavily dependent on irrigation with only 12 per cent of the land considered suitable for growing rain-fed crops and less than 3 per cent is considered truly fertile. Irrigation accounts for 90 per cent of vegetable, fruit and wine production and 12 per cent of the total area under wheat is irrigated. So, although only 1.5 per cent of the land is under irrigation this currently accounts for 30 per cent of the country's crops. As there is limited arable land, the only feasible way to grow the agricultural sector is through irrigation.

2.3 Regional Perspectives of South Africa' Development

Since attaining the status of a democratic state, South Africa has regarded Southern Africa and Africa as a priority in its foreign relations. Agenda 2063 of the African Union prioritises actions that seek to ensure positive socio-economic transformation in Africa within the next 50 years. However, most of its priority areas, for example, poverty, inequality and hunger, health and nutrition, agricultural productivity and production, are at threat of climate variability and change. It is for that reason that African countries have prioritised adaptation in the global governance negotiations under the United Nations Framework Convention on Climate Change.

The country has shown its commitment to all spheres of the Southern African Development Community (SADC) agenda including political, social and economic well-being of the region. For example, South Africa has given support to the spirit and embodiment of the Regional Indicative Strategic Development Plan (RISDP) which is the SADC blueprint for regional integration and development. The SADC's Regional Programme on Climate Change and the various sub-regional climate change programmes developed by the African Ministerial Conference on the Environment are relevant to South Africa's climate change adaptation efforts. An analysis of the Political Economic Social Technology Legal Environment Global (PESTLEG) environment in which the NAS is being developed is reflected in **Annexure 2** of the strategy, as it informs some of the options identified in the NAS Framework.

The NAS recognizes that South Africa has significant inter-dependencies with the region. For example, there is still a high reliance on South Africa's seas and roads, however, this reliance will change as

infrastructure spend grows and the region's own key transport corridors are unlocked. Another example of the SADC inter-dependence is that both South Africa's agricultural and industrial sectors are dependent on regional water resources, particularly for their future development. The NAS also recognizes that South Africa needs to position itself such that it can capitalise on emerging regional comparative advantages that may arise due to climate change. For example, certain crops, may no longer be viable elsewhere but are suited to South Africa's climate. Future water imports are expected to come from countries further north of the country. Therefore, the NAS recognizes that a closer engagement with SADC is necessary to ensure that South Africa meets its growing resource needs. Innovative concepts such as virtual water - where a country imports lower value products with a high water intensity, so as to achieve higher returns per unit water used domestically - as such consider adaptation beyond only a national context, all within a context where other factors such as food security and national security, amongst others, are considered.

Research and development also has a role in the expansion of South Africa's opportunities in the region with the view to expand those opportunities or initiatives that contribute in building regional resilience. For example, a better understanding of the food system in the southern African region as a whole is necessary to understand the pressure points and impacts of unsustainable natural resource usage. Taken together, the NAS emphasises that South Africa should deepen existing initiatives and explore further opportunities in Southern Africa to support regional resilience and different countries in the region while also leveraging economic opportunities that may arise, noting that South Africa can achieve its economic growth objectives primarily from access to resources and markets achieve in Sub-Saharan Africa.

3. THE NAS FRAMEWORK

The NAS framework is the blueprint of implementing the strategy, as it outlines the vision, mission, tenets of the strategy, whilst elaborating the envisaged outcomes as well as the associated interventions to achieve the outcomes. The subsequent chapters therefore provide specific modalities for the various stakeholders in contributing to the implementation of the strategy.

3.1 Vision

To transition to a climate resilient South Africa, which will follow a development path, guided by anticipation, adaptation and recovery to a changing climate and environment to achieve our development aspirations.

The NAS provides a common vision of climate change adaptation and climate resilience for the country. It situates the concept of climate resilience within the broader context of socio-economic development, and provides a framework for the country that describes the interconnectedness between climate change resilience and development goals. The NAS's vision draws on South Africa's National Climate Change Response Policy NCCRP and the adaptation component of its Nationally Determined Contribution (NDC).

The stated vision is timeless, as it constitutes the pursuit of a dynamic state of affairs in a development paradigm that recognises the interconnectedness of development and resources. The vision is operationalised through successive 10 year plans updated every 5 years, that address strategic outcomes towards achieving the vision.

3.2 Mission

The National Climate Change Response policy cites the adaptation objective as being to 'effectively manage inevitable climate change impacts through interventions that build and sustain South Africa's social, economic and environmental resilience and emergency response capacity'. The NAS further elaborates this aspirational goal being to 'build resilience and enhance adaptive capacity to respond to climate change risks and vulnerabilities; whilst providing guidance on the integration of climate change responses into current and future development objectives through optimising coherence between policy, planning, and implementation of adaptation actions.

The NAS recognizes the importance of a shared common commitment by all stakeholders towards a climate-resilient South Africa. As such, the NAS emphasises the view that, the responsibility for building resilience in South Africa is shared by all of its inhabitants. The NAS aims to ensure that stakeholders, including development planners and decision-makers who inform the socio-economic trajectory of the country integrate climate considerations in development options, as well as in resource allocation to support development, hence a more comprehensive approach to the fulfilment of our development vision.

3.3 Strategic Outcomes

The NAS outlines six strategic outcomes towards achieving the vision of the transition to a climate-resilient South African as outlined in **Figure 5** as follows;

1. **Achieve a robust, coordinated and effective adaptation planning regime that covers at least 80 per cent of the South African economy by 2025**: The first outcome that is at the centre of achieving resilience is the ability to plan for different climate and socio-economic futures across sectors, tiers of government, as well as various players such as business, the national system of innovation as well and non-governmental organisations.

2. **Achieve integration of the vulnerability assessment framework in all sector plans by 2020:** The second key aspect of the strategy is the development of a consistent economy-wide vulnerability assessment and resilience framework that informs, and in turn, is informed by a RD& I activities to support planning and tracking of progress towards the achievement of NAS objectives. Such a vulnerability assessment and resilient framework shall be used in the adaptation planning objectives of this strategy.
3. **Define and legislate for adaptation governance through the Climate Change Act by 2019:** The third strategic objective is the establishment of governance, institutional arrangements for adaptation planning and implementation starting with legislated provisions and regulations of the Climate Change Act by 2019. Such institutional arrangements shall provide for achieving domestic objectives as outlined in the NAS, as well as meeting international obligations.
4. **Achieve a 100 per cent coverage of climate change considerations in sectoral operational plans by 2025:** The fourth strategic objective of the NAS is to achieve an implementation regime that takes into account inter sectoral dynamics, where 100 per cent of sectoral mandates demonstrate climate considerations by 2025. Progress towards this objective can only be tracked on the basis of the core operational plans and strategies of the various sectors and players.
5. **Achieve 80 per cent resourcing of national adaptation needs, primarily from national fiscus, including international sources:** The fifth objective of the strategy is to achieve predictable allocation of the national budget to cover at least 80 per cent of stated sectoral adaptation objectives outlined in plans and strategies for each MTSF period, starting from 2019. This objective includes leveraged financial support from international and innovative sources of funding, and measured against national adaptation needs estimates as contained in the adaptation component of South Africa's NDC.

6. **Development of a national M&E system to track vulnerability, resilience, implementation and resource allocation by 2025:** The sixth strategic objective is the development and tracking of key indicators for vulnerability and resilience with the objective of informing future planning and implementation of actions. Such a system will form part of the national M&E system that is used to generate information as required in terms of our international obligations for adaptation components of NDCs, BURs and National Communications by 2020.

The strategy shall be communicated across the general citizenry as well as to affected players through various communication channels that are relevant for respective target groups, including through non-governmental organisations, industry associations and governmental structures. The communication objectives shall include both awareness and providing inputs for future iterations.

Vision: To transition to a climate-resilient South Africa, which will follow a development path, guided by anticipation, adaptation and recovery to a changing climate and environment to achieve our development aspirations	Strategic Outcome 1: Achieve an effective adaptation planning regime that covers at least 80% of the South African economy by 2025
	Strategic Outcome 2: Define an adaptation vunerability and resillience framework implemented from 2020 across 100% of key adaptation sectors
	Strategic Outcome 3: Define and legislate for adaptation governance through the Climate Change Act by 2019
	Strategic Outcome 4: Achieve a 100% coverage of climate change considerations in sectoral operational plans by 2025
	Strategic Outcome 5: Achieve 80% resourcing of national adaptation needs, primarily from national fiscus, including international sources
	Strategic Outcome 6: Development of a national M&E system to track track vulnerability, resilience, implementation and resource allocation by 2025

Figure 5: Strategic Outcomes of 2017 -2025 National Adaptation Strategy

The tracking of progress towards achieving the strategic outcomes is further elaborated in Chapter xxx on the M&E section of the strategy.

3.4 Strategic Interventions of the NAS

The strategic interventions of the NAS are directly linked to the envisaged outcomes, with each intervention having a dedicated Chapter to outline the envisaged activities of the 1st National Adaptation Strategy.

Strategic Intervention 1: Achieve an effective adaptation planning regime that adequately responds to climate change threats

The NAS aims to provide guidance that will link adaptation efforts more coherently to South Africa's national developmental goals. Climate change adaptation is not a standalone matter for environmental professionals or climate change officials, and this strategy posits climate change adaptation as an economic, social and developmental concern that should be addressed deliberately and proactively as South Africans work to create a secure and prosperous future for all.

Despite various mandates and actions being typically led by different departments and players in the South African economy, the strategy further aims to break down the silos in planning between the various sectors in government and business, as it seeks to ensure that sector strategies, plans by the three tiers of government and those of other role players, support and contribute to a more unified and coherent national approach to building climate change resilience. The envisaged NAS planning regime is outlined in Chapter 4.

The NAS aims to deepen the understanding of the linkages between climate change and development, through providing strategic guidance on mainstreaming climate change into all sectors and all spheres of government, to ensure that planning and governance decisions are aligned with both adaptation and socio-economic development goals. This is to be partially achieved through periodic analysis of resource

state in light of climate change so as to inform national development planning and economy-wide sectoral planning.

Strategic Intervention 2: Define adaptation practice that integrates biophysical and socio-economic aspects of vulnerability and resilience

Globally, adaptation practise has lagged behind emission reduction both in terms of the science, planning, action, and reporting, and as a consequence even funding of actions. South Africa has provided thought leadership to the international community of a repositioning of adaptation. This strategy is an opportunity for South Africa to take this leadership further through systemic planning and policy making that could enhance integrated resource management through optimisation of integrated policy and policy planning and implementation. It does so by embedding vulnerability assessment in the context of development planning, and furthers the understanding of and use of economic and environmental strategies that enables the principles of sustaining ecosystem services to guide the efficient and productive use of natural resources. It promotes integrated decision-analysis tool to better understand how decisions are made and to analyse the associated implications to improve not only access to nexus-related information but also confidence and coordination in investment in productive landscapes.

One of the many imperatives for South Africa to develop a NAS comes from a changing global adaptation landscape. Other countries are gearing up to become more resilient in the face of climate change, both individually and as part of the multilateral process. South Africa needs a strategy that does not only allow it to stay abreast with the adaptation responses regionally and globally, but also helps it to shape the development of a regional and global climate-resilient economy and society. It is in that context that Chapter 5 presents the National Vulnerability Assessment Framework.

The NAS recognizes the reality that further climate change is inevitable and therefore places emphasis on preparedness for the climate of the future through implementing appropriate adaptation solutions to minimize the adverse impacts of a changing climate. The strategy recognises that adaptation to climate change presents South Africa with an opportunity to transform the economy, strengthen the social and spatial fabric, and become more competitive in the global marketplace. To maintain thought leadership, the NAS seeks to broaden the climate change adaptation research such that it extends beyond the biophysical and economic variables and responds to the triggers and processes that define and influence changes in decision-making and action.

Strategic Intervention 3: Establish effective governance & legislative processes to integrate climate change in development planning

As the focal point to the UNFCCC, the DEA's role in climate change adaptation includes thought leadership on leading science, approaches to assessment and implementation of adaptation actions through LTAS, as well as addressing cross-cutting aspects such as resource trade-offs associated with various development options. The strategy defines the role of sector departments and other tiers of government in setting the action agenda that responds to guidance provided by the DEA on economy-wide adaptation approaches, practises and tools, and implementing such actions within their mandates whilst integrating climate consideration in their planning processes.

The NAS further outlines the roles of business, civil society and the National System of Innovation in supporting the sustainable development agenda through incentives, regulation and creation of an enabling environment for a broader contribution to adaptation objectives. In doing so, it creates incentives to collectively set the research and implementation agenda. The governance and legislative imperatives are addressed in Chapter 6.

The strategy takes forward the implementation of the NCCRP and provides a basis that informs, and in turn operationalises provisions of the National Climate Change Act currently under consideration. In relation to the Act, the NAS provides a basis for a vulnerability assessment framework, climate change

adaptation planning, institutional arrangements and governance, implementation framework, resource mobilisation; and adaptation reporting which will guide the formulation and implementation of the Act.

Strategic Intervention 4: Achieve coherent adaptation implementation that addresses key vulnerabilities and cross-sectoral dynamics

A periodic identification of adaptation priorities, and actions within sectors along the same timeframes provide a basis for achieving a multiplier effect across the economy, as well as an understanding of trade-offs. The MTSF cuts across all aspects of the economy and identifies concrete actions envisaged for the five-year period, including the provision for Annual Performance Plans. Under the auspices of the NAS, this necessitates the publication of Long-Term Adaptation Scenarios well in advance of an updated/revised NAS so as to inform sectoral operational plans for the MTSF. The LTAS will also provide a basis for technical assessments and reporting for the upcoming period.

The integration of NAS priorities as well as sectoral targets for various elements of the NAS should therefore be reflected in operational documents of the various sectors and stakeholders such as the National Water Resources Strategy (NWRS) for the water sector, Disaster Management Framework of the National Disaster Management Centre, etc. For business which is organised in some respects, the implementation plans could interpret priorities for an upcoming five-year period, and provide technical support to their members in translation to business objectives, e.g. through the Disclosure Project of water by the National Business Initiative NBI. Increasingly, industry bodies such the Chamber of Mines will have to indicate how they are effecting national objectives. The priorities for the 1st national Adaptation Plan are outlined in Chapter 7.

For evidence base, investment in research that responds to questions and priorities for an MTSF, initiatives such as the Global Change Grand Challenge by the DST should outline research priorities in support of the key adaptation initiatives. Understanding that civil society primarily contributes to project implementation, and dissemination of new technologies and policy, civil society groups can be encouraged to coordinate five-year plans that coincide with the MTSF such that a broader view can be visible.

The same applies to provincial governments and municipalities where they would outline implementation priorities to be reflected in Integrated Development Plans (IDPs), with South African Local Government Association playing a role of interpreting national priorities for the period, and supporting municipalities in their translation to IDPs. Civil support to local community action through sector department and municipal programmes as well as civil society initiatives at grassroots level needs elucidation by all concerned.

Strategic Intervention 5: Achieve adequate and predictable financial resourcing of adaptation actions and needs, from a variety of sources

The primary source for adaptation funding for implementation of NAS priorities lies with National Departments as well as local government structures as part of discharging their mandates. Appropriation for climate change should therefore be reflected in departmental Medium Term Expenditure Framework (MTEF) in line with their MTSF and Annual Performance Plans (APP) priorities. The Department of Environmental Affairs, however, should provide for coordination activities in terms of research, establishment of institutional arrangements and implementation for those sectors under its mandate.

Noting the limitations of national fiscus, especially in the tight economic environment that is foreseeable in the near future, innovative funding approaches are to be investigated and championed by the National Treasury as well as the Department of Environmental Affairs. Chapter 8 examines the climate finance landscape, and present some options of a more coherent resource mobilisation. Scaling up of the Green Fund through a window for NAS priorities is but one example. Options of leveraging private sector finance and collaboration to support adaptation is an option that requires further exploration, such as rehabilitation of post-mining landscapes building on the Mine Closure Trust Funds, catchment

rehabilitation to improve input process water and reduced operational costs, and investment in water use efficiency to directly reduce operating costs, amongst others.

In the international arena, the DEA as a focal point for climate change under the UNFCCC, as well as a contributor to the Global Environmental Facility, and participation in the Adaptation Fund and the Green Climate Fund, should take lead in supporting the preparation of fundable proposals that support NAS priorities. Bilateral donor support, primarily grants should further form part of resourcing project implementation. Regional programmes outlined in regional climate change strategies also provide a platform through which South Africa can access climate finance. Some regional initiatives for insuring resource poor farmers can also be considered, including further capitalisation of the Disaster Management Fund. However, due to the split nature of the disaster relief, between human settlements and agriculture, consideration of amalgamation of such funding for a broader coverage and reduction of transaction costs necessary.

Strategic Intervention 6: Develop an M&E system that tracks implementation of adaptation actions and their effectiveness

The Paris Agreement significantly changed the architecture of the international regime that governs climate change. This is particularly true with regards to adaptation. Some of the key adaptation aspects that are associated with the Paris Agreement include contributions by countries to the advancement of the global goal of adaptation, periodic development and submission of the adaptation component of National Determined Contributions, meeting the adaptation related reporting obligations that are part of the enhanced transparency framework, and the readiness to receive the support through international cooperation for implementing adaptation actions.

South Africa has committed to adaptation in its INDC, subsequently its NDC. With the entry into force of the Paris Agreement, South Africa is shifting its focus towards its implementation. South Africa understands the adaptation component of its NDC as setting out high-level objectives that it aims to address through its adaptation efforts. It views these international commitments as providing momentum for building climate resilience in the country. On the other hand, the NAS is a country-driven, national-level process that aims to integrate adaptation into national planning processes and implement adaptation priorities, including those contained in the adaptation component of the NDC. This understanding makes the NAS and the adaptation component of the NDC mutually reinforcing.

Under the NAS, South Africa envisages to establish an M&E system for adaptation built on a suite of common/aggregable methodologies and metrics for tracking vulnerability, as well as methodologies for assessing impacts of adaptation projects towards achieving climate resilience and reducing vulnerability. This is reflected in Chapter 9 of document. The NAS charts a framework for reporting across sectors on vulnerability/resilience implementation and impact of implementation on vulnerability and resilience, as well as M&E of all strategic objectives of the NAS including finance.

3.5 Tenets of implementing strategy

This NAS provides a framework for climate change adaptation in South Africa, as such provides guidance to all relevant stakeholders on the key aspects of the national efforts and expectations, particularly from those with a statutory mandate. As such, it does not usurp the responsibility of the various players on their mandates, rather affirms the responsibility for their contribution to the national effort. The Department of Environmental Affairs (DEA) as the climate change focal point for the country has the responsibility of guiding and supporting the implementation of the NAS, and reporting on the various objectives of this strategy. The implementation of the NAS shall be based on a continuous improvement approach through five-year cycles, where all sectors outline their quantitative objectives in line with the national strategy.

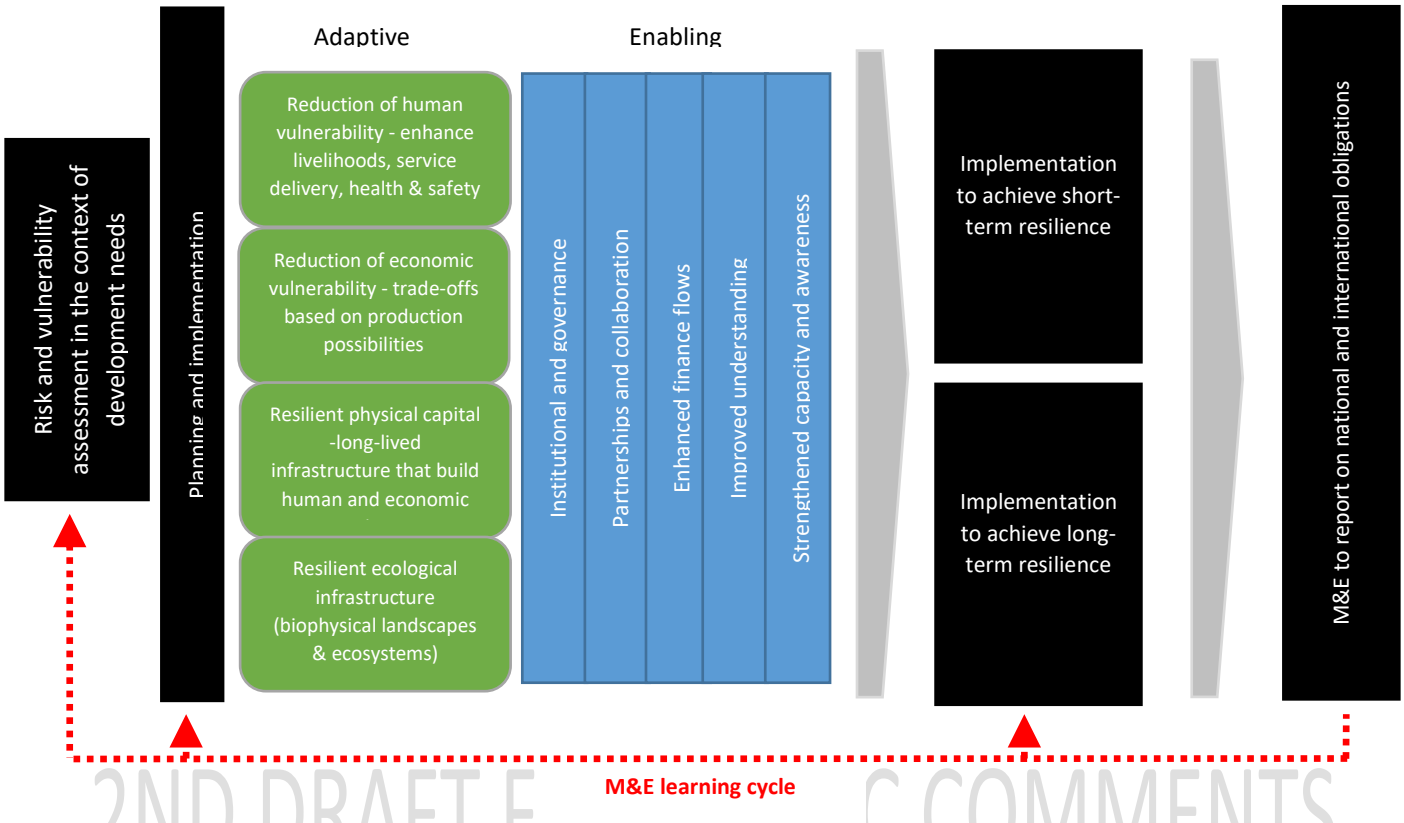


Figure 6: A framework for building a climate resilient South Africa

The principles guiding the implementation of the NAS (including the conceptual framework in **Figure 6**) shall include,

- **Participation by a wide range of actors:** This is a strategy for South Africa and all South Africans. While the custodian of the strategy is the government, its success depends on the involvement and support of a cross-section of stakeholders.
- **Prioritisation of adaptive measures:** The strategy is translated into an effective response through measures that target certain high-priority vulnerabilities, in particular sectors and focus on building adaptive capacity in these areas.
- **Prioritisation of enabling measures:** The strategy also identifies cross-cutting measures that do not target particular sectors but rather apply to institutions, processes or capabilities that are systemic and can build social, biophysical and economy-wide adaptive capacity.
- **Short-term resilience leads to long-term resilience:** The NAS' goal is to foster sustainable, deep-rooted long-term climate change resilience that allows South Africa to respond to significant shifts that may occur as a result of climate change. This principle supposes a balance between addressing climate variability with change.
- **Learning by doing**: The strategy emphasises the need for effective monitoring and evaluation (M&E) to ensure adaptation is iterative, and that lessons learnt will help improve responses to **Principles**
- **Place people at the center:** Adaptation action must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably; Special consideration of vulnerable groups, such as women, the elderly, and children shall receive specific attention in adaptation planning and implementation

- **Informed by science, developmental in orientation:** Adaptation action must pursue efforts towards achieving sustainable development, equitable access to resources, the rights of workers, environmental justice, and empowerment; adaptation planning must strive for the use of best available science in decision-making and implementation of adaptation action; assessments shall be based on the latest IPCC 'benchmark' temperature scenarios as well as plausible scenarios[ii].
- **Environmental integrity:** It must ensure that the disturbance of ecosystems and loss of biological diversity are avoided, minimised and remedied, as appropriate; the social, economic and environmental impacts of its activities, shall be considered, assessed and evaluated, in order to optimise benefits and reduce impacts

[ii] Benchmark temperature scenarios in accordance with Article 2 of the Paris Agreement are '…2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels…'

4 ADAPTATION PLANNING GUIDELINES FOR SOUTH AFRICA

The national adaptation planning regime has to be nested within the national planning regime as well as the international planning regime, in this case to include the UNFCCC. The strategy NAS provides for five-year cycles for the national strategy with a 30-year outlook, hence this first NAS planning cycle provides a 2050 vision of building climate resilience in South Africa. This is consistent with both government planning cycles, as well as meaningful scientific and socio-economic planning timescales. It should, however, be noted that responsive economic projections are usually up to four years due to the dynamic nature of the global economy.

4.1 Stakeholder Guidance on Vehicles for Adaptation Planning

The NAS identifies various parameters for adaptation planning in South Africa for national, provincial and local government structures, and the appropriate vehicles for communicating adaptation planning as follows:

- The NAS shall be prepared every 10 years and/or following the publication of an updated national development plan or its variant. The progress in implementing the NAS shall be reviewed every five years, with adjustments made where necessary. As the NAS informs the Sectoral Adaptation Plans, plans from a previous cycle and consultation with relevant sector players shall inform each update.
- The development of the NAS and its updates shall be completed at least two years before the communication of the country's adaptation component of the NDC. As such, following the first version of the NAS, the next update will be completed by the 2022/23 financial year.
- Sector Adaptation Plans shall be prepared every 10 years with the first set concluded in the 2019/2020 financial year, with a review and update where appropriate every five years. The Sector Adaptation Plans shall, in turn, inform and be implemented through the MTSF and MTEF framework of the government.
- Following the 2019/20 Sector Adaptation Plans, the next iterations/updates shall be concluded by the 2024/25 financial year as such provide the necessary information to report on the country's planning commitments, vulnerability assessment and priorities, as well as adaptation costs and needs to the UNFCC.
- For subnational governments, the national election cycles determine the production of the relevant planning documents such as the IDPs, Provincial Growth and Development Plan (PGDP), as such will remain on those cycles, with the next iteration expected to be concluded by 2021, then 2025. In this instance, the NAS will capture the latest available information.
- In seeking integration of climate considerations in development planning and implementation, wherever possible, existing operational tools which are linked to MTSF and MTEF are proposed, with the Sector Adaptation Plan being a chapter in such a vehicle. In some instances such integration is not possible, as such the plans will be prepared as standalone documents as shown in **Figure 7**.
- The NDP and the PGDP, with the latter published after the former are published every 10 years. The next iteration is expected to be around 2019/2020. Such an iteration should be informed by the objectives of this strategy as it outlines the path to a climate-resilient South Africa, an important aspect towards achieving the country's socio-economic development objectives. This iteration of the NDP shall, in turn, inform the next revision/update of the NAS to be published in 2021 and 2025.

The adaptation planning guidelines listed in Section 6 of this NAS are to be codified in the a Climate Change Act in order to ensure consistent economy-wide adaptation practise to achieve objectives of this strategy. Effecting additional requirements for climate change considerations might require an

amendment to existing regulations, in which case the relevant sector department shall undertake that process as part of its implementation of the NAS.

INTEGRATE	STANDALONE
Water - NWRS	**Agriculture - IGDP**
Biodiversity - NBSAP	**Health - NCC&HAP**
Mining & Extractives - Mining Charter and IPAP	
Energy - IEP and IRP	
Human Settlements - IDP and SDF	
DRRM -DRRF	
Transport - GTS	
National Development Planning - NDP	
As part of PGDP?	**Provincial Adaptation Strategy/Plan**
As part of IDP?	**Local Government Adaptation Strategy**
Business	**Business Charter on Adaptation**
Civil Society	**Implementation Plan**
Environment	**LTAS**

Figure 7: Vehicles for communicating sector adaptation plans

The Agriculture and Health Strategies currently either do not comprehensively cover the sector, or have a clear legal mandate, or do not constitute the operational documents that inform budgetary allocation as part of the MTEF, hence are treated as standalone. However in subsequent iterations, the objective is to find integration with the core operational documents that the respective departments use for delivery against their mandate.

In implementing the NAS, the Department of Environmental Affairs is to work towards clear commitment of the choice of vehicles to be used by each of the affected sector departments within one year of the gazetting of the NAS, i.e. the 2018/19 financial year.

4.2 Minimum Information to be Provided as Part of Sectoral Strategies

The objectives of the NAS include ensuring coherence in approach and practise of climate change adaptation in South Africa, as such it provides for the minimum information to be communicated in each sector plan, whether, it is standalone or integrated as a chapter in an existing operational documents of a sector. The strategy recognises the expertise that resides in the various sectors as such provides minimum information to be provided by various sectors in order to ensure clarity and ability for aggregation of such information, as well as track progress in the planning aspects of adaptation across South Africa.

The minimum information for each sector plan is outlined in **Figure 8**, and this constitutes the guidance on information to be communicated for the 2019/2020 sector plans. The minimum information shall also be defined in the Climate Change Act, with provisions for the DEA to publish minimum information for every iteration and review of the sector adaptation plans, at least 2 years before the due date for such plans.

It is important to note that cross-sectoral trade-offs shall be undertaken by the DEA through the LTAS with a view of informing both the NDP and the Sectoral Adaptation Plans, with the key objective of defining the production possibilities as informed by resources and climate change. Such trade-offs are particularly important in the understanding of the food-water-energy nexus.

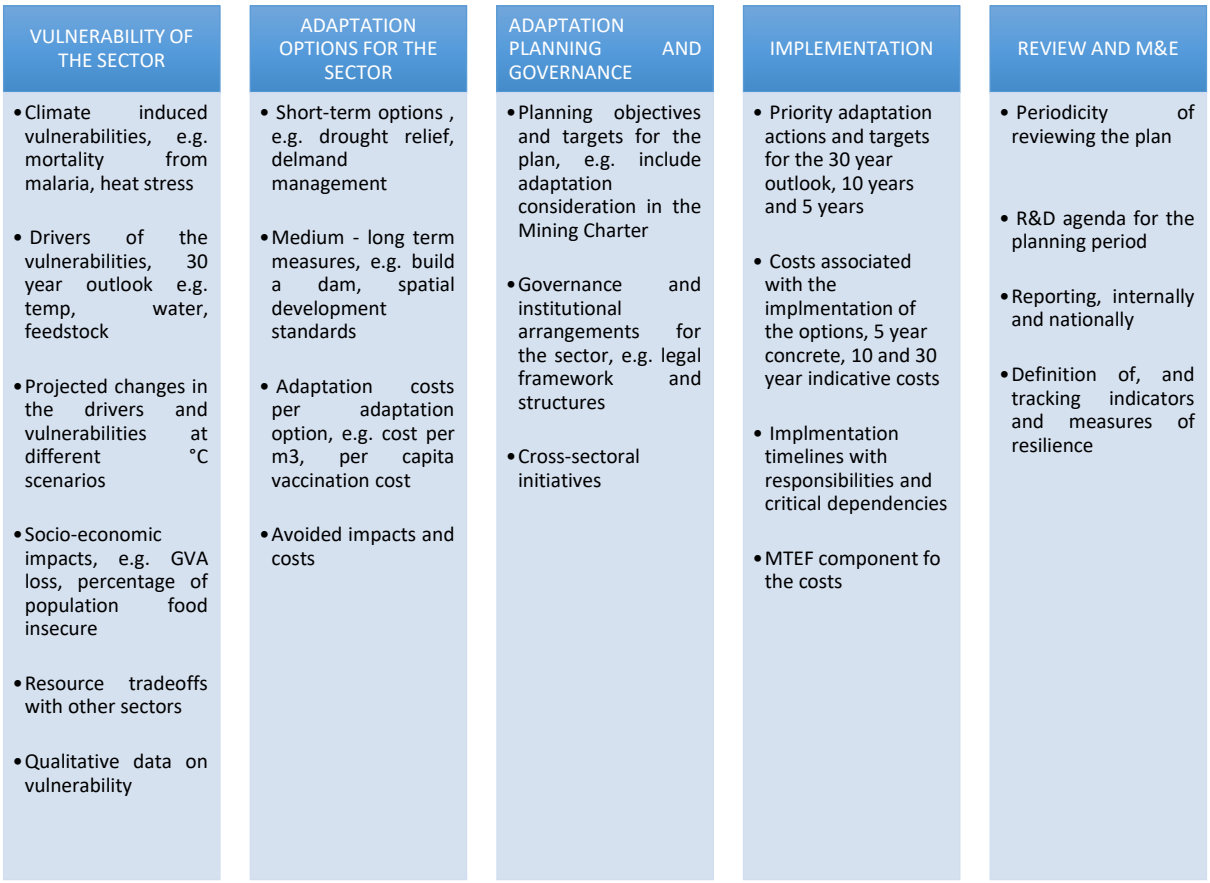


Figure 8: Minimum information for Sector Adaptation Plans

Further guidance on the generation of the minimum information per sector is provided in Chapter 5 for vulnerability and adaptation options, with Adaptation Planning and Governance as well Review and M&E covered in Section 6 and 10, whilst Implementation is covered in Sections 7 and 9.

4.3 Provincial and Local Government

National government, provinces, and local government have different appropriations to implement nationally defined priorities, as such an alignment along the three tiers of government. To ensure that adaptation priorities and practises are integrated the priorities have to be interpreted within the spatial area of the relevant authority. As such, provincial governments have the option of either integrating provisions of the NAS in their Provincial Growth and Development Strategies or as standalone documents.

In the case of the local government, a case is made for both a local government-wide preparation of the strategy, building on the Lets Respond Toolkit under the auspices of DEA and SALGA, however with a view of providing guidance on integration into municipal IDPs in accordance with cycles in Section 6.1 of the NAS. The strategies will follow the minimum information as outlined in Section 6.2 at a spatial resolution appropriate to the jurisdiction.

4.4 Business and Civil Society

South African business is organised through voluntary associations, some which cover all sectors such as the National Business Initiative and the South African Chamber of Business, amongst others. Whereas some are industry-specific, such as the South African Chamber of Mines and the National African Farmers Union, some are commodity-based, such as Grain South Africa in the agriculture sector. There is also a category of businesses such as the Water Boards/Catchment Management Agencies, electricity utilities, primarily ESKOM and Transnet, which play a critical role in the country's socio-economic development. Business as a collective would therefore be encouraged through the Climate Change Act to develop adaptation strategies, and progressively include adaptation considerations in their business operations.

Civil society activity on climate change adaptation in South Africa is far reaching both in terms of scope of adaptation activities to geographic reach. The contribution of civil society is primarily important as it augments the investment by the public sector addressing areas that the government may not be best positioned to address. It further acts as a multiplier on climate finance as a number of charitable causes and philanthropic organisations, with some aid agencies primarily use this channel for supporting climate action. Noting that a majority of these organisations address a specific issues such as health, food security and water, the NAS encourages civil society to consolidate activities in a framework document, which can serve both as tool to lobby government, as well as provide insights on areas in which government can leverage such actions.

4.5 Research and Technology Organisations

The South African National System of Innovation, which includes research councils, universities and private sector research initiatives have a significant role to play in both providing an evidence base for policy-making, as well as innovation towards adaptation technologies. The Department of Science and Technology is responsible for the country's NSI, and this NAS encourages the Department of Science and Technology DST to develop a strategy/ plan/roadmap for climate change adaptation in South Africa, taking a cue from the NAS, also to be updated every five years in line with the adaptation planning timeframes for South Africa.

The strategy/plan/roadmap can build from the Global Change Grand Challenge initiatives such as the Southern Ocean Carbon Climate Observatory (SOCCO), Risk and Vulnerability Atlas, and the National Research Foundation programmes, amongst others, with an expanded scope that goes beyond science, to include technology development investments. Coordination with other departments involved in the NSI, such as Agricultural Research Council (ARC), Medical Research Council (MRC) and Mintek would ensure a full ownership and alignment of the strategy, as such represent an economy-wide perspective of RD&I in support of the NAS. The aim of such a strategy/plan/roadmap will be to coordinate rather than centralise activities, with cross-overs on soliciting funding for the research agenda.

Climate change and variability demonstrate a gradual change over long periods of time where the averages that can be attributed to a change in climate, so as the change in variability being observed over time. In order to both anticipate the future as well as track performance against interventions, a National Vulnerability Assessment Framework (NVAF) is proposed. The NVAF is to be applied at a conceptual level across all sectors, taking into account specific peculiarities of each sector, however such provide a basis for aggregation, as well as setting the RD&I agenda for the country. The NVAF further presents a platform through which trade-offs across sectors can be assessed so as to further inform sector strategies and plans.

5.1 National Vulnerability Assessment Framework

The NVAF provides substantive guidance on how to develop and provide minimum information in **Figure 9** in respect of vulnerability of the sector as well as adaptation options. The objective of the NVAF is four-fold:

1. Ensure integration of socio-economic development dimensions in climate change adaptation;
2. Provide guidance to adaptation planners, practitioners, researchers and sector departments;
3. Provide a platform for assessing trade-offs between sectors through the periodic publication of the LTAS; and
4. Contribute to the generation of information necessary for M&E as well as reporting to national and international constituencies.

Adaptation is generally considered to be site-specific, location-specific, and difficult to separate from the normal development process, as such difficult to assess progress and aggregation. The NVAF as proposed in in the NAS aims to address some of these difficulties, and is presented in **Figure 10** in a step-by-step format, with further narrative and examples presented in this sub-section.

Step 1: What are the objectives?

Each department, tier of government, business stakeholder has a primary reason it seeks for its activities, either through its mandate or its objectives. This step in the NVAF is to define these objectives in a succinct manner. These should, however, be limited to those that have a resource dimension that has a climate change aspect.

Box1: Agricultural Sector

1. Achieve food security, support smallholder agriculture to reduce incidents of crop failure;
2. Increase contribution to GVA, increased grain production; Increase horticultural exports

The objectives need not be limited to one in any sector, however the consideration and consensus within the community should not lead to a too expansive and exhaustive list, noting that priorities can change over time. The sector can choose to have a combination of the so-called 'low-hanging fruit' and other aspects that are material to the objective. Other examples that are comparable to Box 1 could include human settlements safe from flooding, population exposed to malaria, or assurance of water supply to users nationally or in a catchment or municipal area.

Step 2: What are the key vulnerabilities?

The second step in the NVAF applies to the identification of key vulnerabilities in the context of objectives outlined in Step 1 that are natural resource dependent, and climate-relevant. It is important to note that vulnerability and resilience are a function of a number of factors which include dimensions

which are not directly attributable to climate change, such as level of education, employment, health conditions, etc. In the NVAF, these are considered as contextual circumstances rather than those that are explicitly assessed. At a community level, the IPCC methodology which considers exposure, sensitivity and adaptive capacity is appropriate in understanding key vulnerabilities. Whereas at the economy-wide sector level, the consideration of key vulnerabilities would include droughts for the agriculture, forestry and water sector. For the energy sector it could be drought, wet coal events, and heat stress, or diarrhoea for certain populations and age classes. For business, it could be risk factors such as water, and energy.

Box2: Local Government

On an objective of safe settlements;	On an objective of climate resilient infrastructure
1. Fire risk during cold months 2. Flood damage during rainy season	1. Flood damage to storm-water systems and bridges 2. Building damage from intense thunderstorms

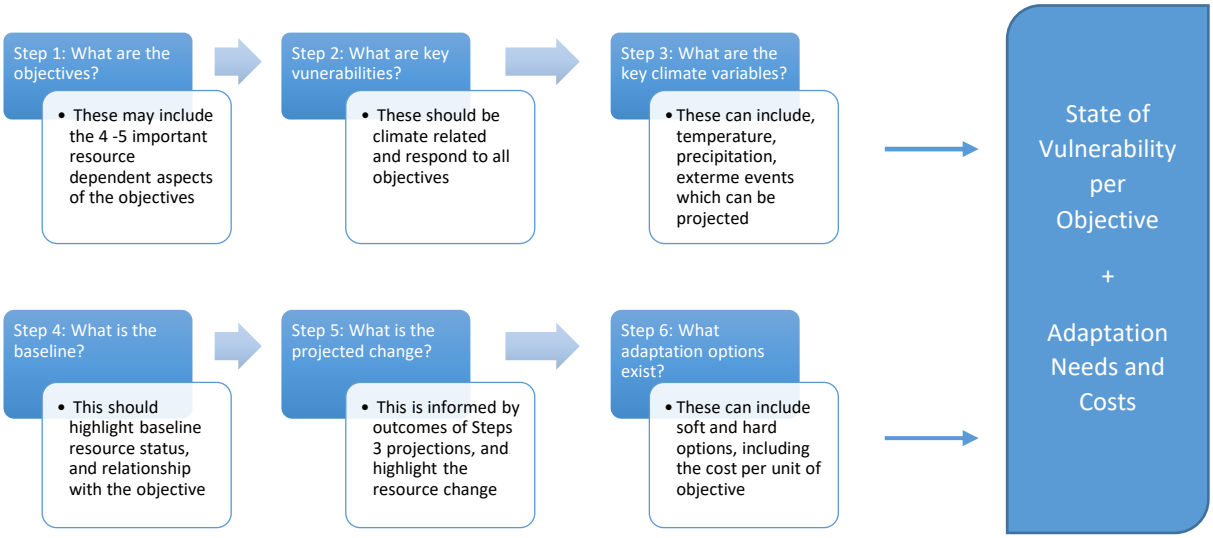


Figure 9: National Vulnerability Assessment Framework

Step 3: What are the key variables?

The key climate variables that drive the vulnerabilities identified in Step 2 of the NVAF need to be identified. The primary variables are temperature, precipitation and sea level rise. Secondary variables that can be projected are extreme events, such as intense thunderstorms, flood events, or heatwaves. The critical aspect on the indicators is that they should be able to be projected for different time steps, i.e. 5 years, 10 years, 30 years and 50 years in scientifically descriptive and defensible results as the timeframes are consistent with the adaptation planning parameters. For the NAS, the basis for assessment will be on the basis of scenarios for 2°C, 1.5°C and a plausible temperature scenario where appropriate based on the global mitigation effort.

Step 4: What is the baseline?

This is the first step that incorporates socio-economic dimensions to adaptation planning in that, the baseline is defined based on the country's development scenarios. The starting point is the definition of a baseline that responds to the objective in Step 1 under consideration, which can usually be expressed in socio-economic indicators. This further requires the definition of underlying socio-economic scenarios/parameters relevant to the objective and vulnerability. Further examples of baselines could include, for the energy sector, energy demand, energy mix, distribution infrastructure, with projections of future energy demand and mix in light of economic development, population dynamics, etc., whereas in the agricultural sector it could be annual production of grain, livestock, horticultural crops, and projected demand in light of economic development-affluence, and population growth. Furthermore, the baseline should describe the relationship between resource and utility, such as KW generated per m^3 of water, or cost of treating malaria per patient.

Box2: DRRM

Towards the objective of safe Human Settlements; the baseline scenario could be expressed as number or % of households vulnerable to fire risk in the first instance, and floods in the second instance. The future proportion of such households based on socio-economic scenarios for the country such as population growth, urbanization, etc. would underlie projections in similar time-steps as the key variables in Step 3.

Step 5: What is the projected change?

This step combines the natural resource projections with the socio-economic projections in a manner that illustrates resource demand in the baseline scenario against the projected climate future and impact on the resource. The scheme is outlined in **Figure 10**.

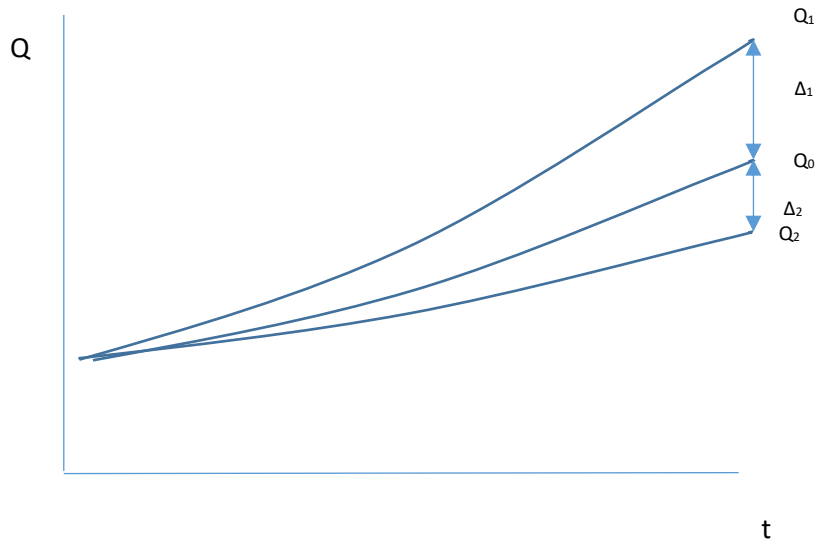


Figure 10: Constructing the projected change

If Q_0 represents the resource need at the baseline scenario, such as rainfall regime in relation to yields, of water required to support present energy mix, or population exposed to malaria in present day climate, water required to mine in ton or Rand figure of gold, Q_1 would therefore represent the required resource/state in order to achieve the development objective. The required change is expressed in the Δ_1. On the other hand Δ_2 which can be both a negative or positive figure represents increase of decrease in the status of the resource due to climate change, with the sum of the two deltas representing the resources needed to achieve the socio-economic benefit. It should be noted that Δ_2 will be different for various temperature scenarios.

Step 6: Identification of adaptation options

With the vulnerabilities identified in Step 2, and the required resource/state defined in Step 5 the next step in the NVAF is the identification of adaptation options to close the $\Delta_1 + \Delta_2$ gap or at least the Δ_2 gap. Adaptation options vary from sector to sector, e.g. in the water sector these could include a mix of water use efficiency measures, alternative water sources such as recycling of grey water, or allocations that encourage imports of high water intensity products, whereas for Disaster Risk Reduction and Management (DRRM) these could include insurance, infrastructure, or building capacity and resourcing of response teams. For the agriculture sector, adaptation options could be insurance, cultural practises, varieties/breeds, or irrigation. All these options have a cost associated with them, hence the need to rank those in terms of cost associated with closing a unit of the gap. It is however, plausible that a mix of such responses will be followed per sector, rather than the on consider cost-effectiveness of options.

The information generated in the 6 steps can therefore provide a basis for a trend analysis of vulnerability/state of resilience, as well as tracking of effectiveness of interventions in achieving the desired objectives. This will also serve as a basis of motivating for adaptation needs both with the National Treasury as well as the international community. The NAS iterations as well as the LTAS shall use the same approach with the latter looking at economy-wide trade-offs, as well as synergies, such as rainwater harvesting, health, or food security, where objectives can be achieved in the context of a single programme that incorporates several government departments and players.

5.2 Research and Development

The lack of adequate research is identified as a significant barrier to climate adaptation, this can be attributed to the various approaches and perspectives of what constitutes adaptation. To be able to adequately adapt to climate impacts, it is essential that these needs are addressed, and the NVAF provides a South African perspective of how to arrive at priorities.

The National Climate Change Response Policy emphasises the need to: "...prioritise research, systemic observation, knowledge generation, information management and early warning systems that increase our ability to measure and predict climate change and the implications of its adverse effects on the economy, society and the environment, [and] prioritise cooperation, and promotion investment in technologies, practices and processes for employment by various sectors".

The South African NSI is well positioned to deliver on research that can address the key questions raised by the NVAF. It is worth noting that the area for which more investment is needed lie in Steps 4-6, as the practise on adaptation has not caught up with the basic science. The research will then be periodically synthesised into the LTAS.

Priority Research Considerations

The chapter on adaptation planning and implementation in the IPCC Fifth Assessment Report identified the following research needs to create and maximise adaptation, and enable the effective implementation of adaptation strategies:

- Research on operational strategies and approaches for adaptation can help maximise available resources for adaptation to climate change, focusing on:
    - Expanding knowledge of the connections between adaptation and development in different contexts and at different governance levels;
    - The role of multiple stresses (not just climate) in adaptation planning and its implementation; and
    - The role of low-regret strategies strengthening operational approaches for adaptation.

- An emphasis on climate impacts and defensive infrastructure in a number of early adaptation plans. Research on defensive infrastructure, and a better understanding of how early adaptation plans can transcend from defensive but fragmented approaches to multidimensional policy process recognising adaptation planning and its implementation as a learning processes.
- Expanding research on institutional arrangements focused on approaches that:
    - Improve multilevel institutional coordination between different political and administrative levels in society, focusing on balancing a combination of top-down and bottom-up activities;
    - Overcome the institutional rigidity limiting the horizontal interplay within local governments, where climate adaptation is seen as the isolated task of a singular sector. This hinders mainstreaming horizontal coordination across sectors and departments, and constrains the extent to which systems can learn or adapt to climate change;
    - Improve coordination between formal governmental and administrative agencies and social and private stakeholders in order to create participatory approaches maintaining regard for the highly localised and contextual nature of climate adaptation, and facilitating collaboration for production of knowledge and interactive learning.
- Expanding research seeking to build a better understanding of the limitations and strengths of planning. Research efforts considering adaptation planning and implementation as learning processes can help in carrying out periodical adjustments to accommodate changes in climate, socio-economic conditions and emergent risks in order to strengthen the role of planning as a societal tool for adaptation. The literature recognises M&E as important learning tools in adaptation planning, but also acknowledges that these are under-researched.
- Expanding the research on the metrics to characterise the success of the goals of adaptation, the trade-offs involved, and recognising the importance of context can help avoid generalised assessments about the contribution of adaptation to managing the risks posed by climate change, and to identify what builds adaptive capacity and what functions as limits and barriers to adaptation.
- Research on holistic approaches afforded by linking adaptation to development, by coupling adaptive improvements in infrastructure with ecosystem services, governance and community welfare, by improving community resilience through enhancing local ownership, and by creating organisations able to respond to climate change issues through increased adaptive capacity.

The NAS therefore provides for the determination of such priorities by the DEA and the National System of Innovation in association with affected sectors to periodically define and resource priorities for an upcoming five-year planning period.

Institutionalisation of Adaptation Research

Securing the necessary resources for such programmes hinges on effective communication of the research agenda to the relevant financing institutions. Successful implementation of adaptation actions depends on the availability of information, access to technology and funding. In some cases a supposed lack of relevant and legitimate information (on scientific, technical and socioeconomic data) has been used as a rationale for inaction. Organisations bridging science and decision-making,

including climate services, play an important role in the communication, transfer and development of climate-related knowledge, including translation, engagement and knowledge exchange.

In order to achieve both national and international imperatives the NAS provides for a periodic publication and update of the LTAS which will provide a scientific basis and thought leadership on adaptation practise. The nature of the LTAS is to provide a synthesis of latest research and state of adaptation in the country, as such informing future cycles of the development of adaptation plans and strategies.

The required knowledge can be attained from research institutions particularly the NSI, NGOs, the private sector and civil society (where indigenous knowledge is manifested through lived experience). Based on the needs identified for each sector, research should be focused on identifying climate-related risks, impacts and opportunities for different sectors (at all scales). The implications of climate change for sectors, particularly key industry value chains, should be further analysed, with particular focus on how local climatic impacts interface with globally integrated supply chains. A specific focus in integrated impacts assessment is urgently needed.

Opportunities arise as actors learn from experience with climate variability and climate impacts. These lessons are incorporated and considered for disaster risk reduction efforts. This promotes learning and adaptive management, and enables the improvement of research and technology options to improve adaptation. An information-sharing network will enable a process in which different stakeholders can share and access relevant information in a timely manner.

6 GUIDELINES FOR CLIMATE CHANGE GOVERNANCE

6.1 Coherence on Governance on Climate-Related Frameworks

It is now well established that to build resilience to the effects of climate change and transforming economies towards low-carbon development requires integrated, cross-cutting solutions. This realisation has led to an emergence of a new paradigm to address multiple risks and delivering co-benefits across climate and non-climate drivers. In practise, this translates to connecting climate action to long-term sustainable development planning, financing and governance.

The NAS represents a national effort to align primarily several key processes - the National Development Plan, Vision 2030 Sustainable Development Goal (SDG) Agenda, the Nationally Determined Contributions to the UNFCCC, and the implementation of sectoral strategies. These are all implemented in the context of international agreements with varying degrees of legal bindingness, which include amongst others, the Paris Agreement, the 2030 Agenda of the SDGs, the Sendai Framework on Disasters, and the UN Habitat Framework on Disasters and Risks, amongst others. Co-ordination and linkages between these processes would contribute to South Africa reducing its vulnerabilities. The Paris Agreement, however, still poses the most direct link with the NAS in terms of international obligations in respect of climate change.

The 2030 Agenda emphasizes that the well-being of many societies, and the biological support systems of the planet, are at risk because of the impacts of climate change. In addition to a goal dedicated to taking urgent action to combat climate change and its impacts (SDG 13), climate action and resilience are integrated throughout the SDGs as core components of this systemic transformation. Although only 11 targets explicitly address climate-related mitigation, adaptation, and resilience efforts, 27 targets specifically rely on climate action, such as those under SDG 12 (responsible consumption and production) aimed at building a new zero-carbon economy based on sustainable, inclusive, and resilient production and consumption systems, sustainable infrastructure, and natural resource management.

The role of climate in supporting sustainable development is also reflected in the Paris Agreement itself. The preamble emphasizes the central importance of climate change actions, responses, and impacts for equitable access to sustainable development and eradication of poverty. The Agreement also recognizes the fundamental priority of safeguarding food security, ending hunger, and the particular vulnerabilities of food production systems to the adverse impacts of climate change. It also takes into account the imperative of ensuring a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities.

Climate change disasters are by far the most frequent disasters in the world with large scale, with both sudden and slow onset characterisation. From this premise, the Sendai Framework has a strong relevance for climate change adaptation. As a developing economy, South Africa is particularly vulnerable to the impacts of disasters as they affect the key levers of socio-economic development due to their broad impact on the economy, businesses, and their physical, social, cultural and environmental assets, including loss of lives, livelihoods and health. In some instances they have security issues due to their threat to communities and countries.

The framework sets targets for 2030 that include: (a) reduction of disaster mortality; (b) reduction of affected people; (c) reduction of economic losses as percentage of GDP; (d) damage to critical infrastructure including basic services; (e) preparation of disaster strategies; (f) increase availability of early warning systems; and (g) promote international cooperation. The framework identifies three priorities of understanding of disaster risk, which in the case of climate change will benefit from the NVAF. These are: 1) strengthening disaster risk governance to manage disaster risks in terms of prevention, mitigation, preparedness and recovery; 2) investing in disaster risk reduction and resilience by both public and private sector through structural and non-structural measures; 3) and enhancing disaster preparedness for an effective response, ‘building back better’ in the recovery, rehabilitation and reconstruction.

6.2 Legal Status of the Strategy

Gazetted in October 2011, the National Climate Change Response Policy (NCCRP), South Africa's seminal policy document on climate change, contains foundational principles to guide climate change mitigation and adaptation in the country. Under the NCCRP, South Africa's response to climate change has two key objectives:

- To effectively manage the inevitable climate change impacts through interventions that build and sustain South Africa's social, economic and environmental resilience and emergency response capacity; and
- To make a fair contribution to the global effort to stabilise GHG concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe that enables economic, social and environmental development to proceed in a sustainable manner.

The policy provides a suite of principles that are important in guiding South Africa's climate change response which are guided by NEMA. The NCCRP stipulates that all governmental departments and state-owned enterprises must conduct a review of all policies, strategies, legislation, regulations and plans falling within their jurisdiction or sphere of influence by 2012, with the intention of aligning all relevant policies, strategies, legislation, regulations and plans falling within the policy by 2014. The NCCRP has been able to support the integration of climate change into various policies and frameworks. Of particular note is the role it has played in guiding the MTSF outcomes, specifically on outcome 2.

There has been concerted effort by key sectors highlighted in the NCCRP towards this alignment in terms of developing their adaptation strategies. In 2016 there are climate change adaptation strategies available (some in draft) for the sectors of Water, Biodiversity, Health, Agriculture Forestry and Fisheries and Rural Human Settlements. Some sectors do not have specific adaptation plans but policies that integrate climate change, for example the Amendment of the Disaster Management Act in 2015. The impact of these policies in terms of supporting implementation is varied and also requires further analysis once all strategies are finalised.

The NCCRP White Paper requires the DEA to implement the policy in partnership with national, provincial and local governments, including research institutions and centres, to achieve its goals of transitioning to a low-carbon and climate-resilient society. Section 10.2.6 of the policy calls for each province to develop a climate response strategy, which evaluates provincial climate risks and impacts, and to give effect to the policy at provincial level. In 2016 all provinces have either completed or are in the process of revising their strategies. The policy further directs local government to integrate climate change considerations and constraints into their municipal development tools such as IDPs and municipal service delivery programmes. Municipal by-laws are one of the most concrete channels for municipalities to give effect to activities that build climate change resilience.

As a further policy development, the DEA is developing a Climate Change Act, which as aforementioned, presents a strong legal obligation for climate imperatives. The policy is to codify adaptation objectives, planning, vulnerability assessment, research and development, implementation priorities, and reporting. The NAS is a further elaboration of how to achieve provisions of the Act, whilst at the same time providing inputs to the development process of the Act. The Climate Change Act provides for the development of the NAS as a legal obligation in terms of its contents, periodic update and review by the DEA. The Act further provides for regulations for other players such as sector departments, segments of business to plan, implement and report on climate change adaptation.

South Africa's NAS is the cornerstone for climate change adaptation in the country that reflects a unified, coherent, cross-sectoral, economy-wide approach to climate change adaptation. It signals priority areas for adaptation, both to guide adaptation efforts and to inform resource allocation. The

NAS speaks to South Africa as a whole, including the country's many sectoral institutions, provincial and local governments, and nongovernmental entities including the private sector, the research community and civil society. The NAS is a national document directed not only at national government departments. It speaks to South Africa as a whole, including the country's many sectoral institutions, provincial and local governments, and nongovernmental entities including the private sector, the research community and civil society. Most importantly, the strategy is for anyone who plays a role in South Africa's socio-economic growth and development, and has a stake in the country's future.

This strategy does not supplant or do away with existing sectoral, provincial and local climate change strategies or plans. It rather emphasises that these must be implemented and enforced to improve sectoral and cross-sectoral resilience. Strategies still in development or not yet implemented should use the strategic priorities outlined in the NAS as a reference point. As sector strategies are developed or revised, the NAS and its updates will serve as a reference for South Africa's national vision of climate change resilience.

South Africa's national climate change adaptation strategy proceeds from the understanding that climate change represents a threat to socioeconomic development and has the potential to undo many hard-won development gains made in the past two decades. The strategy indicates that South Africa is taking prudent action that internalises climate resilience into socio-economic development and ensures that the economy remains well-resourced and flexible. The strategy also ensures that the socio-economic development is not only resilient, but is also able to thrive, by harnessing the opportunities that climate change offers.

6.3 Climate Change Governance Structure

South Africa's governance in climate change is influenced by several international, national and subnational entities. Climate change is already being addressed through projects and programmes that are implemented across all spheres of government. At the national level, the DEA is responsible for leading policy implementation. While the DEA is the nodal department, it has to take into account several other governance structures and institutions and their various responsibility in the implementation of the NAS (**Figure 11**).

The DEA is responsible for formulating an implementing the Climate Change Act, the NCCRP and the NAS, amending and promulgating legislation to deal with climate change, establishing and administering regulatory frameworks, and allocating resources and incentives. It is also responsible for participating in international negotiations. National departments are responsible for integrating climate change into their policies and programmes, and will manage near-term priority flagship programmes to build climate resilience.

DEA	• Develop and update the NAS as appropriate • Develop and update the LTAS as appropriate • Co-ordinate stakeholders in the implementation of the NAS • Coordinate resource mobilisation • Report on the state of adaptation, nationally and to the UNFCCC
National Departments	• Develop Sector Adaptation Plans and Strategies, as envisaged in Section 6 • Co-ordinate stakeholders in the development and implementation of Sector Adaptation Plans • Report on implementation of Sector Adaptation Plans and Strategies
Provincial Government	• Develop and update Provincial Adaptation Strategies as part of the PGDP • Coordinate provincial stakeholders in the implementation of the strategies • Report on implementation of the Provincial Strategies

Local Government	• Develop adaptation components of Climate Change Plans and Strategies • Integrate adaptation considerations in the Integrated Development Plans • Report on implementation of the Provincial Strategies
Government Parastatals	• Develop Strategies in accordance with guidance in Section 6 of the NAS • Develop operational plans for adaptation • Periodically report on the implementation of climate change strategies
Business	• Develop a Business-Industry strategy in accordance with guidance in Section 6 • Develop operational plans for adaptation where appropriate • Periodically report on the implementation of climate change strategies
Civil Society	• Outline a civil society plan of action on climate change • Report on climate change activities through the Climate Change Database

Figure 11: Responsibility of various players in NAS implementation

In addition to the line function departments, there are several parastatals (public sector enterprises) in South Africa that play key roles in their respective sectors. These include the South African National Biodiversity Institute (SANBI), the energy utility ESKOM, a freight logistics company (Transnet), the forestry company, SAFCOL; and Alexcor, a mining enterprise. These entities, being central to the country's economic infrastructure and/or industries, have the responsibility of developing adaptation plans. Furthermore, there are several interdepartmental fora and institutional structures that aim to improve coordination across departments and alignment in national-level efforts on sustainable development. Each of these structures can play a role in coordinating and better integrating climate change activities.

At the national level, intergovernmental cooperation and interaction on environmental matters is guided in part by South Africa's Inter-Governmental Relations Framework Act (2005). The national government's coordination with local government is facilitated through the South African Local Government Association as well as the Department of Cooperative Governance and Traditional Affairs (CoGTA). Similar to national government, the provincial government department responsible for the environment in each province is tasked with leading its climate change response. This includes coordinating the climate change response of line provincial departments and other active provincial entities. To assist with this, most of the lead departments have established provincial climate change fora where provincial stakeholders can learn about climate change and coordinate their climate change responses.

In terms of sector responsibilities, the water, mining, energy and fisheries sectors are the constitutional responsibility of the national government. As a result, the provincial climate change response for these sectors is led by the provincial offices of the appropriate national department. Several other sectors are a concurrent responsibility of national and provincial government. As a result, provincial line departments exist for the following sectors: health, biodiversity, agriculture and forestry, disaster management, human settlements, infrastructure and transport. Every province has a provincial environment department, which may also include other functions (e.g. economic affairs, development planning, tourism and agriculture). Each provincial administration designs its institutional arrangements for the environment in accordance to their needs and strengths. For example, one province may locate conservation with agriculture while another may locate conservation with environmental management and planning. Since climate change response capacity is extremely limited in the provincial sphere of government, a strong distinction is generally not drawn between mitigation and adaptation efforts in the provinces and provincial staff in the climate change sector work on both mitigation and adaptation.

In 2016, South Africa's local government structure consisted of eight metropolitan, 44 district and 226 local municipalities, spread unevenly across the provinces. The municipalities are not homogeneous in their spatial, social or economic environments and are allocated into categories in accordance with the Local Government: Municipal Structures Act (1998). The national disaster management framework is a direct way in which municipalities are empowered to act on climate change and already have existing institutional arrangements. Under this, the Municipal Disaster Management Centre must develop a progressive risk profile for the municipality and integrate this into the IDP process to enable disaster risk reduction. The broader mandate for local government to respond to climate change is rooted in South Africa's Constitution, because many critical actions required for climate change responses fall within the responsibility of local government.

7 IMPLEMENTATION FRAMEWORK FOR KEY ADAPTATION INTERVENTIONS

The implementation framework for each stakeholder is based on key elements of the strategy which take forward the planning, vulnerability assessment, priorities for implementation, and the M&E system. The process of implementing the strategy in its entirety is addressed in Section 13, as a remit for DEA, however the role of DEA as sector department on Biodiversity and Ecosystem is covered in this section. Even though the implementation framework is durable, the activities for the 1st NAS covering the period 2017 - 2022 will be revised and translated into sectoral APP or equivalent plans for a stakeholder group.

7.1 Cross-cutting aspects of the Implementation Framework

The implementation of the NAS is to transcend all levels of development planning in South Africa starting from the National Planning Commission through to local municipalities. With the NAS structured around adaptation sectors some role players, particularly the National Planning Commission or its future variant, Provinces, Municipalities are important contributors and are addressed in this sub section. Some of their outputs presents inputs into the sector planning scenarios, e.g. economic and social development aspirations.

The MTSF and MTEF are governed by the Public Finance Management Act of 1999, with the MTSF being the prerogative of an elected government setting priorities for the administration supported by the MTEF which is annual plans with a 3-year outlook. The relevance of this of this aspect of national planning is that, the s-NAS and NAS should precede it, such that its priorities and projects are built into sectoral plans and budgets.

	2017	2018	2019	2020	2021	2022	2023	2024	2025
NDP									
MTSF									
MTEF									
PGDP									
IDP									
a-NDC									
BUR									
NatCom									
SAP									
NAS									

Figure 12: National Planning regime in relation to the NAS

Internationally, South Africa is expected to communicate it's a-NDC every 5 years including an adaptation component. The first INDC was communicated in 2015, with the next communication due in 2020, 2025, etc. The NDC contains commitments to climate action for an upcoming period, whereas the BUR and the NatCom reports on climate action, as such the SAP requires a timing that is at least 18 months before the next a-NDC and 1 year to MTSF. The NAS should precede the SAPs, as such at least 2 years from the next NDC.

National Planning Commission

South Africa unlike its emerging economy counterparts, such as China with its 5-year plans, has not had consistent national development planning regime, particularly in terms of timeframes. Historically, the country implemented the Reconstruction and Development Plan from 1994-1996,

which was replaced by the Growth Employment and Redistribution strategy for the period 1996-2005 when it was replaced by the Accelerated and Shared Growth Initiative from 2005-2013. In 2013, the National Development Plan was launched and is has been the governments cornerstone development policy, which most likely be implemented at least until 2019.

The inconsistency lies in the fact that the RDP, GEAR, ASGISA, had timeframes of 3, 10, 9 years, and the NDP is likely to be implemented at least until 2019, with some initiatives such as the 9 point plan and Operation Phakisa being seen as approaches and methodologies used to achieve the envisaged development outcomes. The NAS planning framework therefore works on the premise of the NDP and its future variants being a 10 year period. This aspect of the national planning cycle is important such that the NAS can take cue of development priorities and provide perspectives of resource implications of such aspirations in light of climate change.

Planning	NVAF	Implementation Priorities	M&E
• Chapter in the 2019 NDP covering adaptation and resilience objectives for the country	• Outline of socio-economic objectives of the country • Future sectors to drive economic development	• Define resource based 'production' possibilities' of growth sectors • Define trade offs and and implications	• Define indicators to track progress on objectives

The National Planning Commission implementation aspects will inform the development of baseline scenarios as part of the LTAS which will inform the 2nd NAS and sector plans. I will build on the 1st NAS provisions and the LTAS 3 outcomes.

Provincial Governments

Provincial Growth and Development Plans are inconsistent in the frequency of their revisions and consideration, as there is no legislative provision for their development. However for all the provinces that have developed them, such as the EC and KZN, they were aligned to the NDP, as such for this strategy, they are considered to be revised every 10 years, even though their outlook is over a longer timeframe, and indicators monitored with every MTSF.

Planning	NVAF	Implementation Priorities	M&E
• Chapter in the 2020 PGDP covering adaptation information contained in Section 6 of the NAS	• Intepretation of NDP socio-economic objectives • Sectors driving economic development	• Define resource based 'production' possibilities' of growth sectors • Define trade offs and and implications • Define Flagship Adaptation Projects	• Define indicators to track progress on objectives

Local Government

The IDPs are prepared in line with elected terms of local government administrations, and every 5 years thereafter. The NAS therefore has the opportunity to inform subsequent IDPs through guidance contained herein for the period starting 2021. In practise, most municipalities have

developed standalone climate change strategies and plans, whereas the NAS provides for the integration of the climate change adaptation chapter in the IDP for subsequent iterations.

Planning	NVAF	Implementation Priorities	M&E
• SALGA prepares a climate adaptation plan for the sector based on Section 6 of NASby 2019 • SALGA and DEA update the 'Lets Respond Toolkit' by 2019 • All municipalities develop an adaptation component of their climate change strategies	• SALGA and DEA provide 'mock' key vulnerabilities for a typical municipality according to mandate by 2020 • SALGA and DEA to develop examples that translate the socio-economic scenarios in LG context by 2019	• Define Flagship Programmes, and solicit investment by 2021 • Integrate adaptation actions in the IDP for 2021	• Define indicators to track progress on objectives

The role of local government is primarily driven by development of best practise and development of methodologies, which would inform climate action. As such the role of SALGA and DEA in this respect is expected to be significant.

Business

Planning	NVAF	Implementation Priorities	M&E
• Develop Industry Climate Resilience Strategies	• Each sector define its own vulnerabilities and resource linkages with climate change	• Flagship Programmes, and solicit investment • Integrate adaptation actions in the operational plans/strategies	• Define indicators to track progress on objectives

With different industries and businesses at varying levels of climate adaptation considerations, the actions recognise the need for industry-wide engagement as well as, specific business interventions. An example would be ESKOM considering the update of their strategy and operational considerations in light of NAS, whereas other companies, such as SASOL would develop their initial adaptation strategy.

7.2 Sectoral Implementation Framework 2017- 2022

The desired state is for Sector Adaptation Plans to be integrated into departmental operational plans, rather than standalone plans, **Figure 13** shows the relationship between the various sectoral plans with and the NAS cycle, noting the importance of the NAS being developed prior to sectoral plans and the MTSF, such that NAS priorities are budgeted into the national fiscus. The focus of the implementation is to identify the activities to be implemented by each sector under all elements of the framework.

	2017	2018	2019	2020	2021	2022	2023	2024	2025
NWRS									
IGDP									
NCC&HAP									
NBSAP									
MC									
IPAP									
GTS									

Figure 13: Policy documents relevant for the implementation of the NAS, and their timing

Water

Water underpins economic activity in all sectors. It is also the primary medium through which the effects of climate change will be felt in South Africa. Climate change will alter water runoff and recharge rates, and change the availability, seasonality, timing, volume and quality of water available. New risk and vulnerability studies conducted by the Department of Water and Sanitation show that all the six hydro-climatic zones -the Limpopo, Olifants and Inkomati basins; the Pongola-Umzimkulu region; the Vaal River system; the Orange River system; the Mzimvubu-Tsitsikamma region; and the Breede-Gouritz and Berg-Olifants basins- will be affected by climate change, including surface and groundwater. While climate models display a level of uncertainty, an increase in erosion and sedimentation, water pollutants, flooding and drought, among other impacts, is expected.

The fist NWRS strategy was published in 2004, following the promulgation of the National Water Act in 1998. The objective of the strategy is to operationalise the National Water Act of 1998, with provisions for updating the strategy in light of new strategic drivers. The National Development Plan of 2011 is such a strategic driver for the second NWRS was published in 2013. This plan is projected to respond to subsequent national development plans in the coming years, with updates expected after every 10 years, as such 2020 and 2030 in the foreseeable future.

The Department of Water and Sanitation is realigning its strategy to build capacity for the adaptation responses needed in each of the country's nine water management areas, and to clarify the implementation of these responses. The Department of Water and Sanitation is currently developing a Climate Change Response Strategy for Water Resources in South Africa. This strategy is expected to be ready by 2017. However, many of the principle tenets of the new strategy are likely to remain aligned with a previous version of the strategy developed in 2012. Most critically, the new strategy is expected to reflect key priorities articulated in 2013's second edition of the National Water Resource Strategy (which includes a discussion about managing water resources for climate change).

Planning	NVAF	Implementation Priorities	M&E
• Seek alignment with the NAS in the period going to 2019 • Develop the NWRS by 2020 taking into account the NAS and the Climate Change Response Strategy for the Water Sector	• Implement the NVAF as input into the 2020 NWRS • Study on tradeoffs between sectors to inform water allocations	• Define and identify priority areas for EbA approach through a collaborative effort with DEA, DRDLR, DAFF for 2019 MTSF •Scale up of Working for Water through international funding • Define Flagship Programmes for implementation covering both water quantity and quality for 1st NAS • Collaboration with the NDMF and development of an early warning system of variable time-frames	• Define indicators to track progress on objectives • Define a reporting platform for information on climate change adaptation

Agriculture

Climate already plays a role in limiting agricultural activities, and a changing climate will significantly affect the country's agricultural sector. Expected effects include temperature increases, enhanced evapotranspiration and cold spells, changes in water quality and quantity, and increased flooding. The recent LTAS (2013–2014) studies indicate mixed effects on dryland crop yields - some crops will increase in yields, while others will decrease.[1] It is likely the total average annual yields of maize and wheat will decline by 2050.[1] In the worst-case scenario, there will be a 25 percent reduction in annual maize yields, although it is also possible that under a very wet scenario total average annual yields will increase by 10 percent. Optimal growing areas are likely to shift by 2050 for field crops (such as barley, maize, sorghum, soybean, sugarcane and wheat), pasture/rangeland grasses, horticultural and viticulture crops, and major commercial forestry tree species.[1] The distribution of insect, plant and disease vectors are also likely to shift, which could adversely affect crop and livestock production and animal health.

The effects on rangeland systems include inadequate water provision, potential increases in wooded plants and trees, changes in invasive species, increases in wild fire occurrences, heat stress, increases in livestock diseases, and lowered grazing potential for livestock. Increased flooding occurrences will exacerbate the effects of overgrazing, resulting in increased soil erosion, which will affect ecosystems and livelihoods that rely on livestock production, and increase siltation levels of irrigation dams and canals.[1] Labour is also likely to be negatively affected due to the projected increase in the number of days that people will experience thermal discomfort.[1] This has serious implications for the productivity of agricultural labour, particularly those working with summer and multi-year crops. Further research is needed on the effects of climate change on the production of biofuel crops, although canola has already been identified as a vulnerable crop in this regard.[1]

Climate change will add to the agricultural sector's current pressures, namely land degradation, population increases, growing demand for agricultural resources, and the loss of agricultural land to development. There are, however, opportunities for new irrigation technologies and tilling and manure applications, among other techniques, to overcome some of the expected effects.

Other than the MTSF, the Department of Agriculture, Fisheries and Forestry does not have a comprehensive operational document that can deliver against the full objectives of the National Adaptation Strategy. The department however published the Integrated Growth and Development Plan for the sectors in 2012, which is a comprehensive outlook. In 2014, the department further published the Agriculture Policy Action Plan and the Food and Nutrition Security Policy. In the absence of clear plan development and updates, for the purposes of the NAS, it is assumed that the next comprehensive iteration will be following the next national development plan. The plans are therefore assumed at the current status quo to be produced every 5 years.

All these documents fail to comprehensively and operationally address climate change considerations. The strategies/policies only identifies/recognise specific actions that could be linked to climate change, e.g. MTSF 2015-2019 only identifies research needs and integration of biogas production with livestock, whereas APAP recommends climate smart agriculture, IGDP identifies crop and diversification, including irrigation, whilst National Food and Nutrition Security promotes water harvesting technologies. These strategies including the NWRS do not address some of the critical issues such as the water-food trade-offs and funding mechanisms for such initiatives (Montmasson-Clair, Zwane, M. 2016).

DAFF is currently developing a climate change adaptation and mitigation plan for the agriculture, forestry and fisheries sectors. DAFF is also developing a sectoral cold spell management plan that aims to reduce the vulnerability of farmers to more frequent and extended cold spells, which will be exacerbated by climate change.

Planning	NVAF	Implementation Priorities	M&E
• Develop a Climate Change Response Strategy in line with the NAS Guidance by 2019 • Integrate priorities of the strategy in the 2019 MTSF	• Implement the NVAF as input into the 2019 Climate Change Respose Srategy •	• Define Flagship Projects to address key vulnerabilites for inclusion in the 2019 MTSF • Develop Disaster Risk Reduction Strategy and Instruments for the agricultural sector in 2020 • Develop a platform for a seasonal forecast based national crop estimates, include subsistence farmers	• Define indicators to track progress on objectives • Define a reporting platform for information on climate change adaptation

Fisheries

Climate change will influence the distribution and abundance of fish and their habitats; the extent, condition and connectivity of fish ranges; the behaviour, physiology and mortality rates of fish; and the availability of resource species. There will likely be changes in sea surface temperature, storm frequency, freshwater flow and runoff patterns, nutrient levels, oxygen levels and wind patterns, which will alter estuarine, inshore and offshore ecosystems. This will affect the productivity and diversity of South Africa's fishery sector, with significant adverse consequences for subsistence fishers, as well as for commercial and recreational fishing.[1]

The subtropical region may expand as tropical species move in response to warming temperatures, while temperate regions may contract, with the diversity and abundance of coastal species decreasing because of changes in upwelling, related temperature extremes, reduced

runoff and habitat loss. Intensely exploited stocks are likely to become more vulnerable to the effects of climate change. Overfishing could result in reduced genetic variability negatively affecting the possibility of an evolutionary response to climate change, and the ability of depleted stocks to recover. Accelerated sea level rise, frequent high-intensity coastal storms, and high-water events, such as reduced/increased freshwater flow, all pose significant risks to estuarine and inshore fisheries.[1]

Directional shifts in the spatial distribution of several marine species, possibly attributable to climate change, have already been recorded off South Africa's shorelines. This affects intertidal, shallow coastal and offshore species. Increased occurrences of extreme rainfall and dry spells, coupled with sea level rise, could damage or lead to the loss of nursery habitats that are essential for prawns and estuarine fish. Decreased rainfall may cause open/closed estuaries to close more frequently or even permanently. An increase in summer rainfall, however, could result in estuaries such as St. Lucia opening more frequently, which would enhance the abundance of shallow water prawns on the trawling grounds, given good management practices. An increase in rainfall could also, however, confuse behavioural cues at critical lifecycle states such as spawning and migration for estuarine and marine species. The KwaZulu-Natal and West Coast estuaries are likely to be most affected.[1]

Of South Africa's 28 fishery sectors, 21 are particularly vulnerable to climate change, including small-scale and net fishing, aquaculture, commercial line fishing and small pelagic fishing. Increased storm activity will reduce the number of viable sea-fishing days and is likely to damage fishing vessels and shore-based offloading facilities. In 2013 DAFF developed a climate change sector plan.148 DAFF partnered with DEA in 2013 to develop LTAS for Climate Change for the fisheries sector. The fisheries sector has been proactively involved in a project that aims to build resilience to climate change in the major fisheries of the Benguela Large Marine Ecosystem, in compliance with South Africa's commitment to the Benguela Current Commission.

These outputs served as a baseline for the initial Climate Change Sector Plan for Agriculture, Forestry and Fisheries, which has now being updated to a Climate Change Mitigation and Adaptation Plan for Agriculture, Forestry and Fisheries. The department is currently implementing the following policies that are important for climate change considerations: the Small-scale Fisheries Policy, which aims to introduce fundamental shifts in government's approach to the small-scale fisheries sector; the National Policy on Extension and Advisory Services, which aims to facilitate the establishment of effective and efficient extension and advisory services; and the National Research and Development Policy, which aims to promote research and innovation in the agricultural, forestry and fisheries sectors. There is also ongoing research around vulnerability and situational analyses.

Planning	NVAF	Implementation Priorities	M&E
• Develop a Climate Change Response Strategy in line with the NAS Guidance by 2019 • Integrate priorities of the strategy in the 2019 MTSF	• Implement the NVAF as input into the 2019 Climate Change Respose Srategy	• Define Flagship Projects to address key vulnerabilites, in particulalr aquaculture as part of Operation Phakisa • Develop Disaster Risk Reduction Strategy and Instruments for the fisheries sector in 2020 • Develop an early warning system for the fisheries sector, including algal bloom incidence	• Define indicators to track progress on objectives • Define a reporting platform for information on climate change adaptation

Forestry

Climate change will affect the distribution of the natural forest biome, which only covers 428 000 hectares of South Africa's land surface. Drier conditions and future development could reduce this further. The woodlands, which cover about 40 million hectares, are likely to further expand into savannah and grassland biomes, which could negatively affect the ecology of these systems. Although it is possible that the total area suitable for commercial forestry plantations in KwaZulu-Natal, Mpumalanga and the Eastern Cape could increase in future under certain climate scenarios, the sector remains vulnerable to climate change effects, including changes in growing conditions, increased occurrences of fires and lightning storms, increased survival and spread of insects and pathogens that directly affect forest ecosystems, and increased spread of invasive species that affect biodiversity.

Building on DAFF's 2013 climate change sector plan, DAFF is currently developing a climate change adaptation and mitigation plan for the agriculture, forestry and fisheries sectors, 145 which highlights adaptation approaches for the sector. There are no other specific adaptation strategies for forestry of all types.

Planning	NVAF	Implementation Priorities	M&E
• Develop a Climate Change Response Strategy in line with the NAS Guidance by 2019 • Integrate priorities of the strategy in the 2019 MTSF	• Implement the NVAF as input into the 2019 Climate Change Respose Srategy	• Define Flagship Projects to address key vulnerabilites, in particulalr Working on Forests and Working on Fire • Develop Disaster Risk Reduction Strategy and Instruments for the forestry in 2020 • Develop an early warning system for the forestry sector, including incidence of fire •Adoption of EbA approached to landscape management	• Define indicators to track progress on objectives • Define a reporting platform for information on climate change adaptation

Biodiversity and Ecosystems

Biodiversity is crucial to ecosystem health, and healthy ecosystems are central to human wellbeing. Healthy ecosystems provide the foundation for clean air and water, fertile soil and food. But cultivation, overgrazing, coastal development, invasive alien species in terrestrial and freshwater ecosystems, mining, and certain fishing activities (such as trawling) are damaging natural habitats. Terrestrial, freshwater and marine environments are being lost in many parts of South Africa, which means species are being lost. Fragmentation of habitats also prevents landscape-scale ecological processes, such as fire, from functioning effectively and it affects livelihoods in that resources may become inaccessible or scarce. Climate change will exacerbate these effects.

South Africa published its second National Biodiversity Strategy and Action Plan for the period 2015-2025 following the 2005-2015 NBSAP, which is produced as an Article 6 requirement of the Convention on Biological Diversity. This document published every 10 years with a 20 year outlook, is the most comprehensive report through which climate change adaptation could be addressed. It is however important to note that the targets contained in the NBSAP are implemented through other strategies such as the National Biodiversity Framework, last version published in 2009, and the National Protected Areas Strategy of 2008 which are grounded in the Biodiversity Act of 2004, and the Protected Areas Act of 2003. These are operational documents that identify priority actions and therefore constitute MTSF actions, which are funded by government. Existing climate change strategies in the biodiversity and ecosystems sector In 2014 DEA developed a biodiversity sector climate change response strategy, which highlighted adaptation options for the sector and emphasised the importance of EbA as part of an overall adaptation strategy.

Subsequent to the 2014 response strategy, the Council for Scientific and Industrial Research (CSIR) – working with DEA – developed Climate Change Adaptation Plans for South African Biomes, in 2015. In 2015, DEA revised the National Biodiversity Strategy and Action Plan (NBSAP). The vision of the NBSAP is to conserve, manage and sustainably use biodiversity to ensure equitable benefits to the people of South Africa, now and in the future. SANBI and DEA are currently working on an EbA strategic framework and overarching implementation plan for 2016-2021, which includes pilots, research, and mainstreaming and communication of EbA. The plan is also aligned with the NBSAP and should align with the NAS.

Planning	NVAF	Implementation Priorities	M&E
• Update the Climate Change adaptation Plans for South African Biomes and NBSAP in 2019 to include elements of the NAS • Integrate priorities of the strategy in the 2019 MTSF	• Develop a technical paper on implications and methodologies for use in the updating of Plans	• Develop EbA Programme on multifunctional landscapes with relevant players such as LG, DAFF, DRDLR	• Define indicators to track progress on objectives • Define a reporting platform for information on climate change adaptation

Human Settlements (rural, urban and coastal)

Human settlements are vulnerable to several climate change-related impacts. Urban settlements with high population densities are particularly vulnerable to flooding, fires and storms, which can damage infrastructure and harm people. People living in informal settlements are often most at risk due to the location of the settlements, the difficulties of getting emergency teams into the areas, and the density of the housing. Coastal settlements are at risk because they are directly

exposed to extreme weather events, such as storm surges. Rural human settlements, often areas with high poverty rates, are particularly vulnerable to disasters such as floods, droughts, severe storms and fires because of the increased reliance of many rural households on natural resources to support livelihoods. This is often exacerbated by the remoteness of many locations and inadequate transport and communications infrastructure.

The Department of Cooperative Governance and Traditional Affairs is responsible for the Human Settlements component as it has the mandate over IDPs, and DRRM, mandated through the Municipal Systems Act of 2000, and the Disaster Management Act of 2002. The Disaster Management Framework provides an entry point for climate change considerations is disaster risk reduction and management through a chapter on climate change impacts in response to NAS requirements, whereas the IDP Guidelines, which could incorporate the IDP toolkit as part of the regulations for preparation of IDPs.

Existing climate change strategies in the sector The Department of Rural Development and Land Reform developed an adaptation strategy for rural human settlements in 2013. There is however no current strategy specific for adaptation in urban settlements except for the Integrated Urban Development Framework and Implementation Plan (IUDF) but does not specifically talk to adaptation. DEA's Oceans and Coasts Branch is planning to develop a coastal adaptation strategy, which will link to the NAS.

Planning	NVAF	Implementation Priorities	M&E
• Development of Climate Change Adaptation Strategy for teh sector by 2019 • Integrate priorities of the strategy in the 2019 MTSF	• Implement the NVAF as input into the 2019 Climate Change Respose Srategy	• Develop Guidelines for Climate Change Resilience, through updates of the National DMF, SDF, and Building Code by 2020 • Implement the Disaster Risk Reduction and Management provisions • Develop targets with regards to provision of basic services such as water in light of climate change and implement service delivery projects	• Define indicators to track progress on objectives • Define a reporting platform for information on climate change adaptation

Health

South Africa faces complex and pressing public health challenges, which are exacerbated by adverse socioeconomic conditions (including dense informal settlements that constrain effective service delivery), having the highest global prevalence of HIV/Aids and tuberculosis, and waterborne and chronic respiratory disease. Undernutrition and socioeconomic stress are important contributors to poor human resilience and the emergence and propagation of disease. Malnutrition and disease interact strongly, and there is a clear relationship between environmental quality, food security and the disease burden of communities. The LTAS Report on Human Health highlights the health risks likely to be aggravated by climate change over the next few decades. These include heat stress, particularly in the interior, vector-borne diseases such as malaria, extreme weather events, air pollution and communicable and non-communicable diseases. Elderly people and young children, those without adequate shelter and those with pre-existing medical conditions are the most vulnerable.

The Department of Health published its National Climate Change and Health Adaptation Plan for 2014-2019, consistent with the MTEF period. The plan is geared towards the implementation of the NCCRP, with the objective of providing a framework for a sector response including the identification of high risk areas, resource mobilisation, research and datasets to monitor implementation. The plan is preparatory in nature, with the implementation plan for the MTSF being just over R1m, as such does not cover implementation. In a similar manner as with the Agriculture sector there is no legal basis and timeframes for the development of such plans, and continuously improving over time.

Planning	NVAF	Implementation Priorities	M&E
• Develop the Climate Change Response Strategy for the Health Sector by 2020 • Alignment of the MTSF for 2019 with the NAS and Climate Change Strategy	• Implement the NVAF as input into the strategy by 2019 • Study to quantify health impacts of climate change on South Africa	• Co-design and implement with the DAFF a food security and Health Flagship • Implement health related aspects of the Disaster Management Framework • Design a project to implement a programme for managing vector borne diseases • In association with local government implement projects related to air pollution and water services, sanitation, refuse removal • Publish resilience standards for health care infrastructure planning, design, and operation	• Define indicators to track progress on objectives • Define a reporting platform for information on climate change adaptation

Disaster management

Climate change increases the urgency of integrating disaster risk management into development planning, interventions and current disaster management approaches. South Africa is particularly vulnerable to droughts, floods and storm-related events, such as strong winds, coastal storms and hail – all of which are likely to be exacerbated by climate change. Droughts, floods and veld fires are the three most significant drivers of climate-related disasters in South Africa. The cost of responding is increasing; in 2011 response costs were more than R3 billion.

The Department of Rural Development and Land Reform developed an adaptation strategy for rural human settlements in 2013. There is however no current strategy specific for adaptation in urban settlements except for the Integrated Urban Development Framework and Implementation Plan (IUDF) but does not specifically talk to adaptation. DEA's Oceans and Coasts Branch is planning to develop a coastal adaptation strategy, which will link to the NAS.

Planning	NVAF	Implementation Priorities	M&E
• Develop the Climate Change Response Strategy for NDRF by 2020 • Alignment of the MTSF for 2019 with the NAS and Climate Change Strategy	• Implement the NVAF as input into the strategy by 2019 • Publish a costing methodology for all disaster categories and types by 2018	• Resource and operationalise Disaster Management Framework • Explore consolidation of Disaster Relief funds across government sector, such as agriculture, health • Expand the early-warning network, including agricultural disasters, health disasters etc	• Define indicators to track progress on objectives • Define a reporting platform for information on climate change adaptation

Mining and extractives

Climate-related risks to the mining sector are primarily linked to water and rising temperatures. Mining in South Africa relies heavily on water. Recent estimates suggest that between 2.5 percent and 3 percent of the country's water resources are allocated to the mining sector.[1/1] By 2030, South Africa is likely to face a 17 percent gap between available water and projected demand.[1]This is particularly true of the northern and north-eastern parts of the country,[1] where most mining operations are situated. The mining sector's vulnerability to reduced water availability is further compounded by its own contribution to the degradation of available water resources, in the form of effluent discharge from mining operations, which causes acid mine drainage.[1]

More rainfall, especially heavy rainfall events, and increased surface runoff would likely exacerbate the problem of acid rock drainage or acid mine drainage. Flash floods and heavy water runoff can also cause scouring in mining areas, as well as heavy erosion and further degradation. Water stress or scarcity may also result in regulatory risks or restrictions on certain operational aspects, and could lead to the imposition of further environmental standards on the discharge of mining waste to ensure that freshwater quality is not negatively affected

The most important operational document for the mining sector is the Mining Charter which operationalises Section 100(2)a of the MPRDA, whose objectives include improving access to the sector, improving social welfare of mining communities, and further development and beneficiation of mineral resources in South Africa. The Mining Charter however does not explicitly address some of the objectives outlined in the MPRDA particularly Sections 2 (e) and (h) on the sector's contribution to economic growth in an ecologically sustainable manner and justifiable social and economic development. The mining charter is revised every 5 years.

Closely linked to the mining charter is the Industrial Policy Action Plan is an operational document of the DTI which is aligned to the MTSF, as such revised every 5 years. The current IPAP runs until 2019, and includes aspects of mineral beneficiation and other industries. The IPAP is an operational document that supports industrial project development and implementation, it is from that perspective that the NAS propose the consideration of climate change impacts on both the Mining Charter ad the IPAP, where the policy documents respond to the minimum information for guidance and planning in respect of climate change.

At the national level, the Department of Mineral Resources has a division of Mine Environmental Research and Sustainable Development, which focuses on environmental and sustainability issues more broadly, and climate change falls within their purview. Under the Water Conservation Demand Management Flagship Programme, the Department of Water Affairs produced a specific water conservation and water demand management strategy for the industry, mining, and power

generation sectors. While climate change was not a consideration in this strategy, the water conservation and demand management measures suggested therein are nevertheless useful approaches to reducing the mining sector's heavy reliance on water, thereby serving as potential adaptation approaches.

Planning	NVAF	Implementation Priorities	M&E
• Develop the Climate Change Response Strategy for the Mining Sector by 2020 • Alignment of the MTSF for 2019 with the NAS and Climate Change Strategy • Development of a Mining Sector Climate Resilience Charter by the Chamber of Mines	• Implement the NVAF as input into the strategy by 201	• Flagship Programme co-funded by the public-private sector for resilience in the mining sector • Develop and early - warning system for climate related disasters in the mining sector • Contirbute to the Biodiversity and Ecosystem Flagship on EbA and multifunctional landscapes	• Define indicators to track progress on objectives • Define a reporting platform for information on climate change adaptation

Energy

South Africa's economy is energy intensive, mostly because of the energy requirements of the mining, extractive and mineral-processing industries. Coal mining for energy generation uses significant volumes of water in a series of processes, as does thermal energy production from coal-fired power plants for its plant operations. Hydropower facilities are at risk from climate change-related altered water availability in river catchments and changing flow regimes. To maintain the necessary water supply for power plants, allocations would need to be drawn from other sectors, such as agriculture, and, in some cases, transported from far away through pipelines and pumps because availability around power plants is decreasing.

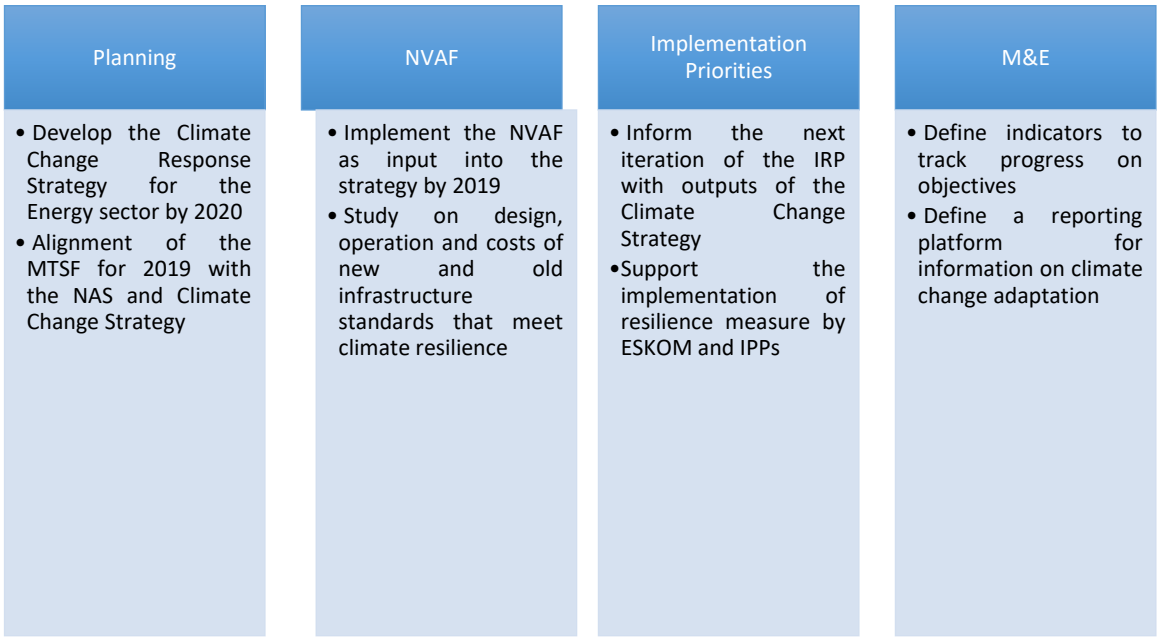
Eskom currently uses 2 % of South Africa's total water supply to produce electricity – this does not include water used in coal mining.[1] The costs of ensuring an adequate water supply to power plants are likely to escalate with climate change, due to greater pressure on increasingly limited amounts of water. There is a risk that demand for power for cooling will increase during more frequent and intense heat waves. This would place additional pressure on an electricity system that is unable to cope with current demand.

Elevated water temperatures are problematic because warm water cannot be used for cooling purposes. The efficiency of transmission lines decreases when ambient temperatures are high, causing power lines to sag or overheat.[1] There is also a growing risk of infrastructure damage from extreme weather events. In coastal areas, energy infrastructure could be exposed to rising sea levels and saltwater damage. Climate change brings increased risks of floods, water abstraction, heat-related damage and resultant maintenance costs, and reduced transmission capacity from derating – lowering the voltage that passes through power lines and transformers to avoid overheating.

The energy futures of the country are contained in the Integrated Energy Plan and Integrated Resource Plan which operationalises the National Energy Act of 2008, and Section 34 of the Electricity Act, respectively. The current version being implemented being the 2010 plan which has a 2030 outlook, and consultations are under way for the 2017 update. Climate considerations in these operational plans, which guide the future energy mix and options does not take into

account the risks posed by climate change, particularly the water-energy nexus, as such consideration, in a similar manner to the NWRS is for such to be included in the documents rather than a standalone plan.

Existing climate change strategies in the energy sector Eskom has a climate change policy in place, as well as a climate change strategy. The strategy was developed by 2005, and has since been revised and updated several times. It is, however, an internal strategy that is not publicly accessible and is not available for review by the general public. Eskom has also started addressing climate change adaptation specifically, and since 2013 it has included a particular climate change adaptation component to its internal strategy. At a broader, system-wide level, Eskom's Resilience Programme commenced in 2014. There is internal recognition that as a provider of essential services.



Transportation and other public infrastructure

Physical infrastructure (such as buildings, pipelines, roads and railway lines) is vulnerable to the effects of climate change. The biggest risk is extreme weather conditions causing physical damage to infrastructure. Shifts in climate can cause depreciation and wear and tear because infrastructure is not usually designed or built with highly variable environmental conditions in mind. Examples of these climate-related effects include: Buckling and cracking of road surfaces - in some cases even melting of tar in high temperatures; flood damage to roads and bridges - often resulting in erosion, cracks in underground pipelines due to land buckling around them and intermittent expansion and contraction from shifts in temperatures; damage of port infrastructure and disruption of port operations due to storm surges

The transport sector has published a Green Transport Strategy, which is expected to be implemented from 2019, and reviewed every 10 years. Albeit the strategy is primarily mitigation focused, it contains elements of climate resilience, particularly in relation to infrastructure build. Such a plan will be operationalised through the MTSF, as such the NAS considers the strategy as a platform that can deliver against the national adaptation planning objectives, as its completion will be informed by the prerogatives of the NAS. The strategy is envisaged to cover road, rail, marine and aviation sectors.

Existing adaptation strategies in the transport and infrastructure sector The Department of Public Works' Strategic Plan 2012–2016 only mentions climate change once, in relation to its Green

Buildings Framework. However, even the draft Green Building Policy Framework leans strongly towards mitigation, i.e. to reduce the impact of buildings on natural resources, reduce GHGs and operate in more resource-efficient ways, rather than considering how adaptive and resilient green buildings can contribute to more resilient and adaptive societies. Policymakers' attention thus far has been devoted to reducing the transport sector's contribution to climate change, i.e. to mitigation, rather than adaptation, and discussions have not dealt with the impacts that the transport sector will face from climate change or how it can make itself more resilient and cope with such impacts. Transnet is developing a climate change adaptation and response strategy, and is actively implementing it. This strategy is, in fact, considered a model by other publicly owned enterprises in South Africa (such as Eskom).

Planning	NVAF	Implementation Priorities	M&E
• Develop the Climate Change Response Strategy for the Transport sector by 2020 • Alignment of the MTSF for 2019 with the NAS and Climate Change Strategy	• Implement the NVAF as input into the strategy by 2019	• Develop and and implement a Transport Sector Flagship Programme covering port, rail and road sectors • Develop a building infrastructre Flagship with the Green Building Council • Support implementation of the Disaster Relief efforts for the sector	• Define indicators to track progress on objectives • Define a reporting platform for information on climate change adaptation

The implementation framework for the NAS is based on key elements of the strategy which take forward the planning, vulnerability assessment, priorities for implementation, and the M&E system. The process of implementing the strategy in its entirety is addressed in Section 12, as a remit for the DEA. As such the role of the DEA as sector department on Biodiversity and Ecosystem is covered in this section, with DEA as a coordinating department in Section 13.

The implementation framework identifies key vulnerabilities for each sector, and outline the next steps in respect of planning as well as NVAF needs and for M&E.

8 RESOURCE MOBILISATION PLAN

South Africa is investing in climate action to protect and build its long-term prosperity. Similarly, international climate finance investments have increased and proliferated over the past years, using several mechanisms. The NAS recognizes that resource mobilisation for adaptation will require deeper knowledge on climate risks, factoring in associated opportunities into decision-making, and expanding the use of approaches such as risk management instruments (for example, guarantees), and blended finance mechanisms. The NAS also emphasises that resource mobilisation for adaptation actions is not a linear approach, but should be an iterative process involving multiple policy and sectoral decisions and multiple role players. The NAS defines adaptation finance as follows,

Adaptation finance refers to all resources that finance the cost of transitioning South Africa to climate resilient economy and society which is inclusive of both climate specific and climate relevant financial resources, public and private, domestic and international, respectively. Such funding should demonstrate contribution to reducing vulnerability, maintaining and increasing the resilience of human and ecological systems to negative climate change impacts. Climate research, monitoring systems as well as capacity building and technology deployment are key supporting mechanisms for adaptation and must be inclusive of adaptation finance.

8.1 Adaptation Costs and Needs

The estimation of adaptation needs and costs is a nascent discipline, with the approaches used generally being either top-down, e.g. economic and climate impact models or bottom-up from project and community level exercises. Projected costs for adaptation in South Africa are in the range of billions of rands, such as in the 2015 South African INDC projected costs, which were based only on damage costs from extreme events, estimated to be approximately USD 2.9 billion for both the low and moderate emission reduction scenarios of the IPCC's RCP for the period 2020-2030. However, these estimates vary widely. The wide-range of projected adaptation costs is subsequent to effect of a range of key factors, inclusive of; the level of global warming that is used, the methods used to estimate them, the ethical choices made, the economic framework applied, and the assumptions made. It is inferred that adaptation costs will be significantly higher once considerations for all relevant sectors are included in the projections.

Finance for adaptation is one of the pillars that is sustaining the on-going shift of adaptation from conceptual frameworks, international negotiation to adaptation practice. Sectoral plans and strategies are central in directing budget allocations to mirror the identified priorities and needs across the economy and the three spheres of government. This alignment brings forward a range of serious practical issues including clear articulation of adaptation options. The NAS proposes a method of estimating adaptation needs that provide estimated damage costs, as well as project specific interventions emanating from options selected or already being implemented as per outcome of the NVAF. The DEA will be responsible for the computation of damage costs[3] in association with the DRR, whilst various players provide the project-based costing.

8.2 Sources of Adaptation Finance

Adaptation initiatives are spread across government departments, and very often they are not labelled as adaptation projects. The primary funding for adaptation activities in South Africa is through direct allocations from the national budget (MTEF) including expenditure on research programmes and activities that directly contribute to building and supporting resilience. The other principal source of public sector finance are public intermediaries. Relevant public intermediaries for South Africa include the Global Environment Facility (which functions as an operating entity of the financial mechanism of

[3] Damage costs are a proxy for adaptation needs, as if adaptation option costs exceed cumulative damage costs over a specified period, it is only rational to address damage costs

the UNFCCC); Development Finance Institutions (DFIs) such as DBSA, the World Bank and the African Development Bank; Official Development Assistance Institutions such as the Germany's International Climate Initiative (IKI), KfW Group and other donor country initiatives; and Climate Funds, for example the Green Fund, Green Climate Fund and the Adaptation Fund.

South Africa's private sector has also invested in adaptation activities, inclusive of sustainable farming practices, building ecological infrastructure and improving water infrastructure. Examples noteworthy of mentioning include activities undertaken by South African Breweries' Better Barley Better Beer, Woolworths' Farming for the Future and the World Wildlife Fund-Mondi Wetlands Programme. A range of economic and financial instruments exist that are being employed by both private and public investors to support adaptation projects. These include grants, equity, concessional and non-concessional loans and debt, and the operational funding of private and state-owned companies. More recently, leading private sector companies are using the combination of these instruments to mainstream adaptation into their operational activities (for example, an energy company investing in improving the resilience of its transmission lines to extreme weather events) or a company that develops products and services that support adaptation (such as a seed company developing drought-resistant seeds).

Figure 14 shows an overview of the adaptation finance landscape. Climate change adaptation projects are often supported by grants and low-cost loans. Grants and concessionary finance should also be blended to cover high-risk aspects, providing an incentive for non-concessional funding. Blended finance options have the potential to un-lock significant funding, particularly from private foundations.

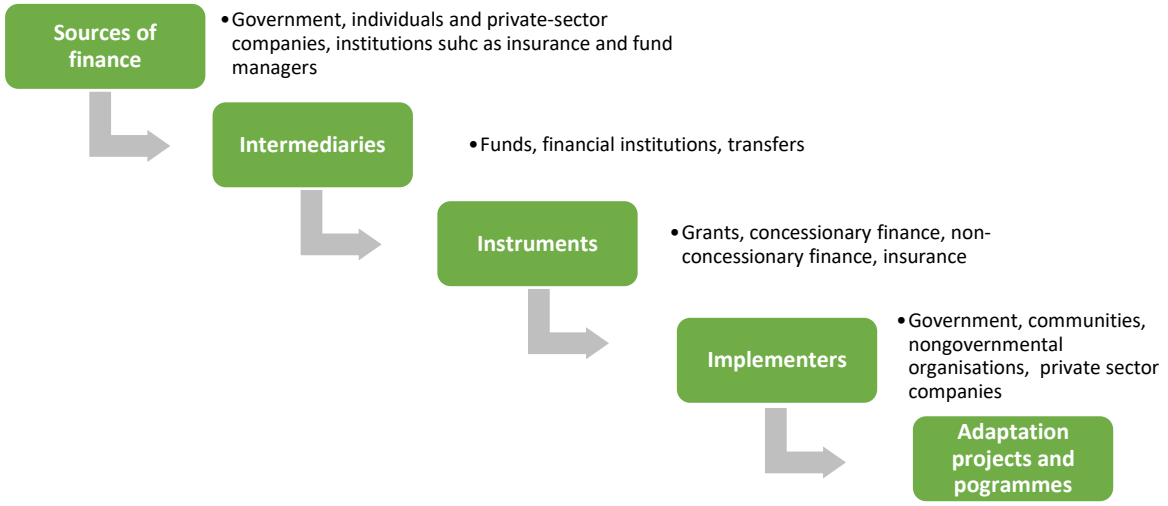


Figure 14: Overview of the adaptation finance landscape[iii]

8.3 Adaptation Finance Challenges

Fragmentation: One of the biggest challenges of adaptation finance is fragmentation, firstly because international climate finance is currently provided *via* multiple sources, multilateral and bilateral measures. As such, it does lend itself as a coherent "package" from which to access the required resources. This state of affairs cannot be expected to drastically change in the near future. Secondly, the plethora of multilateral and bilateral climate finance initiatives bring with them a multitude of differing procedures for accessing, deploying and reporting of adaptation finance. The NAS, through a vision of planning, prioritisation and action, therefore provides a platform to improve coherence.

Finance Risk: The second challenge for adaptation finance is the risk associated with such financing as most adaptation projects are of an innovative nature and therefore a relatively high financial risk,

whether real or perceived. The finance risk is based on policy and/or political risks, technical and/or technological risks, market and commercial risks, and outcome and/or execution risks. The NAS proposes a principle approach to adaptation funding that uses public finance from the national fiscus to either leverage international and/or private sector funding in project design or through grant and highly concessional finance, in an attempt to buy down risk.

Data Gaps: A thirdly challenge pertains to data gaps emanating from limited collection, aggregation and analysis of climate finance data, due to access challenges and available data from diverse sources that use inconsistent methodologies that subsequently present a challenge for making a case for adaptation finance. Activities for climate resilience are rarely reported as such, by both public and private role players. As a result, there is no reliable data for private and domestic public adaptation interventions. Furthermore, little is currently known about the scale of the finance flows for adaptation, as data limitations and methodological challenges make it inherently challenging to track these. Even internationally, tracking methodologies are still under development. The reporting provisions of the NAS as well as the Climate Change Act seeks to address this limitation.

Definition of climate finance: Fourthly, the absence of an internationally agreed definition of "climate finance" - especially for adaptation finance - is a major barrier in understanding the magnitude of climate finance flows and the barriers that need to be overcome to absorb and monitor adaptation finance investments. This is compounded by the lack of common metrics for measuring adaptation or nor adaptive capacity. Ambiguity in metrics for measuring adaptation makes the tracking and reporting on adaptation spending cumbersome and confusing. It also allows for discrepancies, double counting and political influence on tracking processes. Therefore, the NAS will utilise an operational definition of adaptation finance as follows.

Complex and onerous project preparation: Lastly, the fragmented financing for adaptation lends itself to different requirements, priorities, safeguard requirements by finance providers. This translates into onerous project proposal development, as each proposal, even if it is for the same project would require a comparable amount of time. Furthermore, the capacity and experience of developing such proposals is limited in the country, primarily for projects at scale.

Collectively, these challenges undermine the efforts to deliver scaled up climate investments and also limit the ability of policy makers to effectively address investment gaps for adaptation actions.

8.4 Roles in Resource Mobilisation for Adaptation

South Africa has highly sophisticated financial institutions, universities, programmes and political systems that can absorb and also generate momentum for finance for adaptation. However, there is still a great need for building up in-country capacity (human and technical capacity) in both public and private sector institutions, to enhance the capability to access climate finance. This capacity development should include capacity to develop a pipeline of financeable projects, writing bankable proposals, and the identification and analyses of potential climate investment opportunities and development of appropriate financial products and services that appropriately reduce the risk profile of investments.

The DEA should play a leading role in enhancing coordination and development of partnerships between key stakeholders across the adaptation landscape with the view to co-create innovative, relevant, cost-effective and pragmatic funding approaches for climate resilience. The DEA should provide thought leadership on climate finance by commissioning robust research and analysis that will provide a credible evidence base to respond to both perceived and actual investment risks in adaptation actions. Building on its research and convening activities, the DEA should play a central role in pointing and connecting international and national sources of climate finance to the national adaptation needs and priorities. Designation of a coordinating institution approaching global

multilateral funds such as the Green Environment Facility, the Adaptation Fund, and the Green Climate Fund, the DEA, and leading the design of economy-wide proposals is of utmost importance.

The NAS emphasises that the government departments under the guidance of National Treasury should play a leading role in unlocking private sector capital and leveraging private investments for a climate resilient future, reducing financial risks and encouraging significant shifts in long-term private investment, directing financial investments by helping to identify what types of climate-relevant investments are most appropriate for specific sectors and by ensuring that the greatest economic and environmental benefits are generated at the lowest possible cost; through

- Direct investments that also drive investment from the wider financial system, by providing other investors and financiers with the needed confidence to participate in climate projects; and
- Mobilizing additional and scaled up private sector adaptation finance by building partnerships with national and international public intermediaries, in particular.

The NAS regards the role of government funding as indispensable for mobilizing additional private finance for adaptation especially in adaptation sectors where markets do not exist - notably in relation to ecosystem services - and where, from the point of view of adaptation, markets fail to reflect the true costs to society of certain goods and services.

The private sector should enhance their participation in government-administered adaptation programmes, as a case of both social responsibility and 'enlightened self-interest', e.g. contribution to catchment rehabilitation can improve both water availability and quality, as such reducing costs of treating water for process needs. Such involvement will enhance awareness and understanding of the country's adaptation efforts, their vulnerability to climate-induced risks, and the business opportunities that may arise from changing climate conditions. Civil society should help expand the financial support base of adaptation actions, with the aim of ensuring that the adaptation responses reach to the more marginalised groups of society and affected communities benefit in the opportunities created by new adaptation finance arrangements. This can be achieved primarily through philanthropic, bilateral funding sources.

It is recommended that public Intermediaries, such as Development Bank of South Africa (DBSA), may actively build a coalition of actors from across the financial system and coordinate their efforts through a systemic platform with the view to accelerate the development of promising initiatives for financial instruments to investment-ready projects. They should serve as translators between the complex languages of private sector investors and public sector policymakers, by driving greater coordination between government departments and private sector financiers and investors, to create a situation where climate-relevant projects are the norm, not the exception.

ACTIVITY	2017/18	2018/19	2019/20	2020/21	2021/22
Define priorities per sector/ across	x				
Design financeable projects		x			
Resource mobilisation plan		x			
Include in MTSF			x		
Funding MTEF and International			x		
Project Implementation			x	x	x

Figure 15: Indicative pathway to resource mobilisation for the NAS

With the NAS gazetted in 2017/18, it identifies priority actions for the first version of NAS going to 2022 in Section 9 (**Figure 15**). Time is therefore opportune to develop a resource mobilisation plan and project proposal development in 2018/19 financial under the leadership of DEA, whilst noting that other stakeholders would be in a position to do so in the same time frame. It is however in the 2019/20 appropriation that funding from the National Treasury can be sourced, however this should be preceded by the inclusion of such projects in the MTSF of the new government. Sufficient time for consideration of proposals in the international funds has been provided, amounting to a period of two years.

9 PROVISIONS FOR MONITORING, AND EVALUATION

The process of adaptation must be monitored, evaluated and reported on to understand whether progress has been made towards achieving specific goals. As these goals may shift as part of an adaptive cycle of management, an integral component of the NAS framework is the Monitoring and Evaluation (M&E) learning cycle.

Monitoring is the regularised and ongoing collection of data and information to ascertain whether an intervention is progressing according to schedule and is achieving set objectives.

Evaluation is the systematic assessment of the effectiveness or value of an intervention, at a specific point in time, against set objectives.

9.1 Purpose of the M&E System

The effects of climate change differ across geographies and will shift over time. This means that adaptation initiatives will work in some locations and time periods, and not in others. A "learning by doing" approach is therefore needed to enable ongoing adaptation. This approach will help South Africa progressively improve its ability to deal with the inherent uncertainty of climate change science. Learning is, however, not meant as an academic exercise of taking cognizance of the past but as non-reversal and sustaining change of behaviour at the individual, group, organizational, institutional, and societal levels.

The focus of the M&E system should be based on the purpose for which it was designed, namely to:

- Improve South Africa's ability to undertake adaptive management;
- Synthesise lessons to underpin the country's adaptive response; and
- Be accountable to stakeholders for the resources expended, the interventions undertaken and the outcomes achieved.

Monitoring and reporting should be based on the following key principles: Improvement over time as a better understanding of the nature of adaptation outcomes, and metrics are developed; a structured and gradual shift from focusing on inputs and processes across sectors and between spheres of government to a M&E system that accounts for processes and outcomes. Information generated from Adaptation M&E interventions will help ensure the necessary continued political, sectoral and societal support for adaptation actions. It will help to:

- Strengthen sustainable development strategies by demonstrating that adaptation interventions safeguard and support development goals;
- Demonstrate the importance of incorporating adaptation considerations into sectoral strategies through reflection on progress and impact of the actions;
- Create support for adaptation across civil societies and local communities through demonstration;
- Showcase national results at domestic and international level; and
- Support meeting national reporting obligations to the international community (e.g. SDGs, the UNFCCC, the UN Convention on Biological Diversity, Ramsar, etc.).

9.2 Key features of the Adaptation M&E System

Government is designing a national climate change M&E system that includes a component focussing on tracking progress in building resilience to climate change. M&E of adaptation interventions enables government to:

- **Manage:** Determine the extent to which South Africa is transitioning towards climate resilience and adjust the course of action, where necessary.
- **Learn:** Evolve and improve the understanding of context, needs and experience.
- **Account:** Report on progress and outcome of the actions

Adaptation M&E shall fit within the National System and take place at different levels (national, provincial and local) with various stakeholders and scales of assessment. National Adaptation M&E should focus to varying degrees on the leveraged inputs (resources, including financial and human), undertaken adaptation processes (implementation of policies, plans and interventions) and outcomes (the changes realised from the implementation activities).

Capacity-building is a critical enabler to unlock inputs, processes and outcomes. Capacity-building should include technical support for the development of methodological guidelines to track adaptation across different scales and for the inclusion of adaptation objectives within budgetary systems. This should be done with the view to enhance the development of in-house government capacity and resources to implement an effective tracking process.

9.3 Operationalising M&E for Adaptation in South Africa

The DEA, as the responsible coordinating national department, is leading the development of the national climate change M&E system and the associated climate change reporting mechanisms. The DEA is currently developing institutional arrangements with a broad range of stakeholders to support the functioning of the system, for example by defining information needs for the operationalisation of the system. Importantly, reporting requirements need to be aligned with internationally agreed-on reporting requirements (for example reporting on SDGs) to avoid duplicated efforts or misinterpreted results. The development of the system by the DEA shall include:

- Providing background documents about the system;
- Outlining of roles and responsibilities;
- Providing training for those contributing and managing the system;
- Developing tools where necessary to support data collection; and
- Facilitating ongoing engagement sessions that provide an opportunity to discuss and improve the system and help develop a community of practice.

The DEA shall also outline the frequency and timing of data/information submission, which will be used to develop domestic and international adaptation related documents. There is a significant difference between an M&E system and a data collection, synthesis and reporting system. The M&E system is an analytical and experiential process, while the data collection system is an information management tool. The data management system must be effective and user-friendly. It is important that the data collected and analysed through the M&E system is reliable and credible to ensure that decisions are based on accurate, current and complete information.

Improving the understanding of the effects of climate change and the socio-economic implications will support more robust and effective M&E of Adaptation actions. In this regard, South Africa needs to maintain and improve climate monitoring systems and also maintain and improve the monitoring of climate change impacts. Financial and capacity constraints have hampered South Africa's ability to maintain and improve its monitoring networks across a range of sectors. All adaptation sectors should strengthen their monitoring networks as a direct contribution to the country adaptation response.

9.4 Guidance for Monitoring and Reporting of Adaptation Actions

The monitoring and reporting of adaptation shall apply to all designated entities listed in a Schedule of the Climate Change Act. These entities are listed in **Annexure 1** of the NAS. The Reports shall be communicated to DEA every four years starting in the 2018/19 financial year. The reports shall include four aspects, namely;

- Tracking of planning, as outlined in Section 6;
- Tracking of governance and institutional arrangements as envisaged in Section 8;
- Implementation of adaptation actions in Section 9; and
- Resource mobilisation for adaptation in Section 10.

MRV of Planning

The NAS recognises adaptation planning as an action in itself as it provides a perspective of readiness, preparedness, understanding and a basis for reporting adaptation action. The elements through which the NAS assesses progress include:

- Integration of adaptation considerations in national development planning, particularly the understanding of resource futures in light of climate change;
- National adaptation planning regime and level of planning, i.e. whether national planning, sectoral, local planning exists; and
- Sectoral planning regime, including local government, business and civil society including integration in operational plans.

The first two components shall be in the remit of the DEA following a state of adaptation assessment in each iteration of the NAS, whereas the last component shall be in the remit of the various stakeholders.

MRV of Governance

The national tracking governance and institutional arrangements shall include both presence and effectiveness, with the national responsibility of such an assessment being the DEA, Sectoral Departments, Provinces, Local Government, Business and Civil Society within their reports in accordance with the Climate Change Act. The overall assessment and consolidation shall be with the DEA.

The presence of such institutions shall be measured in terms of both the establishment and broad participation of relevant stakeholders, whereas effectiveness will be measured in convening at stipulated frequencies, as well as achievement of planned outputs.

MRV of Action

Considerations in monitoring and reporting shall include the following,

- Recognise and document the significant potential of 'traditional' development activities in contributing to adaptive capacity and reach beyond the initiatives that have the climate change label, rather focus on objective and output;
- Extend beyond tracking highly visible infrastructural and technical outcomes and extend to tracking less tangible capacity-strengthening and governance-related initiatives;
- Document and enable the sharing of lessons learnt with relevant stakeholders to inform future design and development of adaptation programmes and projects;
- Recognise the wide range of needs and uses that different adaptation actors have in tracking adaptation actions;
- Monitor and report across the full spectrum of adaptation activities so as to provide a clear understanding of where actions and investments are taking place or needed, what are their underlying drivers for the actions and needs, and what are barriers that need to be overcome for the implementation of adaptation actions;
- Ensure that methodological development for tracking adaptation actions is specific (e.g. what counts as an adaptation project) inclusive and innovative. For example, it should encourage the diversification of categories used to track adaptation activities by including factors such as sectoral distribution, geographic location, and type of adaptation; and
- Encourage contributing and recipient actors to report in a routine, comprehensive and comparable manner, according to common definitions and standards so as to collect complete, reliable and timely information.

MRV of Adaptation Finance

Tracking adaptation finance contributes in building an evidence base of the broader climate finance landscape. Building a comprehensive picture of the scale, scope, delivery and management of financial investments, requires robust monitoring and reporting approaches across different scales (project level, programme level, national level, provincial and municipal level). This is an important process given the potential scale of funding allocated to the delivery of adaptation actions from both domestic and international sources. Tracking climate finance should serve as a strategic tool to

- Attract further targeted funding from both national and international resources;
- Provide helpful insights regarding current and future resource requirements;
- Serve as a valuable policy and planning feedback tool; and
- Contribute in providing evidence that international commitments for delivering climate finance are met.

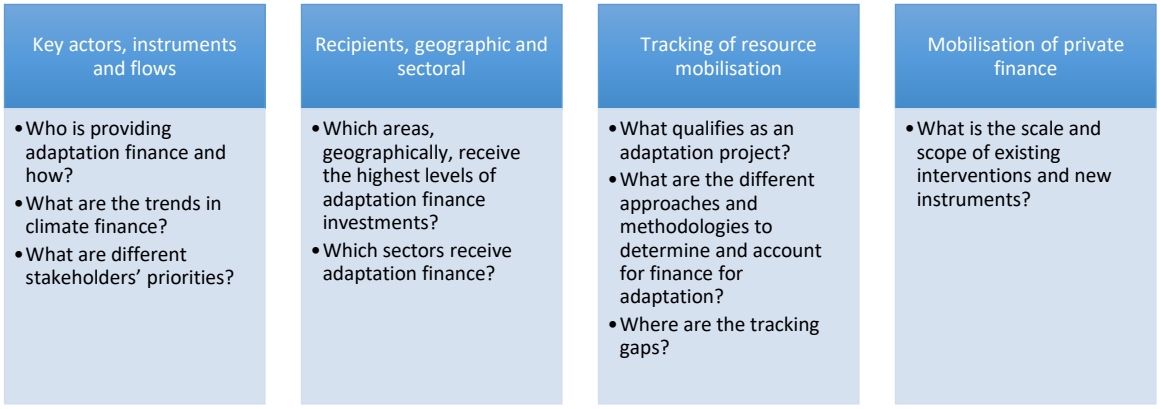


Figure 16: Information to understand, inform and influence the landscape of Adaptation Finance

Figure 16 provides key information required to understand, inform and influence the landscape of adaptation finance, and shall inform the reporting of information by the various stakeholders as provided for in the Climate Change Act.

Internationally and nationally, significant progress has been made towards getting a comprehensive picture of climate finance which has laid the foundation for further collaborative work to address outstanding comparability issues and gaps. Internationally, for example, the Standing Committee on Finance aggregates climate finance in two ways, being (a) the global total climate finance flows and (b) climate finance flows from developed to developing countries. South Africa has taken steps in clarifying institutional roles and remits within and across government ministries and agencies for tracking adaptation finance as the DEA, in partnership with the National Treasury, is developing a tracking and reporting system for climate finance, including adaptation finance. South Africa's BURs and its Annual climate Change Reports are helping in mapping and understanding the country's climate finance landscape.

Tracking adaptation finance is important beyond the goal of complying with international reporting obligations, but to assist the South African government to better track and deliver adaptation actions. Tracking adaptation finance should:

- Map ongoing efforts to track finance flows and undertake a meta-analysis to identify gaps in terms of sectors, geographies, technologies, etc.;
- Build a repository of lessons learned across sectors to help identify best practices on structuring investments, addressing barriers, and ensuring a supportive policy and enabling environment;

- Elaborate findings on innovative mechanisms to leverage private finance and how to scale them up; and
- Distil key lessons learned and policy implications as the basis for strategies for attracting investment.

10 GUIDELINES FOR COMMUNICATION, AWARENESS AND CAPACITY-BUILDING

The NAS aims to improve community participation in supporting and implementing adaptation responses in partnership with the South African government. It recognizes that stronger dissemination of information to relevant actors, whether it be communication between line departments or between spheres of government or communities of practice, is a prerequisite for improved coordination. The NAS also recognizes that climate change has a disproportionate effect on vulnerable groups, such as youth, women and disabled people. It is from that premise that the capacity-building initiatives under the NAS prioritises interventions that address the needs of vulnerable groups.

10.1 Communication and Awareness

The NAS provides a unifying adaptation framework by linking South Africa's willingness and capacity to adapt in an innovative way with its ability to advance and realise the objectives set out in the NDP and the SDGs. National sectoral departments, provincial government and district and local municipalities should use the NAS as a reference and guide to ensure coordinated and effective communication on adaptation needs and initiatives.

Beyond government initiatives to develop climate resilience, the entire citizenry need to become conscious of their role in contributing to and safeguarding against climate change. This requires behavioural change. Growing awareness and generating knowledge in social groups, organisations and institutions about vulnerability, and the effects of and adaptation to climate change, are central to building the individual and institutional capacity needed for effective adaptation planning and implementation.

Campaigns and public awareness programmes are needed to steadily increase public participation in adaptation activities. There is a need to mainstream climate change knowledge into education and training curricula at every level of formal education in South Africa. It should form part of the broader framework of education on sustainable development, be interdisciplinary and aim to equip South African citizens to orient society and the economic system towards climate resilience and sustainability.

The communication strategy which is to be launched through media campaign shall provide key messages of this strategy framework, to include:

- **Adapting to build a strong and resilient South Africa:** This is the key message of the NAS. It captures the ultimate goal of the strategy and its priorities to ensure a climate resilient nation that attains its socio-economic goals in the face of increasing climate change.
- **South Africa needs to adapt to climate change:** Sustained warming and increasing rainfall variability over the next two to three decades will have adverse effects on the economy in the absence of effective adaptation responses.
- **Climate change threatens development:** The projected adverse effects of ongoing climate change are likely to threaten the achievement of urgent national development goals and efforts to address historical inequities. Resource scarcity threatens a thriving economic sector.
- **The poor are most vulnerable to climate change effects:** The impacts of climate change will have a disproportionate effect on the poorest in society (both rural and urban), amplifying existing social inequalities.
- **The NAS will give South Africa an advantage:** Planning for climate change ensures that South Africa is in a position to leverage opportunities, and respond to the risks that arise due to changing climatic conditions and enhance its global competitiveness.
- **Climate change presents investment opportunities:** The scale of the new funding flows to support adaptation provides a unique opportunity to both ensure climate resilience and achieve development goals.

- **The need for integration and collaboration:** Sectoral and integrated cross-sectoral approaches are essential for building resilience across society, and provide an opportunity for better return per Rand.
- **Linkages between adaptation and mitigation are increasingly vital:** This is because there is an intensified international focus on keeping global warming below 2°C, and therefore adaptation responses need to be cognisant of their mitigation implications. At the same time, the adverse effects of climate change on resource availability could limit energy development options. An adaptation and mitigation strategy requires integrated planning.

Communication and Raising Awareness: NAS Strategic Priorities

Beyond government initiatives to develop climate resilience, people need to become conscious of their role in contributing to and safeguarding against climate change. This requires behavioural change. Growing awareness and generating knowledge in social groups, organisations and institutions about vulnerability, and the effects of and adaptation to climate change, are central to building the individual and institutional capacity needed for effective adaptation planning and implementation.

Campaigns and public awareness programmes are needed to steadily increase public participation in adaptation activities. There is a need to mainstream climate change knowledge into education and training curricula at every level of formal education in South Africa. It should form part of the broader framework of education on sustainable development, be interdisciplinary and aim to equip South African citizens to reorient society and the economic system towards climate resilience and sustainability.

10.2 Capacity-Building and Training

The pinnacle of international governance on climate change, the Paris Agreement, emphasises the need to build global adaptation capacity, and the IPCC highlights capacity-building as a priority for developing countries. South Africa's NDP articulates the need for skills-building in regard to developing resilience to climate change. It also notes that building resilience rests on lowering poverty and inequality levels, improving education and healthcare services, creating jobs and enhancing the integrity of ecosystems.[iv] To this end, the plan states that national, provincial and local government need to identify and implement appropriate policies and measures.[v] This emphasis on strengthening the individual and institutional skills base is mirrored in the NCCRP, the Environmental Sector Skills Plan and the LTAS sector reports. It is also indicated in South Africa's provincial and local climate change strategies.

Owing to the fact that adaptation also provides an opportunity to develop and improve livelihoods, this strategy reaffirms this need, but explicitly calls for training and capacity-building that help decision-makers and implementers better understand the linkages between climate change and socio-economic development, and how to best align understanding and action in initiatives. This is critical for building resilience.

Public-sector capacity needs to be strengthened, particularly in local government. This capacity includes staffing, training, access to decision-support and information tools, and dedicated budget lines for climate change. Government needs to equip principal adaptation actors with the necessary technical and information capacity, and the skills to build and integrate resilience into broader socio-economic development activities. In particular, training and capacity-building for adaptation must attend to:

- Training public-sector employees at all government levels to better understand climate change adaptation and the connections to socio-economic development;
- Enhancing and further capacitating institutions and networks that are already focused on climate change adaptation and development goals;

- Building capacity to develop adaptation projects that directly respond to identified climate risks and vulnerabilities; and
- Creating clear guidelines for public officials on integrating climate change adaptation and socio-economic development planning and implementation.

A1.1 Evidence of Climate Change in South Africa

There is ample evidence of national and local changes in the temperature and rainfall climatology of South Africa over at least the past five decades, based on several analyses of the weather station data of the South African Weather Service (SAWS) and the Agricultural Research Council, and internationally developed and maintained climate data sets such as those of the Climatic Research Unit in the United Kingdom. The findings described in Section 4 are based on material summarised in South Africa's Third National Communication to the UNFCCC.

Temperature Trends

Studies of historical climate trends have been steadily increasing during the last decade, given the increasing concerns about anthropogenically induced global warming and climate change. For the African continent, studies are indicative of drastic increases in surface temperature occurring over the last five decades. Warming trends across southern Africa have tended to be up to double the global average over the past four to five decades.

For South Africa, studies of historical temperature trends are indicating that South Africa has been warming significantly over the period 1931-2015. The strongest warming trends have been observed in the drier western parts of the country (North Cape and Western Cape) and in the northeast (Limpopo and Mpumalanga, extending southwards to the east coast of KwaZulu-Natal) - where the observed rate of warming has been 2 °C per century or even higher - more than twice the global rate of temperature increase.

Rainfall Patterns

The results in the trends of annual rainfall performed for the period 1921-2015 for South Africa show a positive trend in annual rainfall totals over the central southern interior, extending to some extent to the north. Negative trends in rainfall were recorded over the northern parts of the Limpopo Province. Otherwise, the recorded trends in annual average rainfall totals are largely statistically insignificant over the remainder of the country even though the distribution may be changing.

For most seasons there were no large-scale spatial coherence in statistically significant trends for seasonal rainfall totals. However, the positive trends in annual rainfall totals over the southern interior were reflected mostly in the summer rainfall trends, which is the main rainfall season for this particular region. The decreasing trends in annual rainfall over Limpopo, on the other hand, appeared to be largely the result of decreasing rainfall trends in autumn.

Extreme Events - Floods, Drought and Heat Waves

There is evidence that extreme weather events in South Africa are increasing, with heat wave conditions found to be more likely, dry spell durations lengthening slightly and rainfall intensity increasing. It must be noted that until 2015/16, South Africa had largely avoided adverse effects of El Niño conditions since 1991/92. Above-average rainfall over the past two decades has limited extreme drought conditions in South Africa and the region. As a result, flooding and storm conditions have featured more prominently as extreme events than drought until 2014.

A1.2 Projections of Future Climate in Africa

Climate change is projected to impact drastically on the African continent during the 21st century under low mitigation futures (Niang et al., 2014). African temperatures are projected to rise rapidly, at 1.5 to 2 times the global rate of temperature increase (James and Washington, 2013; Engelbrecht et al., 2015). Moreover, the southern African region and Mediterranean North Africa are likely to

become generally drier under enhanced anthropogenic forcing, whilst East Africa and most of tropical Africa are plausible to become wetter (Christensen et al., 2007; Engelbrecht et al., 2009; James and Washington, 2013; Niang et al., 2014). More uncertainty surrounds the projected climate futures of West Africa and the Sahel.

Regarding extreme weather events, for the African region, over Tanzania and Kenya, more large-scale flood events may plausibly occur should the future climate regime be characterised by a higher frequency of occurrence of strong El Niño events. Intense thunderstorms are plausible to occur more frequently over tropical and subtropical Africa in a generally warmer climate (e.g. Engelbrecht et al., 2013). More uncertainty surrounds the climate futures of West Africa, the Sahel and the Horn of Africa, particularly within the context of how climate change may impact on the occurrence of mega-droughts over these regions.

Regarding extreme weather events, for the southern African region, generally drier conditions and the more frequent occurrence of dry spells are plausible over most of the interior (Christensen et al., 2007; Engelbrecht et al., 2009). Cut-off low related flood events are also projected to occur less frequently over South Africa (e.g. Engelbrecht et al., 2013) in response to a poleward displacement of the westerly wind regime. Tropical cyclone tracks are projected to shift northward, bringing more flood events to northern Mozambique and fewer to the Limpopo province in South Africa (Malherbe et al., 2013).

A1.3 Projections of Future Climate in South Africa

Temperature

A key feature of the projected climate change futures of South Africa is that temperatures are to increase drastically under low mitigation. For the far-future period of 2080-2099, temperature increases of more than 4 °C are likely over the entire South African sub-continent, with increases of more than 6 °C plausible over large parts of the western, central and northern interior regions. Such increases will also be associated with drastic increases in the number of heat-wave days and very hot days, with potentially devastating impacts on agriculture, water security, biodiversity and human health.

The model projections are indicative that a high mitigation pathway can still significantly decrease this amplitude of warming - most projections suggest that under RCP4.5, a modest-high mitigation pathway, temperature increases over the interior can be constrained to 2.5 to 4 °C. Nevertheless, it should be realised that South Africa is plausibly committed to relatively large increases in near-surface temperatures, even under high-mitigation futures.

Rainfall Change

Under low mitigation, it is also likely that the larger South African region will experience generally drier conditions. This pattern is projected robustly by GCMs and their statistical and dynamic downscalings, and is of great significance as it translates to: South Africa exhibits even under present-day climate a generally dry and warm climate - should this low mitigation future of significantly hotter and drier conditions materialise, it will greatly limit the available opportunities for adaptation.

It may be noted that under low mitigation, a minority of downscalings are indicative of rainfall increases over the central interior of South Africa, and/or over the southern interior regions and the Cape south coast. Moreover, extreme convective rainfall events are projected to plausibly increase over the interior regions under low mitigation, even in the presence of a generally drier climate. Under high mitigation, the projections are indicative of potentially very different rainfall futures for South Africa. Even under RCP4.5, a modest-high mitigation pathway, the projected pattern of drying is significantly weaker. In fact, a fairly large number of projections are indicative of generally wetter conditions over the central and eastern interior regions, whilst the remaining projections remain indicative of generally drier conditions.

Extreme Events

The incidence of extreme events generally provides a much-needed level of resolution in understanding of climate futures, as such events go beyond understanding the averages. The repercussions of such, including their costs, is generally felt for longer periods of time. In the case of South Africa, dry spells, flood events, heatwaves and high fire danger days are expected to increase compared to a base period of 1971-2000. On the other hand, intense thunderstorms and cold snaps are expected to decrease. This analysis is based on the INDC technical report (CSIR, 2015).

In respect of dry spells, these are expected to increase under both low and high mitigation scenarios for the period 2021-2050, a minority of projections indicative of slight decreases in dry spell length over the central interior. In respect of flood events, rainfall events of 20 mm or more occurring within 24 hours over an area of 50 x 50 km^2, for a period of three consecutive days or longer rarely occur over South Africa - most regions on the average experiences less than one of these events annually. The largest frequencies of large-scale flood events are simulated to occur along the east coast and eastern escarpment regions of South Africa. Increases in heavy rainfall events are, however, plausible to occur over the central interior and north-eastern parts of South Africa under low mitigation.

Heat-waves are rare events in terms of southern Africa's present-day climate, with most regions experiencing less than five of these days per annum. In association with drastically rising maximum temperatures, the frequency of occurrence of heat-wave days is also projected to increase drastically under climate change, with increases of more than 8 days per year over large parts of the central interior of South Africa, whilst minimal in the coastal regions. In respect of high fire danger, over the northern parts of the Northern Cape, more than 160 of these days occur annually, on the average. However, drier regions effectively have a very low burning potential due to the sparse vegetation. More relevant are the eastern and southern parts of the country, which under present-day climate experiences less than 20 high fire-danger days per year, however are projected to increase with as many as 10-30 days per year in the forested regions of Mpumalanga, Limpopo, the Western Cape and Eastern Cape for the period 2020-2050.

Over the east coast and eastern escarpment regions, and in the mountainous regions of the southwestern Cape, more than 10 intense thunderstorm events occur annually, on the average. Consistent with the projected decreases in rainfall, intense thunderstorm events are projected to decrease in frequency over most of South Africa under low mitigation, for the period 2021-2050 relative to 1971-2000, with some ensemble members project increases in intense thunderstorm events over most of eastern South Africa, with all ensemble members projecting an increase in intense thunderstorm events over northeastern South Africa. Intense thunderstorms are often also the cause of lightning, hail, damaging winds and flash floods. Cold snaps typically occur when a cold front move deep into the interior of South Africa, transporting sub-Antarctic air inland. Cold-snap days under present-day climatological conditions occur most frequently (about 5-8 days per year) over the central interior regions of South Africa. These are expected to decrease by 2-3 days per year over the central interior regions of South Africa for both low and high mitigation scenarios.

A1.4 Broad Impacts of Climate Change on South Africa

The changes in the climatological regime and the incidence of extreme events have a direct relationship with impacts. This is an important aspect in climate change adaptation, as the changes in climate by themselves do not cause harm, rather it is how those affect natural processes, social functioning and economic activity. The analysis of broad impacts of climate change on the South African economy is primarily based on the 5th Assessment Report of the IPCC, and focusses primarily on primary and extractive economic sectors (see **Figure 5**).

KEY VULNERABILITY	BIOPHYSICAL	ECONOMIC	SOCIAL

Unreliable and uncertain access to water	x	x	x
Risk to agricultural productivity and livestock		x	x
Human safety from climate related extreme events			x
Poor service delivery in human settlements	x	x	x
Vulnerable energy system and infrastructure		x	x
Diminished labour force productivity through exposure and health		x	x
Supply and demand volatility of the market		x	
Carbon intensity and dependence of the economy		x	x
Ecosystem and conservation estate	x	x	x

Figure A1.1: Grouping of key vulnerabilities into social economic and biophysical impacts

Unreliable and Increasingly Uncertain Access to Water

South Africa already suffers from year to year rainfall variability, with uneven distribution of freshwater and groundwater resources. This situation will be exacerbated by climate change, heightening the uncertainty around access to water for domestic, industrial and agricultural use. As a water scarce country, South Africa's river systems and aquifers are highly used and developed, and many are already highly degraded. In addition, there is extreme inequality in access to water for productive purposes, arising out of the apartheid legacy. Furthermore, there is evidence of deteriorating water quality of South Africa's major river systems, water storage reservoirs and ground water resources - the core water supply systems that underpin social and economic development in South Africa.

Agricultural Productivity and Livestock at Risk

While the agricultural sector employs about 5 per cent of South Africa's labour force[vi] and contributes less than 3 per cent to the country's GDP,[vii] climate change effects in this sector have far-reaching development implications. Future climate risks to agriculture result primarily from increasing temperatures and increased variability of rainfall, which will affect the production of different crop types and livestock. Negative impacts would also be felt through increases in irrigation demand and through pests and diseases.[viii]

This means that certain agricultural activities and livelihoods may be rendered obsolete due to higher temperatures. For example, by mid-century it may become impossible to grow beans in South Africa, requiring bean farmers to relocate or abandon the crop and shift to more resistant crops like yams.[ix] According to findings in the LTAS studies, a handful of illustrative examples of economic risks from climate change in this sector include:[x]

- Areas towards the west of the country are likely to become less suitable for maize production;
- Areas suitable for viticulture in the Western Cape could be substantially reduced or shift to higher altitudes and currently cooler, more southerly locations;
- Projected reduced runoff could have important implications for the deciduous fruit industry in the Western Cape; and
- Areas damaged by chilo - a pest of major tropical crops and sugarcane - and codling moth - a pest of several high-value temperate fruits, including apples, pears, walnuts and quince - would increase substantially.

Threats to Human Safety from Climate-Related Extreme Events

Natural disasters will take a heavier toll on human life and property in future. Floods, droughts, veld fires, heat waves and tropical cyclones already affect the economy in direct and indirect ways. Such disasters are likely to be exacerbated - either in frequency, intensity or both - by climate change. This has serious cost implications for the South African economy, especially given that disasters have cost the country significantly more in the years since 2000 than in prior decades. For example, fire damage to the forestry sector has been in the order of USD 3-9 million in the period of 1980-2002, however since then, the losses have been in the range of USD 6-52 million since then going to 2010. The increase in cost is primarily driven by the acreage damage during fires, which has increased from a minimum of 5000 ha to 9000 ha, with the maximum burn area prior to 2002 being 20,000 ha compared to 70,000 ha thereafter.

Poverty and Poor Service Delivery in Human Settlements

The long-term implications of apartheid era planning in South Africa which created fragmented urban communities and increased vulnerabilities of rural and coastal settlements is being experienced by the current generations. Poverty is an underlying root cause of vulnerability for all the different human settlements. High population density, lack of extensive infrastructure, use unsuitable construction materials, inadequate service provision, susceptibility to floods and fire and lack of resources, funds and insurance to repair damages that occur from weather events are among factors making informal urban settlements highly vulnerable to climate change.

Rural communities are already highly vulnerable to the current climate variability and in particular extreme weather events and variable water supply. A high reliance on rain-fed agriculture exposes these areas directly to the impacts of current annual variability in rainfall and water scarcity which adversely affects crop yield and quality. Coastal settlements face financial vulnerability due to loss of real estate, decreased value of beachfront properties, decreased tourism revenue and damaged infrastructure (DEA, 2013).

Vulnerable Energy Systems and Infrastructure

South Africa has recently experienced shortages in power supply, chiefly due to aging, management and inadequate electricity infrastructure. While efforts to address these challenges are being made, the effects of climate change may create future energy shortfalls. More than 90 per cent of South Africa's electricity comes from thermal power plants (coal-fired generation). Both coal mining and coal-fired power generation are extremely water-intensive activities.[xi] In a future where climate change intensifies South Africa's water stress and creates even greater pressure on limited water resources, water use may have to be prioritised for the domestic and agricultural sectors over other users. This would put the country's energy security at risk unless the energy sector adapts to this uncertain future. Furthermore, energy and other public infrastructure may face the growing challenge of damage and loss arising from more frequent and intense extreme weather events.

Renewable energy aims to mitigate against climate change, however, renewable energy is at the same time vulnerable to climate change. The concern over renewable energy's vulnerability to climate change should be expected as the sources of some types of renewable energy, notably hydropower, solar photovoltaic (PV) power, and wind power, are dependent on and affected by climate conditions. There is, therefore, a need to better understand the possible effect of the projected changes in climatic variables so as to inform the designs of renewable energy with the aim of reducing their susceptibility as energy system damages extend beyond physical systems into social and economic impacts.

Diminished Labour Force Productivity

South Africa is extremely reliant on its strong human capital. Climate change, however, represents a threat to the productivity and health of the country's labour force. A range of stresses may diminish

labour capacity, particularly the health impacts of climate change. Climate can impact health either through direct exposures (e.g. floods, increases in temperature), or through indirect exposures (e.g. changes in climate impact distribution of disease vectors). For many climate-sensitive health risks, pre-existing conditions can make a person more vulnerable. For example pre-existing cardiovascular disease have been found to make people more vulnerable to heat stress.

Supply and Demand Volatility and Shocks

The combination of multiple climate change effects (both within and across different sectors) could create supply-side uncertainty for some industries and businesses whose raw materials or inputs (agricultural products, water, energy) may be negatively affected by climate change. This disrupts supply chains. At the same time, if consumers are increasingly stressed by climate change and feeling the effects on their livelihoods, this may reduce consumer spending as more income is spent on security nets, such as insurance, creating demand-side volatility.

The country's reliance on coal and carbon-intensive industries like mining will make it particularly vulnerable to changes in global carbon and trade regimes. As one of the top 20 GHG-emitting countries in the world,[xii] South Africa will face consequences in a carbon-constrained global economy, including possible export restrictions and border controls. The prospect of a global low-carbon future, and the implications this has for the South African economy, is another reason why the country's economic model needs to become more adaptable, flexible and resilient.

Ecosystems and Conservation Estate

All South African biomes - those within and outside the protected areas - are facing non-climatic pressures which will directly and indirectly affect conservation and ecosystem services delivery, notably water and grazing; and ecosystem processes, such as wildfire. Examples, of non-climatic pressures include invasive plants, bush encroachment, land use changes and changes in fire regimes amongst others.

There is now increasing evidence that climate change will exacerbate the effect of these pressures on ecosystems with direct consequences, in particular for the nature-based tourism industry and livestock agriculture. For example, the expansion of invasive plants could reduce the integrity of all South African biomes by reducing indigenous species; while bush encroachment greatly affects rangeland productivity. Increased intensity and frequency of fires and more "out-of-season" fires will affect fire regime, which are essential for sustaining some natural ecosystems.

To understand the broad impacts of climate change, the international scientific community has summarised a significant body of information on observed risks, impacts and vulnerabilities as a result of climate change, but there is a major gap in information on this topic at a national level in South Africa. As a result, South Africa has few demonstrable examples of the effects of long-term climate trends. The most comprehensive analyses have been carried out in natural and semi-natural terrestrial and marine ecosystems. Both reveal some trends, but they are also highly complex ecosystems, which challenge attribution to any single cause. SAWS and the NDMC are synthesising observed climatic conditions risks, their recent trends and their impacts. In addition, several national scientific facilities and institutes gather data on trends in climate-affected sectors. The South African Environmental Observation Network is building a national network of observation nodes to monitor a range of environmental variables and, increasingly, social variables over the long-term.

A1.5 Socio-economic Dimensions of Climate Change in South Africa

The anticipated changes in weather patterns, hydrological cycles, oceanic circulation systems and sea level are expected to lead to changes in biodiversity, the supply of renewable natural resources, agricultural productivity, and increases in natural disasters such as heat waves, floods, drought and

storms. All of these impacts would be felt at all societal and economic levels, with poor communities disproportionately affected.

Add to these, the other interrelated factors like the high economic dependence on climate-sensitive sectors, the lack of service delivery which has led to numerous protests in recent years in many municipalities, rising unemployment and poverty, the spread of HIV/AIDS, looming water shortages, and access to energy and environmental degradation, the South African society faces many challenges. Climate change is likely to exacerbate these challenges and will increasingly stretch the resources available to local, provincial and national governments and their ability to fulfil their mandates. In a country where many people are poor and where levels of inequality are high, these effects of climate change are critical challenges to development. Urban migration will also be affected by the impacts of climate change on rural areas, as extended drought leads to repeated crop failure, impacting on livelihoods and resulting in job losses and increased food insecurity.

In South Africa, the understanding of long-term impacts is not well developed. For example, most medical facilities collect a range of data on human well-being and health trends, and the DEA and the Department of Health are working together to maximise opportunities to analyse the data. Although university-based institutions do not frequently conduct studies to monitor long-term trends, the Wits Rural Facility has gathered data on social well-being in a rural area since the early 1990s and the South African Bird Atlas Project has gathered data on observed changes in the number of wild bird species since the late 1980s. Several industries, including the insurance industry and agriculture, gather data. Unfortunately, it is not always freely available for analysis and synthesis. As a result, South Africa does not yet have an integrated view of these trends, but there is great potential to integrate the data using a national system, such as the South African Risk and Vulnerability Atlas.

The strongest evidence of long-term climate change effects is found in natural ecosystems. For example, coral reef bleaching in the tropical coastal waters of northern KwaZulu-Natal is increasing, and the geographic ranges and/or timing of migration in migrating wild birds and coastal marine fish species are shifting. Another strongly supported and well researched trend is the increasing encroachment of woody vegetation (shrub and bush encroachment), possibly enhanced by increased shrub and tree growth as a result of carbon dioxide fertilisation. This encroachment could have major effects on hydrology, livelihoods and biodiversity. In the agricultural sector, crops sensitive to temperature may have shown early responses to the effects of climate change, but producers have already addressed these by, for example, using shade netting and evaporative cooling, or shifting to alternative crops.

South Africa's Second National Communication under the UNFCCC calculated that extreme events in the country had a financial cost of about R1 billion a year between 2000 and 2009, although it was estimated that this amount could be around twice as high due to under-reporting. Since then, the National Disaster Management Centre and its provincial nodes have begun gathering and reporting data on the economic and financial impacts of extreme events. Data on a wide range of impacts are available for at least three provinces, i.e. the Western Cape, Mpumalanga and KwaZulu-Natal.

ANNEXURE 2: CONTEXT IN WHICH THE NAS IS BEING DEVELOPED

This section seeks to provide the context in which the NAS is being developed, particularly focusing on aspects pertaining to climate change adaptation planning and implementation. The assessment, albeit not comprehensive, identifies some of the key considerations that the NAS should take into account.

A2.1 Political

Institutional arrangements in the continent are primarily based on the African Union (AU) level coordination where the Conference of African Heads of State and Government on Climate Change (CAHOSCC), at Head of State and Government level, is the highest political body, which also transacts on behalf of the continent in negotiations and solicitation of support from donor countries. The African Ministerial Conference on the Environment (AMCEN) is the ministerial level that supports the work of CAHOSCC and provides oversight to the climate change programmes in the continent such as the Africa Adaptation Initiative or the Climate for Development in Africa Programme (ClimDev-Africa). Recently, other ministerial bodies such as the African Ministerial Conference on Metrology (AMCOMET) and the African Ministers' Council on Water (AMCOW) have been increasingly coordinating their efforts towards climate change action.

In the region SADC, the ministerial council and summit of Heads of State and Government drive the regional agenda through climate change strategies, and other regional cooperative initiatives. Some important bodies in the region include shared water resources, such as the Orange-Senqu River Commission (ORASECOM) with other bodies such as the Southern African Customs Union (SACU) providing a platform from which a climate change response can be achieved and supported towards socio-economic development. The NAS should provide guidance on how the interaction of national strategies are supported, and how they, in return, support the regional and continental initiatives.

In South Africa, the Department of Environmental Affairs is the focal point for climate action, as such responsible for the development of the policy and legislative context. In that respect the department published a National Climate Change Response policy in 2011, and has coordinated the development of Long-Term Adaptation Scenarios in 2015 as well as supporting various sector departments in developing sector adaptation plans. However, noting the cross-cutting nature of adaptation, and the variety of sectors and players necessary to build resilience to the country, several government departments have a responsibility to contribute to climate resilience, in line with their mandates. Climate change has received political attention in the NDP, and the country's Intended Nationally Determined Contribution (INDC), which is a commitment to climate action beyond 2020.

A2.2 Economic

It is now well-established that in South Africa climate change is projected to affect almost all sectors directly, especially through damaging extreme weather events in the short-term, disruptions in water and food security, adverse effects on human settlements and human health in the short-to medium-term, and ecological and biodiversity impacts in the medium-to long-term. In the context of the socio-economic status quo of South Africa, this makes climate change in South Africa a poverty and development issue. The government of South Africa is acutely aware of the immense challenges it needs to overcome to build a more inclusive society. Its vision and the priorities are outlined in the 2030 National Development Plan, which outlines the development pathway for South Africa, thereby providing long-term perspective to guide the country's development trajectory (RSA, 2011).

Climate change threatens to disrupt the conditions under which a wide range of goods and services, that are important to economic well-being, are produced and consumed. There are two main likely effects of climate change on international trade. First, climate change may alter countries' comparative advantages and lead to shifts in the pattern of international trade. This effect will be stronger on those countries whose comparative advantage stems from climatic or geophysical

reasons. For example, countries that are more reliant on agriculture may experience a reduction in exports if future warming and more frequent extreme weather events result in a reduction in crop yields. Second, climate change may increase the vulnerability of the supply, transport and distribution chains upon which international trade depends.

International economic studies that have simulated how trade might help reduce the cost of adapting to climate change have focussed on the agricultural or food sectors. Their results illustrate the importance of international trade in promoting interregional adjustments in production and consumption and hence, in lowering the costs from climate change; some underscore the importance of reducing or eliminating trade-distorting measures, such as subsidies, so as to make international trade a more effective tool for adapting to climate change.

There is a need to deepen the understanding of the interaction between adaptation to climate change, international trade and terms-of-trade effects for the South African economy. Also, more information is needed to better understand the means by which international trade can assist the South African economy, a country whose integration into the global economy is depended on their participation in international production chains, to adapt to changes which may occur in the inter-regional location of trade-exposed sectors as a result of climate change.

The NAS recognizes that climate change has become a reality of the present and has ceased to be a problem of the future, and that finance is necessary to fund activities that save lives and property, and enhance human dignity by making significant investments to protect people better from climate. The primary channels used for the delivery of public adaptation finance from developed to developing countries include adaptation-marked ODA, the Pilot Program for Climate Resilience, the Least Developed Countries Fund and Special Climate Change Fund, the Adaptation Fund and the Green Climate Fund.

At the international level, negotiations have focussed on the meaning of the notion of responsibility of developed countries to provide support for adaptation (and mitigation) measures in developing countries and on how support for adaptation interventions should be delivered (control over adaptation decision-making - that is to say, adaptation finance governance). Specific issues typically raised under the UNFCCC negotiations concerning adaptation finance are, amount for adaptation finance (mobilizing resources significant enough to tackle adaptation to climate change and sustainable development). Furthermore, the question of balancing funding for adaptation needs with mitigation action, how to ensure that adaptation funding is additional to existing aid budgets, the acceptability of loans within a logic of compensation for climate damages compared to grants, and stimulating adaptation technological innovation are receiving attention.

Other issues have included fund governance – the fundamental question of who should be deciding how available funds are allocated and for what purpose – as well as the accessibility of funds, independence from traditional development actors such as the Global Environment Facility, and representation in adaptation decision-making. Recognizing international debates on adaptation, the NAS places emphasis on the actual effects of adaptation finance, at the country and local level, that supports adaptation interventions conceived and implemented along the same lines as development.

A2.3 Social

South Africa has a population of about 54 million people with a population growth rate of almost 1 per cent, where the majority lives in urban settlements and with urbanisation growing at a rate of 1.6 per cent. This profile has strong implications to development options in light of climate change, as this informs the areas of future demand for housing, as well as basic services such as water and sanitation. The change in population distribution also has implications for the type of disasters; for example crop failure is more relevant to rural settlements, whereas flood and fire risks are more likely in informal urban settlements.

The legacy of landlessness and previous spatial development policies has a bearing on the types of settlements that currently dominate in South Africa. As 2013, about 77 per cent of households lived in formal dwellings with informal dwellings making up about 14 per cent, with the rest being traditional housing. Albeit small, informal housing has increased which could be due to urbanisation. However, households in formal dwellings have also been on the rise, which can be attributed to the government housing programme. South Africa's human settlements face significant challenges beyond the projected effects of a changing climate, which will compound existing challenges. The human settlements sector, therefore, is a crucial national adaptation focus.

The structure of the economy relies heavily on low skill jobs. Even though the country has a high literacy rate of almost 95 per cent, the school life expectancy, which include tertiary education is only at 13 years, suggesting a high portion of the population having no post-matric qualification. In terms of climate change, this means the country will be dependent on its natural resource base for economic development, which is subject to vagaries of climate change, hence a disproportionate impact of change and variability.

A2.4 Technology

The understanding of what constitutes adaptation technology has been elusive in the international arena, particularly as most technologies such as building a dam, selection of drought-resistant varieties, population and land rehabilitation can be seen as integral part of development. The driver for the implementation of certain initiatives is therefore not always clear, even though climate change considerations can either trigger or include incremental costs of such development activities. Technology development and transfer have formed part of the international regime in respect of adaptation, and operational definitions of adaptation technology are emerging, albeit through practise rather than in a scientific manner.

The Climate Technology Centre and Network (CTCN) of the UNFCCC is the leading agency in climate change adaptation technology, with a focus on technical assistance, creating access to information and knowledge on climate technologies, and fostering collaboration amongst stakeholders that include academia and the private sector. Despite the difficulties of arriving at adaptation definitions, several projects have been supported by the CTCN, ranging from conservation tillage in the agriculture sector, to irrigation methods, to early warning systems and hard infrastructure in coastal zones amongst others. Currently, South Africa has a technical assistance project in KwaZulu Natal (KZN) focussing on the identification of technologies and stimulation of their deployment for both energy and water resources through a Technology Needs Assessment.

Even though technology alone will not be able to solve adaptation challenges, it is likely to play an important role. As a result of the role of technology in adaptation and the importance of international collaboration for climate change, technology transfer for adaptation is a critical. Adapting to climate change may need a community of the society to employ different forms of technology, whether "hard" forms, such as new irrigation systems or drought-resistant seeds, or "soft" technologies, such as insurance schemes or crop rotation patterns. Ideally, they could use a combination of hard and soft technologies, as with early warning systems that combine hard measuring devices with soft knowledge and skills that can raise awareness and stimulate appropriate action.

Farmers have taken advantage of technological advances to better cope with arid environments. Future climate change will simply exacerbate these events, altering their scale, duration or intensity. The global climate system has always confronted human societies with extreme weather events and in many respects future climate change. They design an appropriate response that is not only technically feasible but that is also consistent with the country's development objectives. Many date back hundreds of years. Local communities have, for example, used traditional technologies to cope with regular flooding by building houses on stilts, and many communities continue to do so, even if they use more modern materials such as concrete pillars or corrugated iron roofs.

Other emergent approaches such as Ecosystem Based Adaptation have gained traction, not only as an approach, but as a technology in its own right. The approach focusses on sustainable management of multi-functional landscapes with a view of building resilience in vulnerable communities through the conservation and protection of ecosystems which deliver goods and services. Understanding the diversity of adaptation action which can be the building of a dam or a community project to support soft technologies, it is important for the NAS to recognise the importance of flexibility and building-in of approaches that are consistent with the principles of the NAS. The key considerations for South Africa going forward is that engagement in adaptation technologies should meet some key policy criteria, such as the need for cost-effectiveness, environmental sustainability, culturally compatibility and socially acceptability.

A2.5 Legal

At the highest level, legal authority in South Africa to take action on climate change derives from the Constitution. South Africa's Constitution (1996) emphasises the right to a healthy environment. The Constitution also lays out principles of cooperative governance between the three spheres of government. It defines the areas of provincial and local government competence (in terms of subject-matter jurisdiction), and delineates the areas where provinces have the authority to pass and administer laws (Schedules 4 and 5, parts A) and where local governments have such authority (Schedules 4 and 5, parts B).

The National Environmental Management Act aims to provide for co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment, and supporting institutions that will promote cooperative governance and procedures for co-ordinating environmental functions. The principles of the Act apply to all organs of state, and serve as the general framework within which environmental management and implementation plans must be formulated, as such, including climate change. The Act has provided a significant platform on which to base climate change adaptation policy, particularly our National Climate Change Response Policy.

The Department is in the process of developing a Climate Change Act, which will provide a legal regime for adaptation planning, implementation and reporting in South Africa. The NAS as it being developed concurrently with the Act aims to provide both the *raison d'etere* for the Act, as well as provide substantive guidance on how the provisions of the Act can be discharged. As implementation of the NAS depends on the activities of other sector departments, it is important that the NAS responds to providing national climate change imperatives in the context of those mandates. Other players such as business and civil society, even though no legislative provisions in respect of climate change exist, the Climate Change Act is envisaged to define their role, as such the NAS will further elaborate those provisions. It is noteworthy that, despite lack of legislative provisions, business, for example, is already contributing to climate change adaptation through involvement in policymaking, investments in infrastructure, corporate social responsibility projects as well as through the voluntary disclosure initiative on water. The NAS should therefore provide the framework and guidance for expanding and scaling-up these activities. The NGO sector, on other hand, is very active in the policy space, as well as in community and grass-root interventions with communities.

Internationally, South Africa ratified the UNFCCC, and more recently the Paris Agreement. The Paris Agreement has far reaching provisions on adaptation than any previous legal framework. The Paris Agreement strongly encourages Parties to communicate their priorities, implementation and support needs, plans and actions. South Africa and other African countries see this provision of the Paris Agreement as crucial in achieving a balanced treatment of adaptation with mitigation, as such, an imperative that should be communicated as part of its NDC. This is an obligation that the country has to communicate every five years. As part of the transparency mechanism of the Agreement, the country is further expected to report on its adaptation activities every two years in terms of support received, as well as on its adaptation activities every four years. The reporting provisions are being

negotiated further, so as compliance, where there is scope for a periodic review of how the country is meeting its obligations under the Paris Agreement and the UNFCCC.

The NAS therefore, aims to translate the policy guidance and obligations contained in the Paris Agreement into clear guiding principles for South Africa. It further establishes an implementation framework that will help the country meet both its national development objectives and provisions of the Climate Change Act, as well as its international obligations.

A2.6 Governance

National Government

Each elected national government in South Africa develops a five-year plan - in line with its term of office - to deliver on its development agenda. The current plan, the Medium-Term Strategic Framework (MTSF) 2014–2019, includes several outcomes, each of which is given effect through a delivery agreement by the concerned line department. Outcome 10 of the MTSF sets a target of implementing climate change responses in six critical sectors. The associated delivery agreement identifies five sub-outcomes that support the implementation and effectiveness of a climate change response. These include outcomes of sustainable ecosystems and efficient use of natural resources, and sub-outcomes of (a) calling for an effective climate change mitigation and adaptation response; (b) enhanced governance systems and capacity; and (c) sustainable human communities.

Several of the other outcomes in the MTSF are also inextricably linked to social and economic resilience, and hence to climate change resilience (e.g. outcomes related to public health, food security and sustainable human settlements). In this context implementation of the NAS, and its revision need to be aligned to this government planning process to ensure integration into the national planning and implementation process.

Provincial Government

Similar to the national government, the provincial government department responsible for the environment in each province is tasked with leading its climate change response. This includes coordinating the climate change response of line provincial departments and other active provincial entities. To assist with this, most of the lead departments have established provincial climate change forums where provincial stakeholders can learn about climate change and coordinate their climate change responses. In case of the environmental competency, the link between provincial activities and national government is through MINTECH and MINMEC where the Director General and the Minister collectively plan for the implementation of priorities.

In terms of sector responsibilities, the water, mining, energy and fisheries sectors are the constitutional responsibility of national government. As a result, the provincial climate change response for these sectors is led by the provincial offices of the appropriate national department. Several other sectors are a concurrent responsibility of national and provincial government. As a result, provincial line departments exist for the following sectors: health, biodiversity, agriculture and forestry, disaster management, human settlements, infrastructure and transport.

Every province has a provincial environment department, which may also include other functions (e.g. economic affairs, development planning, tourism and agriculture). Each provincial administration designs its institutional arrangements for the environment in accordance to their needs and strengths. For example, one province may locate conservation with agriculture while another may locate conservation with environmental management and planning. Since climate change response capacity is extremely limited in the provincial sphere of government, a strong distinction is generally not drawn between mitigation and adaptation efforts in the provinces and provincial staff in the climate change sector work on both mitigation and adaptation.

Local Government

In 2016, South Africa's local government structure consisted of eight metropolitan, 44 district and 226 local municipalities, spread unevenly across the provinces. The municipalities are not homogeneous in their spatial, social or economic environments and are allocated into categories in accordance with the Local Government: Municipal Structures Act (1998). The national disaster management framework is a direct way in which municipalities are empowered to act on climate change and already have existing institutional arrangements. Under this, the Municipal Disaster Management Centre must develop a progressive risk profile for the municipality and integrate this into the IDP process to enable disaster risk reduction.

The broader mandate for local government to respond to climate change is rooted in South Africa's Constitution, because many critical actions required for climate change responses fall within the responsibility of local government. These include the provision of basic services (water, electricity, waste removal, sanitation and sewage infrastructure maintenance), road management, disaster risk management, and the provision of safe and healthy human settlements. These local government functions are highlighted in South Africa's Let's Respond Toolkit, which is geared towards enabling local governments to use existing authority to catalyse climate change resilience. The Let's Respond Toolkit has become an important tool to guide mainstreaming of climate change into the integrated development planning process at the local level. The Municipal Climate Change Support Programme has been rolled out through established forums and working groups at the municipal level, which are important platforms on which to build capacity and strengthen institutional structures around climate change.

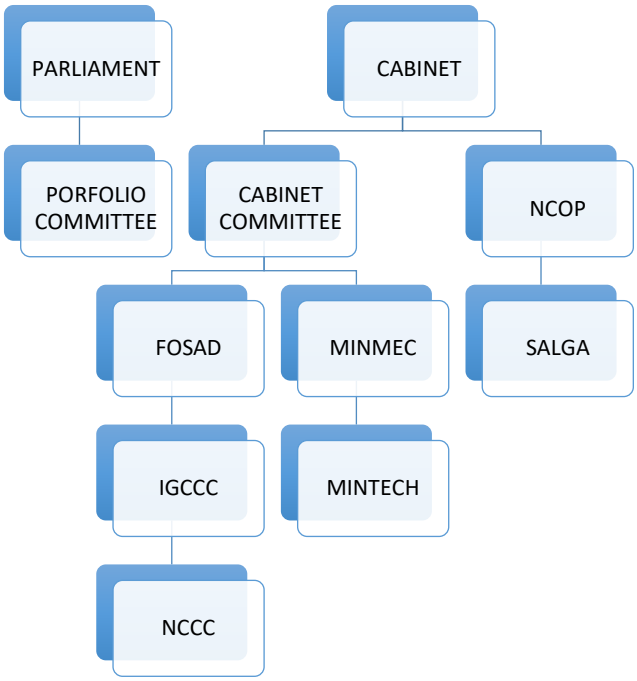


Figure A2.1: Schematic representation of climate change governance in South Africa

Climate change governance in South Africa is embedded in the national governance structure where there is an executive, legislature and judicial arms. The NAS is therefore a strategy for implementation by the executive following the legal prescripts from the legislature, in this case, what will be the Climate Change Act. As **Figure 4** demonstrates, the governance structure further includes, a National Climate Change Committee (NCCC) comprising of government departments and stakeholders that include civil society and business and the Intergovernmental Committee on Climate Change (IGCCC). Consultations in these is for a pre-requisite for policy recommendations to the Forum of South African Directors General (FOSAD) which in turn forwards policy recommendations to the Cabinet through appropriate Cabinet Committees. In light of the Paris Agreement and the commitments various

countries have to make towards the international community, a consideration of foras such as National Economic Development and Labour Council (NEDLAC) require consideration in governance going forward as they encompass various players in the economy including government, business, labour.

A2.6 Environmental

International environmental trends reveal early diverse impacts of climate change that raise concerns about regional and global sustainable development under a changing climate, where atmospheric CO_2 levels have now passed the significant 400- parts-per-million barrier. Rapid warming, amplified by El Niño conditions in 2015 and 2016, has removed any illusions that global warming trends have abated. Adverse effects, including lack of rainfall in some regions, excessive rainfall in others, novel diseases, ecosystem damage, crop failures and human impacts due to heatwaves, reveal a world already showing the human and socio-economic costs of inadequate preparation for climate change impacts.

Climate change is an urgent global priority. A large body of scientific studies has illustrated how climate change will lead to an increased frequency of extreme weather events, (triggering more intense storms, melting polar icecaps and glaciers and raising sea levels) and it is projected to have major effects on everything, ranging from agriculture to the spread of diseases (IPCC, 2014). Owing to increased scientific and political consensus, climate change has become a major political, economic, and social issue that has become institutionalised in global affairs as a top priority issue and is being discussed at major global fora on a regular basis.

The inextricable link between mitigation and adaptation is receiving recognition, with the Paris Agreement linking the temperature goal of 1.5° and 2°C to both the required mitigation effort and the resultant impacts as well as the associated costs. The NAS builds on this understanding in its expression of vulnerability assessments and impacts, as well as reporting where adaptation is assessed against temperature scenarios, including the one consistent with global mitigation effort. Globally, there is now an awareness that climate change spills over into other socio-economic areas and that it can no longer be dealt within the UNFCCC alone. Today, many global (multilateral) institutions are also prioritising it within their mandates so as to act because of the humanitarian and development effects of climate change.

Crucially, there is now significant financing to address mitigation and adaption. The growth of climate finance is an important trend in international relations as it means that developing countries have resources to adapt to and mitigate climate change. Specifically, funding for adaptation can bring in direct or indirect global benefits, such as better monitoring and prediction of climate change, improved modelling of climate impacts, research and development, for example, to improve drought and food-resistant crops.

Climate change impacts, such as severe drought, sea level rise, and shifting seasonal patterns, will affect people everywhere. The climate change risk is linked to extreme weather and loss of lives, failure of global-regional-national governance, unstable governments, interstate conflict, involuntary migration, urbanisation, failure of urban planning, amongst others. The most recent World Economic Forum Global Risks Report (2017) mentions that climate change ranks as one of the top three trends to shape global developments over the next 10 years, and remains one of the truly existential risks to our world. This report further mentions that unlike the threat of nuclear weapons or pandemic disease, climate change ranks among the highest in terms of likelihood as well as impact.

A2.7 Global

Both adaptation and mitigation are set out in the UNFCCC as responses to anthropogenic climate change. However, there has been a long-standing dichotomy in thinking and approach in the treatment of the two issues in the global policy and scientific fora. For example, early IPCC documents

paid minimum attention to adaptation, vulnerability or equity. Similarly, over the past two decades, the UNFCCC has been making slow but incremental progress in the treatment of adaptation.

The framing of adaptation in the UNFCCC negotiations has, over time, shifted from not seeing adaptive capacity as a global policy objective, to developing institutional aspects of delivering on adaptation (notably under the Bali Action Plan), to a focus on normative guidance to the international collective response (by the Adaptation Committee), then to provision of guidance to national actions, with no explicit provision for international responsibility in the implementation of the UNFCCC provisions (notably in the Cancun Adaptation Framework) (Ngwadla, X. and El-Bakri, S. 2016). In stark contrast, the Paris Agreement, so far the highest pinnacle of international climate change governance, places unprecedented importance on adaptation. Building on the momentum that came from the adaptation information that is contained in the country INDCs, the Paris Agreement has taken major steps forward towards placing adaptation in parity with mitigation in framing international policy responses on climate change.

The Paris Agreement (a) explicitly links adaptation to the mitigation goal of limiting global temperature rise to well below 2°C; (b) includes a long-term adaptation goal alongside the goal for mitigation; (c) calls for stronger adaptation commitments from countries, while recognising adaptation as a global responsibility; (d) is explicit about the multilevel nature of adaptation governance; (e) outlines stronger transparency (reporting) mechanisms for assessing adaptation progress; (f) commits countries to periodically (every five years) update and submit adaptation information (which should include countries adaptation priorities, implementation, and support needs) and this information will feed into a global stocktake progress to assess collective progress towards the objectives of the Paris Agreement; (g) balances the provision of overall climate finance between adaptation and mitigation; and (h) recognizes that public grants-based resources are especially important for adaptation, because it is more difficult to attract private investment.

The Paris Agreement has succeeded in building momentum and establishing a broad architecture for accelerating adaptation planning and action. If implemented effectively, as a collective, the obligations on adaptation that are contained in the Paris Agreement will lead to enhanced global adaptation action and the capacity to support it. The international regime makes provision for an Adaptation Committee which provides normative guidance to the UNFCCC process on adaptation, whilst several other institutional arrangements and processes under the finance, technology, transparency, and compliance mechanism are charged with supporting and/or delivery by a country like South Africa on its substantive and conduct obligations. Such processes include communication of an adaptation component of NDCs, and reporting through Biennial Update Reports (BURs) and National Communications, amongst others.

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