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National Business Initiative



A New Climate of Risk:

How South African Businesses are Adapting to Climate Change

2017



Network South Africa

Business Action for Sustainable Growth



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Acronyms

ARC	African Risk Capacity
BAAM	Business-Adopt-A-Municipality (now the <i>Partnership for Risk and Resilience</i>)
CCS	Carbon Capture and Storage
CO₂	Carbon Dioxide
COP	Conference of the Parties
CSAG	Climate Systems Analysis Group
CSIR	Council for Scientific and Industrial Research
DEA	Department of Environmental Affairs
DCoG	Department of Cooperative Governance
ERMP	Enterprise Risk Management Programme
FNB	First National Bank
GCMs	General Circulation Models
GDP	Gross Domestic Product
GHGs	Greenhouse Gases
IPCC	Intergovernmental Panel on Climate Change
LTAS	Long-Term Adaptation Scenarios
NBI	National Business Initiative
NCCRP	National Climate Change Response Policy
NDCs	Nationally Determined Contributions
NDP	National Development Plan
NFCS-SA	National Framework for Climate Services South Africa
RCP	Representative Concentration Pathway
SALGA	South African Local Government Association
SARVA	South African Risk and Vulnerability Atlas
SVA	Sustainability Valuation Approach
UCT	University of Cape Town
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WEF	World Economic Forum
WG	Working Group
WRI	World Resources Institute

Key Terminology

Adaptation	The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.
Adaptive capacity	The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.
Extreme weather event	An extreme weather event is an event that is rare at a particular place and time of year. Definitions of rare vary, but an extreme weather event would normally be as rare as or rarer than the 10th or 90th percentile of a probability density function estimated from observations. By definition, the characteristics of what is called extreme weather may vary from place to place in an absolute sense.
Impacts	The effects on natural and human systems of extreme weather and climate events and of climate change. Impacts generally refer to effects on lives, livelihoods, health, ecosystems, economies, societies, cultures, services and infrastructure.
Mitigation	A human intervention to reduce the sources or enhance the sinks of greenhouse gases.
Resilience	The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation.
Vulnerability	The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

Source: IPCC, 2014. *Climate Change 2014: Synthesis Report - Annex II: Glossary*.

Executive Summary

Background and report overview

Climate change is a reality for business. The 2016 Global Risk Report identifies global water crises, and a failure to adapt to climate change, as two of the five global risks with the highest impact on the global economy (WEF, 2016). The scale of climate-related impacts is further supported by CDP Climate Change data, which indicates that around 95% of participating South African companies see risks associated with climate change as highly likely to materialise within the next three years.

This report describes a range of examples from profiled companies who are taking important steps to adapt to these climate risks. The NBI has drafted this report to offer industry a glimpse into these emerging practices, including where companies have been successful at integrating adaptation into their management practices.

The report describes:

1. The likely risks and impact of climate change for business in South Africa, as identified by participating businesses and company disclosures to CDP
2. The barriers organisations face in adaptation planning
3. Emerging practices from organisations that have already begun implementing adaptation responses
4. Recommendations and lessons learnt for organisations embarking on the adaptation journey

The report focuses on outlining *company* perspectives and known responses in relation to adaptation priorities. As such, the report should not be considered to be exhaustive, but rather, to provide a clear sense of how companies are thinking about and responding to the adaptation challenge in South Africa.

The impacts of climate change on business

Key climate change impacts that require adaptation responses include water shortages and drought, an increased frequency and severity of floods, an increased frequency of extreme weather events, rising food insecurity, public health problems and damage to infrastructure and ecosystems.

For business, these various climate change impacts are felt in four key reported areas, as follows:

- Concerns related to the decreased availability of raw materials, particularly in relation to agriculture, forestry and fisheries
- Risks to physical assets, including ports, pipelines, communication networks, mine infrastructure, transportation networks and electricity supply, as well as associated rising insurance costs
- The interruption of operations, particularly in relation to logistics, shipping, oil & gas, chemicals and retail environments
- The health and safety of employees and communities, including in relation to extreme weather events, fatigue related accidents and changes in disease vectors

Barriers to adaptation planning

Despite the threat that climate change poses to physical assets, health and safety and business continuity, adaptive responses undertaken by business are not without their constraints. Company respondents have identified five key barriers to implementing adaptation planning, namely:

1. Establishing the business case for adaptation planning, particularly where climate change is regarded as an environmental issue, rather than as a risk that could impact medium to long-term organisational survival
2. A lack of sector coordination and collaboration, which limits information sharing, regional adaptation planning and the achievement of economies of scale
3. The availability of locally relevant climate change data and tools, in particular the ability to access high resolution climate modelling data (both temporal and spatial) with known levels of uncertainty, in order to support decision making
4. Investment planning, and the difficulties associated with developing a sound financial case for spending on future anticipated risks
5. The need for stronger policy and legislative frameworks (as well as support and coordination mechanisms) to guide and enhance company adaptation efforts

Emerging practices of South African companies

A number of leading South African businesses have used innovative approaches to respond to climate impacts. These organisations have integrated adaptation planning into their existing risk management processes and supply chains and have identified significant opportunities to reduce costs. These companies have also built clear adaptation strategies based on robust data and established partnerships with their peers, the public sector and civil society.

Overall, these various business adaptation approaches can be located within the following four emerging practices:

- *Practice 1: Companies are not re-inventing the wheel.* The focus here is on good corporate governance of climate change and on integrating climate change into existing risk management systems
- *Practice 2: Companies have turned climate risks into opportunities.* This includes opportunities to strengthen customer, supplier and community relationships, as well as to develop new products and services
- *Practice 3: Companies are recognising the benefits of collaborative partnerships.* This includes the sharing of costs, expertise and resources to improve shared infrastructure, local capacity and disaster preparedness
- *Practice 4: Companies are making informed decisions.* The focus here is on undertaking climate-related vulnerability and risk assessments, including partnering with subject matter experts to understand company-specific climate impacts

Lessons learnt: the way forward for companies

Company respondents that have already implemented adaptation planning within their organisations have identified four key approaches to enhance their climate change resilience. These four key insights are outlined below:

- *Key insight 1: Leadership involvement and buy-in is key.* Senior leaders need to be convinced that addressing climate change will build business resilience and maintain long-term value, whilst providing new opportunities
- *Key insight 2: Early vulnerability stock take and assessments are important.* Organisations first have to understand the vulnerability of their operations, value chain, communities and surrounding environment. Framing this process as a business resilience exercise and using existing risk management frameworks allows for consistent interpretation and reduces the impact of climate sceptics
- *Key insight 3: Integrate climate change adaptation into core strategic business planning and management processes.* Traditional risk management processes can be adapted, rather than seeking new or parallel approaches. Climate risks and opportunities must also be translated into traditional business language, including their impact on growth and costs
- *Key insight 4: Engage, collaborate and partner.* Climate risks cannot be addressed by a single organisation. Enhanced engagement and partnerships between government, business and civil society are fundamental for an effective adaptation response

Conclusion

It is clear that a number of South African organisations have already incorporated climate change into their existing risk and continuity management processes. They have also identified solutions to reduce operational costs, use resources more efficiently, introduce new products and services and build resilience within their supply chains. They also continue to partner with their peers, government and civil society to strengthen their own resilience, as well as the resilience of the communities and environment that their businesses depend on.

While South African companies have made good strides in building climate resilience, there remains a long way to go for many businesses. Fortunately, certain companies have begun to take the lead in showing that climate resilience can build competitive advantage and lead to commercial opportunities.

Business now operates in a new climate of risk, with many companies already facing up to these climatic changes. Business is and must remain at the forefront of adaptation planning, including the financing and implementation of solutions to address a rapidly changing climate.

1 Introduction

“Climate change poses risks for human and natural systems”

– IPCC Working Group 2 Report

1.1 Background

1.1.1 Addressing climate change: mitigation and adaptation

Confronting the impacts of climate change can be categorised as two distinct responses: mitigation and adaptation. **Mitigation** can best be understood as the sum of all responses taken to ultimately **reduce greenhouse gases** (GHGs) and thus reduce the magnitude of climate change. Mitigation examples include the use of lower carbon emitting technologies and renewable energy, as well as the promotion of energy efficiency.

Adaptation, in contrast, recognises that a certain level of climate change is now unavoidable and aims to limit vulnerability to the effects of climate change. Adaptation **addresses the actual or expected impacts of climate change** through implementing processes and practices to better cope with both gradual and abrupt climate change.

In practice, adaptation responses include large-scale infrastructure changes such as building defences to protect low-lying areas against sea level rise, behavioural shifts such as farmers planting different crop varieties, businesses buying flood insurance and individuals using less water. Governance is also central to adaptation, as organisational planning, investment and decision making are required to factor in climate change impacts and adaptation responses.

While mitigation and adaptation measures are equally important in the fight against climate change, adaptation is a relatively newer area in terms of corporate response measures. As such, the National Business Initiative (NBI) has undertaken this report to map the adaptation response landscape in South Africa, both in terms of what is being done currently but also in terms of what is still needed.

1.1.2 The difference between adaptation and mitigation approaches

The Intergovernmental Panel on Climate Change (IPCC) indicates that: “**responding to climate change involves an iterative risk management process that includes both mitigation and adaptation**” (IPCC, 2007a:65). Fundamentally, addressing climate change therefore requires both mitigation and adaptation approaches.

While mitigation is as important in addressing climate change, this report focusses on climate change impacts, adaptation approaches and responses from a business perspective in South Africa. However, it is helpful to understand the difference between mitigation and adaptation and how these responses differ, as summarised in Table 1 below.

To differentiate between adaptation and mitigation, the IPCC provides some examples of each, from a sector-based perspective:

Table 1: Examples of sectoral mitigation and adaptation approaches

Sector/ Resource	Mitigation Approach	Adaptation Approach
Agriculture	<ul style="list-style-type: none"> • Improved crop and grazing land management to increase soil carbon storage • Restoration of cultivated peaty soils and degraded lands • Improved cultivation techniques and livestock and manure management to reduce methane emissions • Improved nitrogen fertiliser application techniques to reduce nitrous oxide emissions • Dedicated energy crops to replace fossil fuel use • Improved energy efficiency • Improved crop yield • Forests as carbon sinks - sustainable forest management 	<ul style="list-style-type: none"> • Adjustment of planting dates and crop variety • Crop relocation • Improved land management, e.g. erosion control and soil protection through tree planting • Improved crop and livestock disease control
Energy	<ul style="list-style-type: none"> • Improved supply and distribution efficiency • Fuel switching from coal to gas • Nuclear power • Renewable heat and power (hydropower, solar, wind, geothermal and bioenergy) • Combined heat and power; early applications of carbon dioxide capture and storage (CCS) • CCS for gas, biomass and coal-fired electricity generating facilities • Advanced nuclear power • Advanced renewable energy, including tidal and wave energy, concentrating solar, and solar photovoltaics 	<ul style="list-style-type: none"> • Strengthening of overhead transmission and distribution infrastructure • Underground cabling for utilities • Reduced dependence on single sources of energy
Health	-	<ul style="list-style-type: none"> • Heat-health action plans • Emergency medical services • Improved climate-sensitive disease surveillance and control • Safe water and improved sanitation
Infrastructure	<ul style="list-style-type: none"> • Efficient lighting and use of daylight • More efficient electrical appliances and heating and cooling devices • Improved cook stoves, improved insulation • Passive and active solar design for heating and cooling • Alternative refrigeration fluids, recovery and recycling of fluorinated gases • Integrated design of commercial buildings including technologies, such as intelligent meters that provide feedback 	<ul style="list-style-type: none"> • Relocation • Seawalls and storm surge barriers • Dune reinforcement • Land acquisition and creation of marshlands/wetlands as buffer against sea level rise and flooding • Protection of existing natural barriers • Extreme weather shelters

Sector/ Resource	Mitigation Approach	Adaptation Approach
	<ul style="list-style-type: none"> and control Solar photovoltaics integrated in buildings Substituting clinker in cement 	
Transport	<ul style="list-style-type: none"> More fuel-efficient vehicles Hybrid vehicles Cleaner diesel vehicles Biofuels Modal shifts from road transport to rail and public transport systems Non-motorised transport (cycling, walking) Land-use and transport planning Second generation biofuels Higher efficiency aircraft Advanced electric and hybrid vehicles with more powerful and reliable batteries 	<ul style="list-style-type: none"> Realignment/relocation of transport corridors Design standards and planning for roads, rail and other infrastructure to cope with warming and drainage
Water	-	<ul style="list-style-type: none"> Expanded rainwater harvesting Water storage and conservation techniques Water re-use Desalination Water-use and irrigation efficiency

Adapted from: IPCC. 2007. Climate Change 2007: Synthesis Report (57, 60). [Online]. Available: https://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf

1.1.3 The Paris Agreement: Placing Mitigation and Adaptation on Equal Footing

While adaptation has not received as much attention as mitigation historically, the recently adopted Paris Agreement places mitigation and adaptation on an equal footing. The Paris Agreement, adopted in December 2015 at the 21st Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC), represents an important global landmark in combating climate change, and is historic in its relevance and applicability to both developed and developing countries.

The Paris Agreement requires nations to submit their intended efforts to achieve both mitigation and adaptation goals in the form of detailed Nationally Determined Contributions (NDCs). These NDCs are to be reported on annually by countries, and their level of ambition increased over time. A global stocktake will also take place every 5 years to track progress towards the collective achievement of the Paris Agreement, with an initial stocktake taking place in 2018 (UNFCCC, 2016).

According to the Paris Agreement, all parties ‘should submit and update periodically an adaptation communication on their priorities, implementation and support needs, plans and actions’ (UNFCCC, 2016). This requirement is primarily to be achieved through the NDC process, as well as through the related development of National Adaptation Plans.

The Paris Agreement opened for signature on 22 April 2016 at the UN Headquarters in New York. The agreement has been ratified (having passed the threshold of ratification by 55 countries, accounting for at least 55% of global emissions in October 2016) and came into force on 4 November 2016. South Africa ratified the Paris Agreement on 1 November 2016.

1.2 Report overview

1.2.1 Report contents and approach

As the impacts of climate change are increasingly felt and acknowledged as a risk to South African businesses, companies are responding with a variety of measures and approaches to address climate adaptation. This report focusses on specific examples from profiled companies who are taking bold steps to adapt to a changing climate. The NBI has drafted this report to offer South African industry a glimpse into these emerging practices, including practices common to companies who have been successful at integrating adaptation into their management activities.

This report describes:

- The likely risks and impact of climate change for business in South Africa, as identified by participating businesses and company disclosures to CDP
- The barriers organisations face in adaptation planning
- Emerging practices from organisations that have already begun implementing adaptation responses
- Recommendations for organisations embarking on this journey

The information contained within this report was gathered through:

- A survey sent to NBI member organisations
- 2014 and 2015 CDP Climate reporting data (individual company responses)
- Desktop research focussed on company annual reports and existing case studies¹
- Semi-structured interviews held with NBI member organisations spanning many years

Finally, it should be noted that this report focuses on outlining *company* perspectives and known responses in relation to adaptation priorities. As such, the contents of this report should not be considered to be exhaustive in nature, but rather, to provide a clear and practical sense of how companies are thinking about and responding to the adaptation challenge in South Africa.

1.2.2 We Mean Business and Private Sector Resilience

Understanding how companies respond to climate mitigation and adaptation opportunities and risks is a key part of the work of the international coalition [We Mean Business](#), a group of organisations working with thousands of the world's most influential businesses and investors. These businesses recognise that the transition to a low carbon economy is the only way to secure sustainable economic growth and prosperity for all. To accelerate this transition, We Mean Business has formed a common platform to amplify the business voice, catalyse bold climate action by all and promote smart policy frameworks.

The NBI is the regional partner to We Mean Business, providing important linkages with South African businesses and policy makers through years of experience working on climate change with the private sector. Climate change is a universal challenge but the risks and opportunities for business, as well as the appropriate policy responses, are always moulded by regional context. It is for this reason that We Mean Business has developed strong local partner networks including in Brazil, China, India and South Africa.

¹A number of case studies were extracted from NBI. 2011. South African Business Case Studies of Climate Change Action

As the South African regional partner of the We Mean Business network, the NBI represents many of South Africa's most prominent companies who have signed up to a range of commitments, pledging their strong support for a low-carbon future. For more information on the various company commitments, please click [here](#). One of the We Mean Business focal areas is private sector adaptation and resilience. It is for this reason that the NBI has developed this adaptation case studies report in collaboration with We Mean Business.

2 The adaptation challenge

2.1 The socio-economic impacts of climate change

“Climate change is not just an environmental issue; it is also a social and economic issue”

– Eskom

The physical consequences of a rapidly changing climate are serious, with increasingly negative implications for social and economic development (WRI, 2011). It is important to view the environmental consequences of climate change through economic and social lenses in order to comprehend the full spectrum of likely impacts.

Socio-economic factors such as service delivery challenges; water and energy infrastructure development constraints; increasing urbanisation and land use changes; as well as the poor quality of the current health and education systems within South Africa are amplified by a changing climate. Taken together, these factors will be compounded by climate change stressors, such as severe weather events, exacerbating inherent or entrenched vulnerabilities and inequalities.

The impacts of climate change that require immediate adaptation responses are summarised in Table 2 below. Global impacts are described first in the table below, following which more specific South African examples are briefly outlined for each risk category.

In reviewing the climate impacts below, it should be borne in mind that a number of impacts could be felt simultaneously by companies, whether directly or within their value chain, with compounding effects for company operations, employees and surrounding communities.

Table 2: Key climate change impacts requiring adaptation responses

Water shortages and drought	<ul style="list-style-type: none">• The IPCC reports that climate change will amplify existing stress on water availability in Africa (IPCC, 2014c)• Water shortages and drought will reduce agricultural and livestock productivity, increase fire hazards and reduce water available for human health and economic activity (WRI, 2011)• Drier future LTAS climate scenarios for South Africa predict reduced surface water availability (DEA, 2013)• The CSIR details how greater temperatures in South Africa will result in increased evaporation from dams. This will be combined with decreased rainfall over most of the country (CSIR, 2009)
Increased frequency and severity of floods	<ul style="list-style-type: none">• Due to sea level rise, coastal systems and low-lying areas will increasingly experience adverse impacts such as submergence, coastal flooding and coastal erosion (IPCC, 2014a)• Flooding can cause severe economic damage, erodes human and natural-constructed storm barriers and can result in the loss of life (WRI, 2011)• The South African Risk and Vulnerability Atlas (SARVA) states that water resources are likely to be affected in the following ways due to the “increase in extreme events, droughts and heavy precipitation:<ul style="list-style-type: none">• Decrease in water quality due to saltwater intrusion• Increase in the occurrence of international water conflicts• Decrease in water quality due to run-off and erosion

	<ul style="list-style-type: none"> • Decrease in agricultural development and profits due to droughts” (SARVA, 2010: 23) • Areas with a higher risk of extreme runoff related events include KwaZulu-Natal, parts of southern Mpumalanga and the Eastern Cape (DEA, 2013)
Increased frequency of extreme weather events	<ul style="list-style-type: none"> • The IPCC projects that climate related storms are set to increase in frequency and intensity (IPCC, 2007a) • Extreme weather events include an increased number of tropical cyclones and typhoons, increasingly severe rain events, hail and snow storms as well as earlier or more extreme frost episodes and extended or unexpected cold snaps or heat waves (IPCC, 2014a) • The above will have significant socio-economic implications, particularly for developing countries where 99% of those seriously affected by weather related natural disasters live (Global Humanitarian Forum, 2009) • Under all four LTAS climate scenarios for South Africa, a higher frequency of flooding and extreme drought events is expected (DEA, 2013)
Rising food insecurity	<ul style="list-style-type: none"> • Spatial shifts in the optimum growing regions for key food crops such as wheat and maize are likely to occur, making reductions in crop yields more prevalent than the projected increases under warmer/wetter scenarios (DEA, 2013) • The IPCC projects that all aspects of food security are potentially affected by climate change, including food access, utilization, and price stability (IPCC, 2014a) • Water shortages and drought, as well as increasing instances of extreme weather events, all play a role in increasing food insecurity from a production and thus stability of food supply perspective (FAO, 2008) • Additional dimensions to this crisis include the impact on food production of the increasing desertification of the world’s arable land and the salinization of arable land by rising sea levels (FAO, 2011) • It is projected that climate change induced declines in global food production could force global food prices up by 20% (Global Humanitarian Forum, 2009) • According to African Risk Capacity, a specialised agency of the African Union, ‘nearly 50 percent of all emergency multilateral food assistance to Africa is due to natural disasters’ (African Risk Capacity, 2012: 2) • Climate change induced plant and animal diseases will also negatively affect crop and livestock health and production in South Africa, including increased or changing vector patterns adversely affecting both crops and livestock (DEA, 2013)
Public health problems	<ul style="list-style-type: none"> • Insect-borne diseases such as malaria, dengue fever and water-borne diseases such as schistosomiasis are also shifting geographically with rising temperatures and dispersed flooding • A recent study by Accenture, GlaxoSmithKline and Oxford University (King, Lacy & Witty, undated: 6) explains how “rising temperatures, more extreme weather events and changes in air quality are highly likely to have a negative impact on six existing health concerns, particularly in

	<p>developing countries:</p> <ul style="list-style-type: none"> • Health effects related to extreme weather events • Cardio-respiratory diseases • Temperature-related health effects • Malnutrition • Vector-borne diseases • Waterborne diseases” <ul style="list-style-type: none"> • Flooding also greatly increases the risk of diarrheal diseases such as cholera and dysentery due to poor sanitation (WRI, 2011) • The World Health Organisation (WHO) calculates that the health of 235 million people is affected annually by climate change due to malaria, climate change and malnutrition (Global Humanitarian Forum, 2009) • Health impacts in South Africa from extreme weather events could range from immediate, direct consequences such as injury or death to long-term, indirect consequences such as those linked to disease vector abundance and the destruction of certain infrastructure (DEA, 2013)
<p>Unprecedented damage to infrastructure</p>	<ul style="list-style-type: none"> • The financial sector is increasingly seeing climate change risks adversely affecting their client base, which in turn poses a direct risk to their businesses. Increasing operational costs directly impact the cash flows of financial institution and their clients, as well as the ability to re-pay loans (CDP, 2014) • Insurers have noticed an increase in fire, flood and hail claims caused by extreme weather events, as well as the increased potential of clients defaulting due to the impact of climate change on operations (CDP, 2014) • The IPCC Working Group 2 Report (IPCC WG2, 2014) details how climate change is likely to impact critical infrastructure, not only leading to crippling financial losses and making parts of the world uninsurable, but adversely affecting the territorial integrity of countries, for example, small island states • Loss or damage to critical infrastructure can also destabilise nation states, leading to increased conflict and decreased human security (IPCC, 2014a) • South Africa’s current World Economic Forum Global Competitiveness Index for infrastructure is 66 out of 148 and would likely fall with climate change damage to key infrastructure (WEF, 2013: 346) • African Risk Capacity (ARC) emphasises the importance of “risk transfer and risk sharing through regional collaboration as a crucial element to climate change adaptation” as key to addressing the loss and damage associated with climate change impacts • ARC best practice indicates that insurance is not the best tool for dealing with chronic risk, advocating risk management and investment as the most important elements for improving a country’s resilience to damage caused by natural disasters
<p>Damage to ecosystems</p>	<ul style="list-style-type: none"> • The IPCC Working Group 2 Report details how species and systems with a limited adaptive capacity are at high risk with an additional 2 degree

warming, including marine life extinction, which would have severe implications for both fisheries and the livelihoods they sustain (IPCC WG2, 2014)

- In Africa, ecosystems are already being affected by climate change, and future impacts are expected to be substantial (IPCC, 2014c)
- Climate change affects ecosystems in a variety of ways, including range shifts, threshold effects, food web disruptions, increased parasites and disease, risk of extinction and changes in timing of seasonal life-cycle events (DEA, 2013)
- All of these changes have adverse effects for ecosystems and the ecosystem services and resources they provide (DEA, 2013)
- Accelerated climate change in South Africa will exacerbate any current ecosystem pressure, threatening vulnerable biomes such as the grassland and Indian Ocean Coastal Belt in particular, while straining the ecosystem health of other biomes (DEA, 2013)

As outlined in Table 2 above, the impacts of climate change on social and economic systems, particularly in developing countries, is likely to be significant and could potentially result in political conflict and social instability. However, at present adaptation is an area receiving far less focus than mitigation, both by governments and by business.

2.2 The impacts of weather and climate change on business

“Climate change is a reality to business and it poses risks for communities and vulnerable members of society and threatens to undermine both social and economic advancement in South Africa”

– Royal Bafokeng Platinum

Climate change is a reality for business. The 2016 Global Risk Report identifies global water crises, and a failure to adapt to the effects of climate change, as two of the five global risks with the highest impact on the global economy (WEF, 2016).

The scale of climate-related impacts is further supported by 2014 and 2015 South African CDP Climate Change data, which indicates that around 95% of participating companies see some risks associated with climate change as highly likely to materialise within the next three years. As summarised in the 2014 CDP Climate report:

“Companies are viewing climate change as increasingly pressing and significant. Many companies expect risks associated with climate change to materialise in the near-term, and see both the likelihood of such risks and their impact on the business to be high” (CDP, 2014:7)

Concerns related to the impacts of climate change also show an upward trend in 2016 CDP Climate reporting. In 2016, for the first time in 3 years, companies report an equal amount of high magnitude risks for both physical and regulatory risk (see Figure 1 below). This upward trend suggests that a stronger focus on adaptation is required by companies.

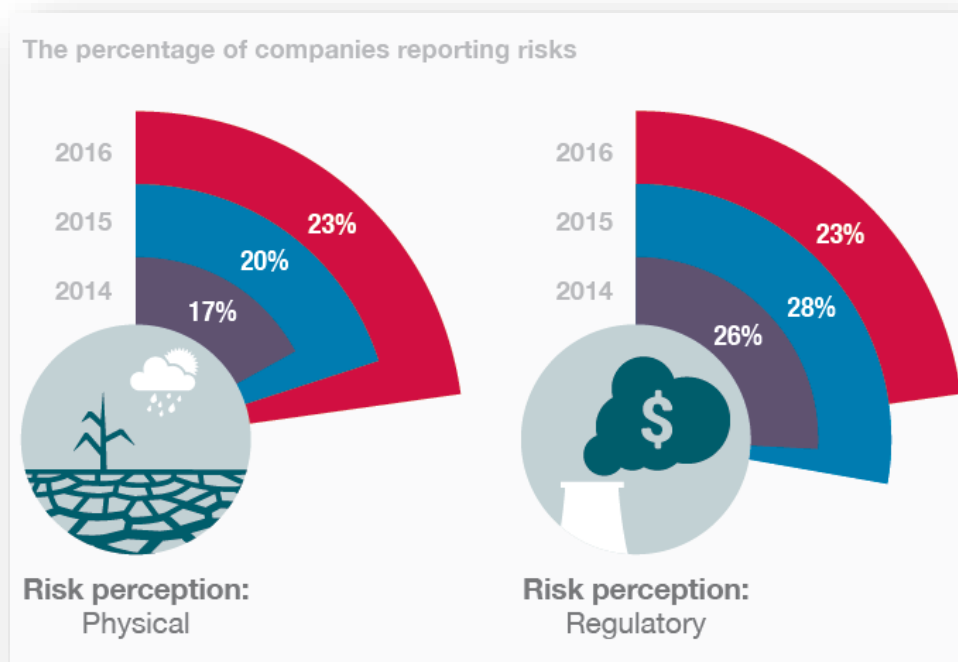


Figure 1: CDP 2016 – The increasing prominence of physical risks from climate change

Based on a survey sent to **37 companies** with **25 respondents**, as well as 2014 and 2015 CDP responses, **four** pronounced areas have been identified where climate change and weather-related impacts are effecting organisations in South Africa, and where adaptation responses are therefore most needed².

These four key areas and their associated impacts, as identified by companies, are described in Table 3 below:

Table 3: Key areas where weather and climate-related impacts are affecting organisations

<p>1. Availability of raw materials</p>	<p>A consequence of climate change is the decreased availability and increased price of raw materials, particularly agricultural commodities. The following companies explain these impacts in their 2014 and 2015 CDP submissions:</p> <ul style="list-style-type: none"> • Beverage manufacturing companies Distell Group Ltd and SAB both identified limitations in the availability of the agricultural produce that are raw materials in their products as the most pervasive climate risks to their respective businesses • FirstRand Ltd. indicated that severe hail storms in 2012 resulted in summer fruit crop losses on 90% of the farms in the Ceres and Witzenberg area in the Western Cape • Woolworths Holdings Ltd. details how major floods in 2010 in Pakistan and Australia impacted cotton crops which raised the price of their apparel. In their 2015 CDP disclosure, Woolworths explains how decreased soil moisture days undermine food production causing potential disruption to the food supply chain and particularly the supply of staples and fresh fruit/vegetables, while weather patterns can also negatively impact on raw
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² It is an area of active scientific research to attribute specific impacts to human-induced climate change. What is certain, is that climate change will increase the frequency and severity of extreme-weather related impacts.

	<p>material farming such as cotton, wool, bamboo, coffee, palm oil and soy, with a negative impact on supply chains</p> <ul style="list-style-type: none"> • Imperial Holdings notes that unseasonal rains, prolonged droughts and warmer average temperatures have adversely affected the growth and productivity of natural rubber resources, severely impacting the cost and availability of rubber for the automotive industry • For Sappi, a changing climate impacts forest ecosystems and plantation health, exacerbating threats such as pest outbreaks, fires and drought which will greatly impact the continuity of their supply chain and thus the cost of their product in the market • Oceana notes that the effects of climate change such as thermal expansion (leading to sea levels rising), variations in thermohaline circulation, fluctuations in important circulatory currents as well as increasing acidification, severity of storms, coastal erosion and storm surges, can all result in significant changes in distribution of fish stocks and migratory routes. In their 2015 CDP response, Oceana adds that they can potentially face a situation of depleted fish stocks due to the loss of key biodiversity areas (warm and cold water reefs) as a result of climate change
<p>2. Risks to infrastructure and physical assets</p>	<p>A number of respondents have indicated that climate change directly impacts capital costs. This is due to an increase in risk cover and upgrades of infrastructure, or as a result of new infrastructure being required to safeguard against the risk of extreme weather events. The following companies confirmed this in their 2014 and 2015 CDP submissions:</p> <ul style="list-style-type: none"> • Telkom details in their 2014 CDP disclosure how increasing temperatures are impacting the wear and tear and resulting maintenance costs of their physical infrastructure • FirstRand notes that increased temperatures will not only create a physical risk for their data centres, but increase the cost of operating the cooling systems required to keep the data centres operational • Transnet indicates that increased storm surges and sea level rise will lead to heightened flood lines and erosion of coastal lines that poses a risk for their freight rail and pipeline infrastructure. Transnet are looking at the impact of wind speed on sloshing in the harbor mouth – increased sloshing in port exits and entrances results in loading and unloading backlogs and thus longer port entry queues. Transnet is also examining lightning strikes knocking down key freight lines and how changes in precipitation extremes and droughts place their operations at Saldanha at risk • Royal Bafokeng Platinum describes in their CDP 2015 submission how changes in rainfall patterns could result in flash floods that could lead to the damage of critical equipment (equipment positioned in proximity to flood lines) and the flooding of underground operations and surface sites (such as tailings dams) in the event of inadequate pumping systems and design considerations to respond to increased volumes of water. This would disrupt operations for an unpredictable amount of time. • The increased cost of pumping is an additional concern, particularly for

	<p>deep gold mines</p> <ul style="list-style-type: none"> • The impact of climate and weather-related events on Eskom's electricity supply may take many different forms. Increases in air temperature cause a direct reduction in thermal plant efficiency. Eskom's assets are also exposed to more numerous/intense extreme weather events, including stronger wind speeds and ocean storms, threatening coastal power generation infrastructure in particular. High temperatures also affect the efficiency of Eskom's electricity transmission and distribution systems – often at times when electricity demand tends to be high. In addition, some of the Eskom supply infrastructure is located in permafrost areas that would be affected by increased temperature, limiting road transport and access to production sites. Electricity transmission is also prone to the effects of increased lightning, storms and resultant fires (while conversely, sagging transmission lines because of increased temperatures have caused fires). Finally, energy-related pipelines are vulnerable to weather-related accidents such as landslides and flooding. Many of these risks are echoed by companies with linear, dispersed infrastructure such as Transnet
<p>3. Interruption of operations</p>	<p>For a number of respondents the effects of climate change, including but not limited to extreme weather events such as floods, drought, hail, snow and frost events, extreme temperature variability, human health risks, infrastructural damage and loss of ecosystem services, have already had an impact on the continuity of business operations. Specific company examples are provided below:</p> <ul style="list-style-type: none"> • The abnormal occurrence of snow in 2012 greatly impacted Imperial's Logistics Division. It caused obstruction of one of South Africa's major highways and logistics routes halting operations for three days at significant financial loss • Allied Electronics Corporation (Altron) estimates that the delay to a single component from suppliers in the Far East results in additional costs of approximately R250 000 per hour of delay in production • Storms at sea can cause critical shipping disruptions, for example in the supply of crude oil to the country. For Engen the effect of climate change on ocean systems is posing a direct risk to their logistics operations due to delays and disruptions • Barloworld notes in their 2015 CDP disclosure how sea level rise could damage harbour infrastructure and disrupt low-lying areas and industries, with negative consequences on their supply chains as a significant amount of vehicles, plant and equipment are transported by sea • Grindrod Ltd explains how their shipping operations (and to a lesser extent freight and trading) could be increasingly affected by tropical cyclones, hurricanes and typhoons - resulting in transport disruptions, delays, and the possibility of increased incidents, all of which would translate into increased operational costs • Sasol has indicated that their Secunda operations have been greatly impacted by slowdowns and downtime caused by heavy rains

	<ul style="list-style-type: none"> • Insurers, including Santam and Absa, have noticed an increase in fire and flood claims caused by extreme weather events, while Absa acknowledges the increased potential of clients defaulting due to the impact of climate change on operations, resulting in higher insurance premiums for losses arising from extreme weather events • Old Mutual Group notes in their 2015 CDP disclosure how they have seen a large increase in crop insurance policies and resultant pay-outs following dramatic changes in weather conditions. Where historically one in eight year weather conditions were poor for agricultural purposes, now one in six years have poor farming weather conditions in South Africa (CDP 2015-Old Mutual response). This means that extreme weather could cost Old Mutual's insurance business heavily through increased claims from crop insurance policies, or under a worst case scenario, render certain areas uninsurable. In all cases, this will drive up agricultural costs and thus food inflation • Woolworths Holdings Ltd. is dependent on water availability for store trading and water cuts as a result of restrictions imposed by municipalities have resulted in trading disruptions
<p>4. Health and safety of employees and communities</p>	<p>The health and safety of employees and communities is another key area of concern for many companies:</p> <ul style="list-style-type: none"> • For mining companies, such as Exxaro Resources Ltd and Anglo American Platinum, notably drier conditions and changing wind patterns are leading to increased dust generation, aggravating the risk of employee respiratory problems. Further to this, warmer temperatures result in an increase in fatigue related accidents • BHP Billiton (now represented by South32 in South Africa) details in their 2015 CDP disclosure, how temperature extremes (both hot and cold) could affect the performance of their workforce • In the shipping sector, Oceana has noted that an increase in sudden extreme swells compromises the health and safety of the employees on their fishing vessels • Royal Bafokeng Platinum explains how climate change could pose risks to the health and safety of employees, communities and mining operations, such as the potential overflowing of pollution control dams and the resultant impacts on downstream communities • Discovery Holdings Ltd explains how extreme weather events could directly affect their member's wellbeing, including injury from extreme weather events such as storms or heat waves. While some impacts may be beneficial, most will be adverse. The main concern is around changes in frequency or severity of familiar health risks • The Clicks Group through their pharmaceutical distribution business (UPD) have been tracking sales of medicine to trace the impact of changing seasonal vector patterns on specific disease treatment.

2.3 How is government responding to this challenge?

2.3.1 The National Climate Change Response Policy

In light of South Africa's vulnerability to climate change, the Department of Environmental Affairs (DEA) concluded the development of the National Climate Change Response Policy (NCCRP) in 2011, highlighting that the implementation of the adaptation elements of the NCCRP will need to be prioritised. The NCCRP provides an overall policy framework for addressing climate related challenges, and provides a number of adaptation strategies specific to the agriculture, health, biodiversity and water sectors.

Responding effectively to climate change from an adaptation perspective is also written into the National Development Plan (NDP), with a strong focus on strengthening South Africa's economic and societal resilience. References to climate adaptation in 'Chapter 5: Environmental Sustainability and Resilience' of the NDP highlight key sectors where adaptation is required including agriculture, water and infrastructure development. These areas are echoed in the NCCRP which promotes the need for special consideration of the impact of climate change on water, commercial forestry, agriculture, human health, biodiversity, ecosystems and human settlements.

2.3.2 The Long-Term Adaptation Scenarios and National Adaptation Strategy

To support the national understanding of the impacts of climate change in the medium term, government launched the Long-Term Adaptation Scenarios (LTAS) in 2013. The LTAS divides South Africa's projected climate future into three stages: 2015-2035, 2040-2060 and 2070-2090.

South Africa's possible climate futures from 2025 and beyond are described in the Summary for Policy-Makers using four broad climate scenarios: 'warmer and wetter, warmer and drier, hotter and wetter and hotter and drier' (DEA, 2013: 5). In the Climate Trends and Scenarios report, climate change projections for South Africa under high emission scenarios include the interior warming by as much as 5-8 degrees, less over coastal zones with a 'general pattern of a risk of drier conditions to the west and south of the country and a risk of wetter conditions over the east of the country' (DEA, 2013: 17). The outcomes from the LTAS will be used to inform long term adaptation planning, as outlined in the draft National Adaptation Strategy for South Africa.

The LTAS process, led by the DEA, aims to 'respond to the South African National Climate Change Response White Paper (NCCRP) by developing national and sub-national adaptation scenarios for South Africa under plausible future climate conditions and development pathways' (DEA, 2013: 2).

The DEA is also in the process of finalising the National Adaptation Strategy for South Africa, with this document meeting the specifications outlined by the UNFCCC for national adaptation plans. The 2016 version of the draft National Adaptation Strategy can be accessed [here](#).

Finally, it should be noted that a number of provincial authorities and local municipalities have developed and are implementing adaptation plans and strategies.

2.3.3 The National Climate Change Conferences

Awareness raising and dialogue on climate change impacts has also been a key focus area of the National Climate Change Conferences, as coordinated by the DEA and occurring roughly every 5 years since 2005. The latest National Climate Change Conference was held in November 2014 and focussed on implementation in relation to the NCCRP, entitled "South Africa is transitioning to a

lower carbon and climate resilient economy and society.”³ This national dialogue is positioned by the South African government within the context of the preceding national conferences held over the past 10 years, as follows:

- “A National Conference in 2005 to discuss the potential impact of climate change in South Africa, and to secure a mandate for the development of a national climate change response policy
- A National Climate Change Summit and Science conference in 2009, to review the latest international and national climate science, and develop the framework for a national climate change response policy
- A National Green Economy Summit in 2010, to build a national consensus on South Africa’s green economy path
- The preparatory process and South Africa’s hosting of the 17th Conference of the Parties of the United Nations Framework Convention on Climate Change, in Durban in December 2011
- The discussion, and finalisation of South Africa’s National Climate Change Response Policy in 2011”⁴

2.3.4 Towards a National Framework for Climate Services

The National Framework for Climate Services South Africa (NFCS-SA), an initiative being led by the DEA and South African Weather Service (SAWS), is also currently under development. Once operational, the NFCS-SA is intended to ‘mainstream climate science into decision-making at all levels and help ensure that every country and every climate-sensitive sector of society is well equipped to access and apply the relevant climate information’ (DEA, undated).

The overall aim of the National Framework for Climate Services is to strengthen the availability and use of science-based climate prediction and services in South Africa. The NFCS-SA priority sectors include human settlements, health, water, disaster management and reduction, agriculture and food security, biodiversity, energy and oceans and coasts.

Both a web-based Climate Services Portal and a National Climate Centre (with the Centre either being established as a programme, legislated entity or unit within an existing entity) are envisaged under the Framework, to assist in the delivery and use of science-based climate services by a range of stakeholders, including the private sector (DEA, 2017).

³ The NBI presented some of the early research for this report at the 2014 National Climate Change Response Dialogue

⁴ Department of Environmental Affairs, 2014. 2014 National Climate Change Response Dialogue. Online. Available: https://www.environment.gov.za/event/deptactivity/2014national_climatechange_responsedialogue

2.4 Approaches to climate change adaptation

According to the IPCC, adaptation is: “**The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.**” (IPCC, 2014b).

The first report of the NBI Green Economy Finance Project entitled **The Power of Collective Action in Green Economy Planning** (Nicholls, Moolla & Vermaak, 2015) quotes two types of ‘adjustments and changes’ that constitute adaptation:

- **Autonomous adaptation:** This type of adaptation (also referred to as spontaneous adaptation) is defined by the IPCC as “adaptation that does not constitute a conscious response to climate stimuli but is triggered by ecological changes in natural systems and by market or welfare changes in human systems” (IPCC, 2007b:869). The United Nations elaborates on this by adding that “autonomous adaptation typically occurs when the benefits accrue predominantly to those investing in adaptation” as such this type of adaptation “is likely to occur through autonomous actors such as individuals, households, businesses and communities responding to the opportunities and constraints they face” (UN, 2009:97). Autonomous adaptation is widely interpreted as initiatives by private actors rather than by governments (Leary, 1999)
- **Planned adaptation:** This type of adaptation is defined by the IPCC as “adaptation that is the result of a deliberate policy decision, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state.” Planned adaptation can be either reactive or anticipatory (IPCC, 2007b:869)

Adaptation activities can be classified as short or long-term interventions, localised or dispersed, serving various functions and taking numerous forms (IPCC, 2001). Business adaptation is defined by the United Nations Global Compact (WRI, 2011:68) as “efforts to adjust business models and take appropriate measures to both minimise vulnerabilities and risks to climate hazards and explore new opportunities.” As such, businesses capable of adapting to climate change are better positioned to provide sustainable and relevant products and services to their clients. Besides being a competitive differentiator, business adaptation to climate change is becoming a required capability to ensure business continuity and longevity.

Finally, it is useful to distinguish between adaptation efforts that can be considered to be **incremental** versus those that can be regarded as **transformational**.

- In simple terms, **incremental adaptation** is about using existing systems and structures to cope with current conditions and short term changes. Incremental adaptation tends to be reactive, and largely focuses on keeping the current system operational
- **Transformational adaptation**, however, focuses on future long-term change, in a manner that could require system wide change and that builds in uncertainty into decision making. Transformational adaptation is focused on anticipation and planned management, and includes the potential for structural changes to occur in order to address adaptation needs

While it is easier for companies to begin with and to think about incremental adaptation, transformational adaptation may be required in a number of circumstances to address climate risks, particularly as the impacts of climate change worsen over time. Incremental adaptation can however provide an entry point for companies to begin to understand their climate related risks, and to identify where transformational efforts are required.

2.5 Adaptation as part of building business resilience

In **The Power of Collective Action in Green Economy Planning**, the authors indicate that adaptation is a component of building economic and organisational resilience (Nicholls, Moolla & Vermaak, 2015). The IPCC defines resilience as:

“The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation” (IPCC, 2014b).

In order to build economic and organisational resilience a company needs to:

- 1. Anticipate** variability in social, economic and environmental conditions. This can be achieved through:
 - Scenario Development and Forecasting from Global Circulation Models (GCMs) and Regional Circulation Models (RCMs)
 - Early Warning Systems that enable dissemination of information gathered by scenario development and forecasting, in order to adequately warn stakeholders of impending shocks and give them time to react
 - In-depth understanding of the companies supply chain and anticipated risks through cradle to grave life-cycle assessments
 - Continuous up-to-date research and data gathering specifically focussed on the social, economic and environmental risks posed to a company and understanding how these can be reduced
 - Ongoing mega-data and trend analysis to anticipate and understand upcoming shocks, including in support of Disaster Risk Reduction (DRR)
 - View risks and uncertainty as ongoing developments to be continually reviewed in order to mitigate risks and take advantage of opportunities
- 2. Adapt** effectively to anticipated changes (autonomous and planned adaptation). This involves:
 - Including all stakeholders in the process including forging effective partnerships and collaboration
 - Putting the necessary processes and practices in place to identify and reduce vulnerabilities and build resilience to the specific contextual shock
 - Implementing more diversified systems less dependent on specific areas of the business- properly integrated systems and approaches are more resilient to sudden shocks to one area of the company
- 3. Recover** as quickly as possible from shocks that were not anticipated. Lessons learned from the event should then be applied to strengthen anticipation measures and thus adaptation going forward. The key elements to successful recovery are:
 - **Disaster management:** the management of resources to best deal with disasters and emergencies and lessen their humanitarian impact. This includes the immediate response to the disaster, the recovery from the disaster and reducing the risk of future disasters (the latter in support of Disaster Risk Reduction efforts)
 - **Emergency response:** providing immediate emergency assistance to communities affected by a shock and the immediate repair of damaged infrastructure, where relevant

- **Incorporate lessons learnt into strategy and planning:** understanding how and why the risk caused disruption to business as usual and applying the lessons learnt to internal strategy and planning so that similar disruptions are likely to be anticipated and addressed in sufficient time
- **Implement best practice immediately:** where the lessons learnt are applicable to improved resilience of the organisation as a whole, these should be implemented with the support of the organisations management to send a strong, clear message of business leadership and quick response times

2.6 Barriers to adaptation planning

In the context of South Africa’s socio-economic needs and the threat that climate change poses to water resources, food security, health, infrastructure and biodiversity, adaptation responses to address these risks are becoming a business imperative (Vogel, 2009; Ziervogel *et al*, 2014). Such adaptation responses are not without their own constraints, however, with a company perspective on the key barriers faced summarised in Table 4 below.

Respondents to the NBI survey identified five key barriers to implementing adaptation planning:

Table 4: Key company identified barriers to implementing adaptation planning

<p>1. Establishing the business case for adaptation planning</p>	<ul style="list-style-type: none"> • Some respondents indicated that organisations do not always recognise the business imperative for engaging in adaptation planning. This is in large due to the fact that these risks have traditionally been positioned as environmental issues, rather than risks which could impact the medium to long-term survival of an organisation • It is therefore very important to have an overall definition and discussion of total costs and benefits (assets, systems and impacts on suppliers and customers) with regards to weather and climate impacts • Further to this, most risk management specialists often lack the required climate change related skills or expertise. As a result, it is critical for an organisation’s sustainability and climate change team to act as a translator, positioning regional climate data within the local business context • Effective interpretation and communication of all uncertainties associated with climate science is important
<p>2. Sector coordination and collaboration</p>	<ul style="list-style-type: none"> • Industries operating within the same environment share the same socio-economic, climate and demographic challenges. However, due to concerns around competitive advantage, many sectors have yet to exploit the potential to collaborate on addressing non-competitive adaptation challenges • Where organisations pool their resources and efforts, understanding and addressing the contextual challenges posed by climate change can be addressed faster and more effectively. An example of this is companies with a shared river basin working in collaboration to improve the quality of the resource

3. Availability of locally relevant climate change data and tools

- The availability of context specific weather and climate related data as well as the expertise to interpret this data is often lacking or insufficient.
- This includes associated climate modelling with higher resolution data (temporal and spatial) with known levels of uncertainty, which is required to support specific and relevant internal decision making processes
- Investment in these skills and resources is urgently required
- Companies need more comprehensive data and tools to adequately understand climate impacts at a facility and operational level. This information is also needed to forecast future climate related risks for companies. Broadly speaking, the refinement of global climate models to provide accurate information at the local level is a key area of work required in the advancement of climate change research

Box 1: Climate change modelling

By comparing observed and projected climate data, climate models can estimate the change in the probability of extreme weather occurrences and catastrophic events, and help analyse the uncertainties associated with the nature and timing of climate variability.

Climate models can present a range of future impacts which are of most concern to a company's facilities, operations and supply chain. General Circulation Models (GCMs) are a mature modelling approach that provides a robust description of the complexities of the climate system. GCMs can be used to study a variety of climate attributes such as surface temperature, atmospheric temperature profiles, rainfall, atmospheric circulation, ocean circulation, wind patterns and snow and ice distributions. A drawback to these models is that the native spatial resolution is quite coarse. Business requires downscaled climate data from GCMs to generate regionally specific forecasts on which to base their adaptation plans. Any GCMs which display spatial information presented at scales finer than 100km are said to have been downscaled.

Downscaling is classified into two categories: spatial or temporal. There are two common methods for combining large-scale climate projections with local conditions: dynamical and statistical downscaling. Dynamical downscaling involves "explicitly including additional data and physical processes in models similar to GCMs but at a much higher resolution and covering only select portions of the globe" (CIESIN, 2014: IX). Statistical downscaling establishes "statistical relationships between large-scale climate features that GCMs and local climate characteristics provide" (Ibid). While dynamical scaling provides desirable results, it requires large quantities of data, high levels of expertise to interpret the results and significant computational power. Statistical downscaling in comparison is conceptually easy to "implement and interpret" (CIESIN, 2014: IX). However, statistical downscaling relies heavily on the availability of high quality historical climate observation records.

Overall, there is no one single best approach for downscaling and often a variety of different approaches and methods are required to obtain the desired spatial and temporal resolution, and thus the climate characteristics of specific interest in a particular context. The quantitative nature of climate model outputs also easily tempts skilled end users into over-interpreting a particular scenario. The variation of model outputs, and most importantly, how they support known regional climate dynamics, is an important part of the interpretation and decision-making process and hence the need for trusted knowledge brokers.

From a South African company perspective, one approach going forward could be to make climate risk data and impact models at a localised level available to business (open-source), such that the public and private sector can work off the same dataset to create capacity, manage shared risk and build resilience on the ground. Over time, observed data will support models for the development of a systemic picture in a specific locality, contributing to further partnerships and collaboration while overall reducing costs.

4. Investment

- Making the financial case for spending on future anticipated risks can often be quite difficult, particularly if the financial decision makers within an organisation are not fully aware of the implications of climate change and currently no tangible adverse effects are being experienced
- This is further exacerbated by the fact that financial governance frameworks do not account for the cost of business demands on the environment or natural resources
- Furthermore, the uncertainty associated with the nature, timing, location and severity of a particular climate change consequence poses a challenge in deciding how and when to invest in resilience beyond “business as usual”
- Companies are often uncomfortable applying projections about future climate change to current business operations when there are usually high degrees of uncertainty as to what these implications may look like in reality. In addition to this, adaptation projects typically have long payback periods with the returns being difficult to quantify
- These factors, compounded by the current global economic climate, mean that the necessary capital investments in adaptation strategies are often hampered. In addition to this, during periods of financial austerity, day-to-day operations take centre stage with limited focus on future risks
- Additionally, there is an overall lack of suitable financing mechanisms from both local and international financing organisations and governments to support and pursue adaptation projects
- Innovative financing mechanisms which are tailored to the particular requirements of adaptation projects are needed. It is therefore important to review and update financial products including insurance offerings in the context of weather and climate impacts, to be undertaken in the context of Integrated Risk and Resilience Management

5. Policy and legislative frameworks

- Some respondents perceived the apparent lack of direction of government policy and planning as a barrier
- These respondents felt that policy and legislative frameworks are necessary to guide and give support in implementing climate change adaptation
- Further to this, some respondents saw the role for government as being to support and coordinate efforts around climate change research, enhance resilience to extreme weather events for critical public infrastructure and advance resilience planning and coordination in regulated sectors such as water, electricity and insurance
- **Eskom** explains how alignment with government regulation and policy frameworks needs to occur where the electricity sector is acknowledged as a vulnerable sector and its vulnerability is understood in the context of economic growth, infrastructure development and overall sustainable development

3 Emerging practices of South African companies

A number of leading South African businesses have used innovative approaches to respond to climate risks. These organisations have integrated adaptation planning into their existing risk management processes and supply chains and have identified significant opportunities to become more efficient, reduce costs and develop new products and services. They have built clear adaptation strategies based on robust data and established partnerships with their peers, the public sector and civil society. These business adaptation approaches are discussed within the context of four clear emerging practices:

- **Practice 1:** Companies are not re-inventing the wheel
- **Practice 2:** Companies have turned climate risks into opportunities
- **Practice 3:** Companies are recognising the benefits of collaborative partnerships
- **Practice 4:** Companies are making informed decisions

Practice 1: Companies are not re-inventing the wheel

“FirstRand views adaptation as a response measure to reduce its risk exposure to adverse climate change impacts.”

– FirstRand

3.1.1 Good governance and risk management

Within the South African context, business’ understanding of resilience, combined with the good governance practice engendered by King III and continued in the 2016 release of King IV, suggest that the systems and culture to facilitate climate resilience already exists. The main shift from King III to King IV will be to encourage companies to move beyond a mind-set of pure compliance when implementing corporate governance and instead decide to implement practices because they are simply good governance. In a sense, climate resilience does not differ much from what companies have already been doing: strategic planning, risk assessment, business continuity management, emergency response strategies, investing in infrastructure, and diversifying their supply chains.

As such, for a number of South African businesses it has been a natural first step to use their existing risk management framework to:

- Identify climate-related risks
- Develop adaptation strategies
- Put in place an integrated risk management system that looks at their businesses holistically

Figure 2 further indicates that 97% of South African companies reporting to CDP integrate climate change into their risk management processes, up from 74% in 2008.

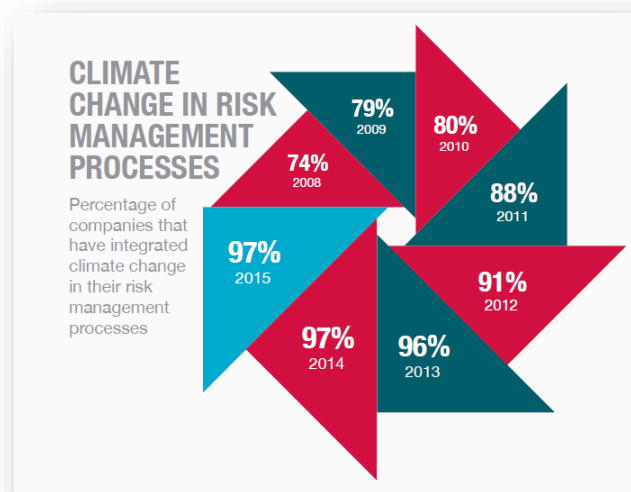


Figure 2: CDP 2015 – Percentage of companies integrating climate change into risk management

3.1.2 Integrating climate change into risk management

A number of organisations have updated their existing risk management frameworks through incorporating climate change specific information, or forecasting models, to supplement conventional risk management activities. One such example applies to **Sasol**, who already have a well-developed Enterprise Risk Management Programme (ERMP) in place and so instead chose to integrate climate change risks into their existing risk framework. The updated ERMP now ensures that all climate change risks are systematically identified, assessed and managed to acceptable levels at business unit, functional and process portfolio level. This approach also allows for the identification of *ad-hoc* studies needed to assess specific adaptation opportunities. **Exxaro** has also customised its SAP Enterprise Risk Management System to provide an integrated risk profile for the organisation, including operational, economic, social and environmental risks.

Royal Bafokeng Platinum has included a climate change vulnerability risk assessment process within its Enterprise Risk Management to aid in identifying relevant business risks and adaptation potential. They also allocated ownership of these risks to various executive and departmental heads, to ensure that they are managed through the normal management process, rather than as a separate risk management process. This integrated approach to risk management allows climate risks to be addressed as a business risk and not an environmental issue to be dealt with separately by a sustainability team. This approach also drives greater awareness of the impact of climate-related risks on the organisation's business model.

A number of companies already have well established business continuity and emergency management plans to minimise damage from extreme weather and to speed up recovery from such events.

3.1.3 Risk management and adaptation planning

Developing a climate adaptation plan for a company specific area, in terms of current activities and future required studies/information, should be undertaken to inform adaptation activities. The outcome of this plan should be presented in an integrated risk management format as this will allow for further definition of governance structures, task owners, timelines and reporting guidelines.

Eskom has an Adaptation to Climate Change Methodology (an integrated risk management approach) which outlines a clear process for compiling an adaptation plan. This process consists of the following steps:

- Outline the project boundary: geographical scope of vulnerable areas
- Outline key weather variables in terms of the vulnerable areas
- Explain weather variables and vulnerable areas in the context of integrated risk management: define risk including the context of these risks
- Identify and outline activities: controls and tasks already being undertaken or in place to address risks including extreme weather events, disasters and observed climate variability
- Integrate forecasted climate change impacts (2020-2050) by defining long-term treatment plans
- Review, identify and outline all strategies, policies, standards, plans and procedures within areas of the business where management of the identified climate risks are already reflected and/or where there is still an opportunity to integrate issues of climate risk and adaptation response

For Eskom, extreme weather events are seen as a major operational risk. To address this, Eskom reviewed their business risk assessment and mitigation plans to assess how best to address adaptation to weather and climate variability. Eskom identified adaptation as needing to increase the robustness of infrastructure designs and long-term investments, as well as the flexibility and resilience of managed natural and social systems.

Box 2: Eskom's adaptation approach

Eskom has been working with the Council for Scientific and Industrial Research (CSIR) to illustrate Representative Concentration Pathways 4.5 and 8.5 at a 50km and 8km resolution for the period 1961 to 2100, focusing on all Eskom sites and infrastructure across Southern Africa. This climate data and information has focused on the following weather variables:

- Average temperature
- Minimum temperature
- Maximum temperature
- Very hot days
- Heat wave days
- High fire danger days
- Cold snap days
- Rainfall
- Extreme rainfall days
- Heavy rainfall days
- Dry spell days
- Projected changes in weather extremes and extreme storms

The main climate related risks applicable to Eskom as a company have been identified as:

- Limited water availability
- Temperature changes
- Adverse implications for human health
- Damage caused to transmission and distribution by more extreme weather events
- The complexities of shifting load centres due to the relocation of people; and
- The resultant insurance or reinsurance needed to address losses from the above risks

Infrastructure damage is likely to occur through a range of key weather parameter shifts including: temperature, rainfall, snow, ice, frost, storms, wind speed and direction, tornados, lightning, floods, sea swells, solar radiation, relative humidity, fires, vegetation growth and air pollution.

Eskom included the identification of vulnerability and hotspot areas (identified as areas across the business that are prone to extreme events within their risk assessment approach). Examples of vulnerability hotspot areas identified by Eskom include the Waterberg catchment areas and Lesotho highlands. Eskom has commissioned academic studies to understand the full risk profiles and implications for these areas. Awareness around these vulnerability hotspot areas were communicated to management, after which systems were put in place to ensure that key business areas are kept informed of weather changes and extreme weather conditions.

In order to address these areas of concern, Eskom is partnering with government, the private sector and other stakeholders on water supply and water demand management, energy efficiency projects, biodiversity and natural resources management, weather forecasting and reporting, as well as innovation and technology development.

Transnet has developed a custom risk management framework that specifically addresses issues of resilience in the form of a climate change adaptation roadmap that is being implemented in four phases, as follows:

- Phase 1: Selection of Climate Science Simulations
 - Confirm scale down models to inform level of risk and potential for adaptation
- Phase 2: Application of Sustainability Risk & Opportunity Assessment
 - Context Setting
 - Identify Risks
 - Scenario Analysis
 - Assess options
 - Recommendations
 - Communicate and Consult
 - Monitor and Review
- Phase 3: Development of Climate Change Adaptation Strategy
 - To address current and planned operations; property and infrastructure
 - To address the impact of upstream and downstream value chain adaptation
 - Incorporation of adaptation pathways into decision making processes to ensure resilience, allow for incremental transitions and where necessary initiate transformation
- Phase 4: Implementation of Climate Change Adaptation Strategy
 - Operating Divisions to lead implementation through ERM
 - Collaboration with customers to ensure resilience across value chain
 - Embedding adaptation into Long Term Planning, Project Lifecycle Processes, Procurement systems and other relevant business processes.

Practice 2: Companies have turned climate risks into opportunities

“Climate change risks can also be capitalised into business specific opportunities”

– Barclays Africa

A number of South African companies have used innovative approaches to turn climate change related risks and constraints into opportunities to ensure business viability, build resilience within their supply chain, reduce costs, become more efficient and develop new products and services.

3.1.4 Building resilience within communities and supply chains

Santam

Santam noticed an increase in insurance claims associated with extreme weather events such as fires, flooding, and storm surges in the Eden municipality district. Further to this, the weather related losses in specific areas grew faster than insurance penetration. This proved to be a business challenge in an industry where growth is strongly correlated with economic activity. Instead of a reactive response of merely increasing insurance premiums, which would increase pressure on the availability and affordability of insurance and shift greater risk exposure onto governments and individuals over time, Santam embarked on an in-depth scientific study to better understand what drives these risks and how local resilience can be strengthened. The learnings from this study catalysed further risk and resilience initiatives such as further work in the Eden district, risk node analysis, the African Infrastructure Risk & Resilience inquiry, the Business-Adopt-A-Municipality

(BAAM) programme and participation in the UNEP Global Resilience Project, to better understand how to address the identified shared risks.

A number of companies have experienced first-hand that even when their own risk assessments take climate change impacts into account, their operations can still be severely impacted if their suppliers have not taken the same steps. Companies such as **Woolworths** and **South African Breweries (SAB)** have incorporated adaptation initiatives along their value chain to ensure that their existing supply sources become more resilient to future weather extremes and slow progressive changes, thus securing their supply chains.

Woolworths

Woolworths' Farming for the Future initiative resulted from a growing concern around the sustainability of the retailer's fresh produce supply chain. The organisation started noticing a decline in crop yield and quality from their supplying farms. Woolworths recognised that in the context of rising demand, existing environmental pressures and projected climate changes, high quality, high yield produce can only be achieved by adapting current farming practices to improve soil and water management as well as facilitating crop selection for resilient varieties in specific areas. This resulted in the Farming for the Future initiative which provides guidance to producers within Woolworths' agricultural supply chain on developing farm management systems that improve soil health and water management practices.

The Ceres Water Stewardship project, a trial working with nine stone fruit suppliers to identify water related risks as a result of climate change impacts, progressed to enable collective action through engaging catchment stakeholders. This project is a partnership between WWF-SA, the Alliance for Water Stewardship, Marks & Spencer and Woolworths. Involving organisations such as the Breede-Gouritz Catchment Management Agency and other local authorities was a recognition that water-related adaptation should be implemented on a catchment level to have a meaningful impact, working both upstream and downstream along the water source. This project has resulted in the formation of community networks to manage and conserve water resources.

SAB

Similarly, SAB supported the adaptation adjustments of their South African barley farmers to new environmental conditions (such as higher temperatures, reduced rainfall, increased flooding and other extreme weather events) through the Better Barley Better Beer programme. The programme aids barley farmers with the implementation of farming practices that improve soil health, reduce water usage, lower carbon emissions and clear alien vegetation, as well as protect and restore ecosystems.

3.1.5 Innovative adaptation solutions to water supply variability

Water is a central component of many businesses supply chains, making sustainability of supply an important aspect of any adaptation solution. In South Africa's CDP Water 2015 response, 21 (70%) of the responding companies reported detrimental water impacts in the reporting year. The top risks reported for CDP water 2015 are drought, water scarcity and/or water stress, flooding, inadequate infrastructure and declining water quality. Of the 2015 respondents, 67% stated drought, water scarcity and/or water stress as a top reported risk with 30% claiming this as a top impact. Of huge concern, droughts & increased water stress cost reporting companies a total of R610 million for the reporting year.

It is therefore clear that changes in water availability and quality are not only identified as a high priority risk by companies but are also challenges already being experienced by many companies. A number of organisations have linked their adaptation efforts to opportunities for reducing operational costs through better water management practices. Water conservation, recycling and demand management are key approaches that can be employed by companies to improve water efficiency and use. Most importantly, these initiatives make sound business sense so there is an all-round benefit: adaptation and business acumen in one.

At a macro scale (given the water-energy nexus), measures undertaken to meaningfully shift the reliance on coal-based electricity towards renewable energy options such as wind, solar geysers and biogas, can also have adaptation benefits. This applies most notably in terms of reducing the amount of water needed for national power generation and providing air quality benefits for both people and ecosystems.

In their company case study, survey or CDP response, the following companies indicated how they have adapted by developing innovative water approaches:

Table 5: Company examples of innovative water approaches

<p>Tongaat Hulett</p>	<ul style="list-style-type: none"> • Tongaat Hulett has adapted their water use processes to take advantage of the water produced as a by-product of their sugar mills • Tongaat has adapted their processing facilities to include water recycling, efficient water use and responsible wastewater disposal processes • This enables the company to reuse treated water for production within their factories for irrigation and to provide potable water to local communities in the areas where they operate • As water availability decreases, these adjustments will ensure a certain degree of continued supply and reduce the vulnerability of local communities to supply shocks
<p>Sibanye Gold</p>	<ul style="list-style-type: none"> • In the context of South Africa being a water scarce country, Sibanye Gold has implemented processes to treat and recycle the large quantities of water that they need to pump in order to manage their facilities • The water is used for Sibanye’s own needs and that of surrounding communities meaning the groundwater aquifer can serve as a reserve during low rainfall and drought periods. This approach provides a direct opportunity for Sibanye Gold to decrease the vulnerability of its surrounding communities and workforce
<p>Oceana</p>	<ul style="list-style-type: none"> • Oceana has also adapted their cold stores to ensure the reuse of water • Water is drained from cooling pods to wash floors and is then returned to condenser sumps and urinal flushing units, placing less strain on external water supplies
<p>Woolworths</p>	<ul style="list-style-type: none"> • Woolworths has introduced in-store pulse meters to monitor water consumption, rainwater harvesting and grey water recycling, utilising a groundwater spring at the headquarters for toilets, a carwash and air conditioning units • The food retailer is also considering specific criteria for water and wastewater

	<p>when purchasing new real estate</p> <ul style="list-style-type: none"> • In farming, the Farming for the Future programme focuses on not only maintaining soil balance to prevent run-off and soil erosion, but also on reducing chemical input and encouraging sustainable waste water management. A Farming for the Future water footprint index tracks water management across the farming value chain from farm to packing and processing facilities, against 116 parameters. This is aimed at encouraging farmers to reduce water use over time. The retailer also works with WWF and other organisations such as the Alliance for Water Stewardship, the Breede-Gouritz Catchment Management Agency and Marks & Spencer on addressing water related risks at a catchment level for produce suppliers • In clothing, eliminating hazardous chemicals has been identified as a means to prevent harmful impacts on water and to conserve water resources. Woolworths' intent is to have 13 priority chemicals removed by 2020. Using alternative fibres further allows the retailer to reduce the overall water footprint in clothing production
Avis	<ul style="list-style-type: none"> • Avis, a subsidiary of Barloworld, has implemented water recycling plants at its main depot car wash facilities in Johannesburg, Durban and Cape Town, amounting to cost savings of around R1 million per annum
Old Mutual	<ul style="list-style-type: none"> • Old Mutual has become one of the first large corporates to participate in a water recycling project run by the Cape Town City Council • This initiative recycles sewage water and distributes it to participating companies premises, and is used for garden and sports field irrigation
Barclays Africa	<ul style="list-style-type: none"> • Barclays Africa's flagship building, Towers West, recycles 43 000 litres of water a day through one of the largest greywater systems in Southern Africa

3.1.6 New market opportunities

Companies have also recognised opportunities in developing products and services that meet new or expanding market demand. This includes climate related opportunities expected to occur in the next five years. As indicated in Figure 3 below, 81% of the opportunities from climate change are expected to occur within 5 years.



Figure 3: CDP 2015 – Opportunities expected to occur within next 5 years

Distell

Distell has identified how changes in climate conditions could also possibly lead to the planting of “new” grape cultivars in South Africa that are more drought and disease resistant, which could result in new market opportunities.

FirstRand

FirstRand has identified opportunities to shift financing trends for property in new areas as a result of current changes in precipitation and seasonal weather patterns. These changes have also meant a need for increased capacity in specialist financing of certain sub-sectors. Specifically, the First National Bank (FNB) commercial agricultural finance division has noticed a growing trend in the purchasing of property in the north western regions of South Africa by wine farmers. FNB, a part of the FirstRand Group, investigated this market shift and discovered that it was linked to changes in temperature ranges in the current wine producing regions of South Africa.

FirstRand has developed a product for the agricultural sector that takes into account the impact on the commodity cycle as a direct result of weather patterns tracked through monitoring and reporting processes, and provides for a capital moratorium during the early stages of the re-establishment or expansion of a project. Another market opportunity identified by FirstRand is in relation to shifts or decreases in available natural resources, such as water, which has resulted in

clients requesting additional loans for infrastructure financing for the purposes of water treatment plants, water pipelines or water storage facilities.

Sappi

Sappi Southern Africa's tree breeding programme continuously tests and selects tree genotypes which are best suited to the climate conditions in the range of sites where Sappi operates. Having a broad genetic base enables Sappi to utilise a variety of sites for tree planting, including harsh areas that would not normally be suitable but can be utilised due to drought resilient tree varieties. By anticipating possible climate shifts and planting trees that are water efficient in these environments, Sappi is able to ensure security of their supply chain going forward.

Woolworths

Woolworths has noted how changes in growing seasons may create new supply chain opportunities, including new regional supply chain opportunities in Southern Africa over the next 3-10 years. Currently, 90% of Woolworths' food is sourced regionally. Woolworths is also working with WWF on a climate resilience programme on selected fruit and vegetable farms to look at solutions for the protection of crops from extreme precipitation and hail in such a way that does not cause negative ecosystem impacts.

Santam

Santam has identified product innovation opportunities, including providing incentives to clients for risk management behaviours in response to climate change.

Grindrod

Grindrod has invested in upgrading their fleet with monitoring, prediction, safety and navigation systems, with 90% of their owned and operated fleet comprising new generation, modern vessels. The combination of these technologies and more advanced vessels allows Grindrod's fleet to better handle changing sea conditions and reduce operational costs. As an international freight company they are able to track changes in natural resource use anywhere on the planet and respond by moving natural resources around the globe in response to these trends.

Practice 3: Companies are recognising the benefits of collaborative partnerships

"Adaptation cannot be done in silos; it is a multifaceted approach that requires a collaborative effort"

– Woolworths

Business has recognised the advantage of collective action in order to build resilience and adapt to climate change. Establishing partnerships with peers, the public sector and civil society enables companies to drive effective action through improvements to shared infrastructure, local capacity, and disaster preparedness and response. Collective action also provides the benefit of sharing costs and resources.

3.1.7 Partnering with municipalities on adaptation

Santam, SALGA and DCoG

To address the increase in weather related insurance claims, Santam realised the importance of partnering with municipalities to better equip and empower these local authorities to deal with weather related disasters. Through the Partnership for Risk and Resilience (P4RR), a programme previously known as Business-Adopt-a-Municipality, Santam has partnered with the South African Local Government Association (SALGA) and the Department of Cooperative Governance (DCoG) to determine the critical needs required for improving municipal disaster risk management. After consultation with numerous municipalities, the parties agreed that the need for firefighting equipment and training would be prioritised within the first delivery phase of the programme. Five municipalities were identified, for which fire-fighting goods, equipment and training to the value of R2.3 million were sponsored. The second phase of this initiative focuses on flood risk management to enable municipalities to reduce the impact of floods on the lives and assets of communities. This second phase now includes 10 district municipalities comprising 54 local municipalities.

The water stewardship paradigm

An additional national trend has seen the growth of ‘corporate water stewardship’, whereby companies’ partner with municipalities and civil society to address shared water risks in a particular location. In recent years companies such as **SAB**, **Sasol** and **Woolworths** have actively engaged with local authorities in South Africa to support improved water management, with these initiatives often having dual climate resilience and supply chain benefits.

3.1.8 Partnering with other companies

Anglo Coal and BHP Billiton

Companies are also partnering with other businesses in anticipating and preparing for water scarcity or flooding and responding with strategies that support community adaptation. Anglo Coal South Africa, BHP Billiton Energy Coal South Africa (now represented by South32 in South Africa) and the eMalahleni Local Municipality joined forces to build business and community resilience in an extremely water stressed region. The municipality lies within the Olifants River Catchment, where climate models project a potential reduction in mean annual rainfall by 2050. The three entities partnered to establish how to utilise underground mine water to address heightened water supply and demand challenges caused by industrial, commercial and residential growth in the area. After intensive research the eMalahleni Water Reclamation plant was commissioned in 2007. The plant desalinates underground water from the mines in the area. By doing so, it has addressed serious operational and safety challenges, prevented polluted mine water from decanting into the local river system while providing a guaranteed water supply for the operations of nearby collieries. The plant currently treats 30 million litres a day, producing potable water for use by the local municipality. This water supply provides the eMalahleni community with the capacity to address long-term climate adaptation risks.

First National Bank, Sasol and Tower Technologies

Collaboration between FNB, Sasol and Tower Technologies resulted in an innovative approach to develop new affordable housing made from mining and manufacturing by-products. This panel-based alternative building system delivers housing units in a shorter period, which are stronger and better insulated than conventional brick and mortar houses. The building system ensures a cost saving of between 10% and 30% compared to conventional building systems, depending on locality, and each housing unit saves up to 25 tons of bricks and cement. This adaptation project builds the

resilience of the communities receiving housing, making them less vulnerable to extreme weather events, heat waves and other environmental shocks.

Practice 4: Companies are making informed decisions

“Sufficient accurate data are needed along with good understanding of why climate risks need to be accounted for”

– De Beers

Regardless of the sector in which a company operates, businesses are using data to make informed decisions around how their company can adapt to climate change. According to the GreenCape Market Intelligence Report 2016 on Agriculture, the adaptation opportunities identified in the agricultural sector include: alternative energy sources and energy efficiency technologies, water use efficiency technologies, precision agriculture techniques and environmentally-friendly alternatives to chemical inputs (GreenCape 2016: 9). The Market Intelligence Report 2016 on Water details how businesses are recognising “the risk that water may have on their profitability and long-term viability” and are using this information to develop collective water stewardship approaches (GreenCape, 2016: 43).

In building organisational adaptation strategies, companies are supplementing their adaptation management strategies with robust climate data that informs decision-making. A number of companies have conducted climate-related vulnerability assessments of their operations or have used climate-specific risk models to analyse climate change impacts. Most of the companies that have indicated that they have undertaken detailed vulnerability assessments are companies at greater risk of direct climate impacts, including companies such as Sasol, Eskom and those in the mining and insurance sector. Such companies typically:

- Are highly dependent on the long-term availability of a key commodity or natural resource(s)
- Have operations in high-risk locations such as drought or flood-prone areas
- Have a direct financial interest in risk management and disaster risk reduction due to the above two factors (insurance and finance)

Companies that do not fall into this classification and not necessarily less at risk from climate change impacts, however, the risks may not be as apparent, leading to fewer of these companies conducting vulnerability assessments. In addressing the challenge of finding user-friendly climate data, companies have undertaken vulnerability assessments in partnership with research institutions, subject matter experts or external consultants. Although these assessments are costly and time-consuming, companies have indicated the value of using these assessments as the basis to build organisational resilience in the short and long-term.

Specific company examples include the following:

Anglo American

Anglo American uses regional climate modelling to assess long-term strategies for increasing the resilience of its operations and projects. In partnership with climate change assessment and data modelling experts such as Imperial College London, and more recently the United Kingdom (UK) Met Office, they have developed regional climate change models. This information enables Anglo American to establish and maintain a risk/opportunity inventory and to incorporate climate change

risks and adaptation requirements as key considerations in mine planning, project prioritisation and development.

Eskom

Eskom has an overarching strategy, approved at Board and Executive Committee level, which guides the organisation's undertaking of a number of climate change impact studies and vulnerability assessments. The purpose of this work is to inform the development of company strategies that ensure business continuity, increase adaptive capacity and support long term resilience, with the end goal to reduce the overall cost of adaptation and minimise operational disruptions.

In order to continuously understand the science of adaptation and further inform vulnerability assessments, these science-based research projects have been executed in partnership with the Climate Systems Analysis Group (CSAG) at the University of Cape Town (UCT), the CSIR and the University of KwaZulu-Natal. Specific projects undertaken by Eskom in this regard include the following:

- An assessment of projected changes in weather extremes
- An assessment of projected changes in summer rainfall and associated extreme storms
- The development of an operational short-range weather prediction system (15 km resolution)
- The development of an operational seasonal weather prediction system (50 km resolution)
- The development of six RCP4.5 and RCP8.5 scenario projections over Southern Africa for 1961-2100, with a focus on the 2030 and 2050 timelines (8 km resolution)
- The development of six RCP4.5 and RCP8.5 scenario projections at a global level for 1961-2100, with a focus on the 2030 and 2050 timelines (50 km resolution)
- An assessment of extreme events and renewable energy systems
- A coal supply-chain vulnerability assessment

Santam

Santam's Eden project was developed based on climate data gathered in partnership with UCT, CSIR and the World Wildlife Fund (WWF) South Africa. The study has enabled Santam to identify the key drivers of climate change risks namely fire, alien invasive species, flooding and coastal storm surges and to identify and fund projects to address these risks. One of the initiatives included sponsoring an early warning system and electronic sign board for the Eden Municipality, which provides local businesses and communities' access to emergency message alerts in English, Afrikaans and isiXhosa.

Box 3: Santam's Eden study

Findings from the Eden project study confirmed both Santam's claim experience history as well as the scientific community's predictions of increasing climate risk. The study indicated that the number of high risk fire periods in the Eden District Municipality is likely to increase by approximately 41% for the period 2020 to 2050 compared to 1960 to 1990. Further to this, the number of intense rainfall days (>20mm) per year were predicted to increase by 36% in winter months for the period 2020 to 2050 compared to 1960 to 1990. Finally, the occurrence of extreme wave run-up events, recorded as recently as 2007, is expected to be six times greater due to a predicted sea level rise of 1m by 2100. Perhaps the most significant outcome was not that the study reflected the occurrence of climate change, but that land use management and risk management actions can be effectively used to manage these risks and improve resilience to reduce exposure and thus enhance adaptation to these changes.

Source: Insurance in a changing risk landscape. Available online: http://www.unepfi.org/fileadmin/documents/insurance_changing_risk_landscape.pdf

Sasol

In 2012, Sasol commenced a study to estimate the financial losses associated with extreme weather events during the past decade and to establish the readiness of its South African plants for extreme weather events. The study also analysed climate change projections for the short (to 2025), medium (2025 to 2050) and long-term (2050 to 2090). The study enabled Sasol to develop readiness and plant design procedures, re-evaluate maintenance plans and develop early warning systems and improved emergency response measures based on its operational risk profile.

Royal Bafokeng Platinum

KPMG worked with Royal Bafokeng Platinum to undertake a climate change vulnerability assessment in terms of the range of possible impacts on the mine's operations. The assessment used a framework approach to assess vulnerability by understanding the context in which the business operates and how climate impact can add an existing stressor to an already vulnerable situation or amplify a latent vulnerability (with resulting business risks for the company's operations). An example is how an environmental shock such as heat stress could add to an underlying vulnerability such as poor nutrition within the workforce and the resultant impact on employee wellness and productivity.

FirstRand

FirstRand's internal strategic risk identification processes are supported through regular reviews of trends in the market place, economy, customers and investors, including risks related to climate change. The risk review processes in turn informs the annual review of the business strategy and business plans for the FirstRand Group.

4 Lessons learnt: the way forward for companies

Climate Change Challenges and Opportunities for Companies

Climate change brings opportunities for companies, but it also creates a number of new challenges. Although some companies and sectors are more at risk than others, the reality is that all organisations will experience the impact of climate change to some degree in the near future. Many companies have already begun to experience climate-related risks and cost drivers. As such, companies are realising that inaction is not an option and have already embarked on building business adaptation strategies to capture the competitive advantages that accrue from more effectively managing these risks.

Respondents that have already implemented adaptation planning within their organisations have identified four key approaches that enhance the success of building climate change resilience. These four key insights are outlined below:

Key insight 1: Leadership involvement and buy-in is key

“Without buy-in from senior and executive management it will be a futile journey”

– Woolworths

The Role of Leadership and Executive Management

In order for business to become more resilient it needs to institutionalise the capacity and capabilities to adapt quickly, comprehensively and continuously to climate-related risks. This can only be achieved through the leadership, commitment and support of executive management and the implementation of supportive policies, adequate resources and a clearly communicated vision.

Senior leaders within the organisation need to be convinced that addressing climate change and associated risks will build business resilience and protect against factors that threaten long-term value, whilst also potentially providing new business opportunities. In this regard, sustainability/environmental practitioners have a key role to play in building the business case and securing buy-in by clearly articulating the operational and financial value of adaptation planning.

“Leadership from the Board level is critical to ensure that climate change is taken seriously at all levels of the organisation”

– Exxaro

Senior management must be fully engaged and play an active role in setting the resilience agenda at all levels of the organisation. This effort should reach out broadly across the company to include all people who must be part of risk identification and the implementation of climate change actions. It is critical that senior management ensure they raise adequate awareness and secure an environment where the relevant skills, culture and language are developed to build business resilience.

“Undertake a business case analysis as early as possible”

– Sasol

Defining a Clear Business Case

Businesses action in implementing adaptation planning is most likely to occur when the benefits outweigh the costs. For companies to take climate action there needs to be a clear commercial rationale. It is therefore critical to translate climate-related risks and opportunities into business language and to develop the business case for adaptation planning. The best way to translate climate change related risks and opportunities is to use business language (profitability, disruption, staff welfare, client and customer service, liabilities, added value, winning business, loss of reputation, insurance costs, changing asset value, and constraints on future business) through the development of a business case and to tailor the business case argument for each level within the organisation. An organisation needs to be able to describe climate change risks and opportunities using quantitative information or illustrative market examples.

The importance of planning for sustainability risk is a key driver in defining the business case. Goldman Sachs highlighted the importance of this in a report entitled ‘The Window for Thermal Coal Investment is Closing’ which inspired Transnet to integrate the inherent risks into their coal transport planning going forward, specifically in defining the business case around infrastructure and long term planning.

The business case will also have to take into account the risks posed to the company’s current business model, and the opportunities that will create business value in the long run. It is also important that the business case is tailored for each level of the organisation as adapting to climate change will entail adjustments and changes at every level – which requires buy-in and clearly articulated business values.

Key insight 2: Early vulnerability stock take and assessments are important

“Knowledge of climate change trends needs to be understood within the context of the business and adaptation measures should be quantified and planned for prior to tendering and/or implementation”

– Group Five

In order to build climate resilience, organisations have to first understand the vulnerability of their operations, value chain, communities and surrounding environment to climate change impacts. A detailed vulnerability assessment can help an organisation understand key environmental, socio-economic, infrastructure and demographic conditions and associated trends, all of which influence the vulnerability of operations to a changing climate.

Although relatively costly, respondents have highlighted the value of partnering with researchers, universities or subject matter advisory services in executing and updating vulnerability assessments and ensuring that the data is reliable.

The assessment should analyse climate impacts over the long and short-term to develop forward-looking assumptions about changes in the risk profile of extreme weather and climate change. Framing the assessment as a business resilience exercise as opposed to a climate change assessment, and using existing risk management frameworks will allow for consistent interpretation of likelihood, impact and residual risk and reduce the impact of individuals sceptical about climate change.

Once organisations understand the current and future business risks they are better equipped to implement short, medium and long-term adaptation actions to address climate change. Adaptation actions could include using more resource-efficient production techniques, conserving natural resources upon which they and communities depend, safe-guarding infrastructure and building capacity throughout their value chain to manage extreme weather events.

“Develop metrics to track vulnerability and resilience over time”

– Sasol

The vulnerability assessment should ideally be used to raise organisational awareness, support long and short-term decision making and identify appropriate adaptation strategies and actions. It is critical to incorporate resilience-related corporate targets or goals, and to develop a range of measures and performance indicators to reflect climate-resilience priorities, risks and opportunities.

Key insight 3: Integrate climate change adaptation into core strategic business planning and management processes

“Internalise climate change challenges into corporate strategy and the value chain”

– Industrial Development Corporation

Incorporate Adaptation Strategies into Business Process

Adaptation strategies must be embedded into corporate and unit level decision making, business planning and management processes. There are several approaches to achieve this, as outlined below:

- Traditional risk management processes can be adapted to include climate change risks, rather than seeking to develop new or parallel approaches. The risk assessment should include risks within the organisation’s operations, value chain and the environment and communities in which it operates
- Climate change risks and opportunities must be translated into traditional business language. It is critical to articulate how climate risks will impact future growth, costs and risk profile as well as the business advantage and opportunities of incorporating adaptation strategies
- Ownership for climate risk management and adaptation should be taken at all levels of the organisations; roles and responsibilities should therefore be clearly assigned and understood

- Adaptation must be seen as a key component of financial and business performance. It is therefore critical that adaptation actions are linked to the key performance indicators of business units and personnel
- It is important that awareness and understanding is raised to such an extent that climate risks are fully considered within business decision making processes across the organisation. It is therefore important that risk reporting is integrated into regular upward and downward Board and governance communications and that the company has the required internal skills and culture needed to build organisational resilience

Anglo American has been able to successfully bring operational, financial and sustainability disciplines together through the development of the Sustainability Valuation Approach (SVA). The SVA is a methodology that aims to determine the financial value of sustainability considerations, including adaptation, in all project and operational decisions. **Altron** has also developed a Sustainability Manual which is used along with annual carbon data and other sustainability indicators to develop each individual business unit's climate change strategy.

Transnet has started building system improvements into where they locate branches and operating facilities, including incorporating necessary changes into the design and building of infrastructure by making different assumptions about flood occurrence or sea level rise implications.

Key insight 4: Engage, collaborate and partner

“Collaboration is key”

– Engen

Enhanced Engagement, Collaboration and Partnerships

Climate change risks cannot be addressed by a single organisation. Enhanced engagement, collaboration and partnerships between government, business and civil society are fundamental for an effective response to climate change. In this regard the private sector has an important role to play in initiating and maintaining collaboration.

Partnering with the Public Sector and Business Support of Government

Partnering with the public sector can be an effective strategy for companies to build resilience in areas of their value chain that they do not control, such as critical transportation networks, electricity grids and infrastructure. Further to this, as the options and incentives for business adaptation decisions will be greatly influenced by policies and institutional arrangements, business collaboration with national and local government is essential. Business should therefore engage in dialogue with government to ensure that regulatory and institutional frameworks support the effective management of climate risks, provide the right incentives for investment in adaptation and ensure that sector-based adaptation responses capture the operational realities of companies.

Business can support government in building capacity in terms of climate change research, modelling and tool development. Another vehicle for facilitating collaboration between business and government is public-private partnerships between relevant government agencies, for example the

Department of Environmental Affairs and industry-sector trade associations. Sector trade associations can play an important role in developing tools and methods (such as standards, work practices and guidelines) that allow individual companies across the sector to meet their corporate objectives. Specific projects can also be implemented based on a public-private partnership approach, drawing on initiatives such as the eMalahleni Water Reclamation project.

“Share learnings within and outside the company with a view to establish a platform to leverage best advice”

– Sasol

Given that the clusters of issues related to extreme weather and climate change impacts tend to be common to a sector, engagement with peers on non-competitive climate challenges can benefit organisations through sharing costs, knowledge and resources. It is also important to leverage different skills, knowledge and disciplines within an organisation for the benefit of developing a holistic adaptation strategy.

“Form strong partnerships with entities on the ground”

– Santam

Successful adaptation will entail building resilience beyond organisational boundaries to include the value chain, communities and the environment in which a company operates. Engagement is therefore critical in understanding climate risks that pose a threat to business viability and civil society as a whole, as well as establishing partnerships to find workable solutions.

Box 4: What is the NBI doing in the adaptation space? (FY ending July 2017)

- The NBI is driving courageous conversations around collective action and adaptation planning, specifically under the National Development Plan project. Please contact the NBI if you would like to find out how you can collaborate with other companies working in a similar space – for example around water stewardship within a particular context
- The NBI provides business support to companies through continuous data gathering as the local partner of CDP, as well as via case study presentations
- As an organisation, the NBI strives to raise awareness amongst our members regarding the importance of accurate data in climate change decision making and internal resource planning. We will be hosting a number of workshops and capacity building sessions with the WITS Global Change Institute (GCI) to support our members in understanding climate change modelling, data accessibility and data use (see Box 1)
- The NBI continually connects our membership and business community with key government officials and supports government working groups
- Finally, the NBI has a proposed project on the reduction of food waste in support of regional food security in the pipeline

5 Conclusion

Successful organisations are those that best adapt to a continually changing market landscape and its associated risks, whether economic, social or environmental. These companies are able to anticipate market changes and adapt their business model, products and services to ensure that they remain relevant and competitive.

These companies will also need to obtain the buy-in and support of key senior and executive management in the importance of doing vulnerability stock-takes, supported by relevant data and metrics to track these changes over time. As such, they view organisational risks and opportunities holistically and have an integrated approach to building a sound business case for incorporating resilience strategy within their organisations, supply chains, surrounding environment and the communities in which they operate.

An important aspect of business resilience in the twenty-first century pertains to incorporating climate change into company thinking and practice in an integrated manner. As evidenced by the CDP in South Africa, the number of responder companies adopting this integrated approach to climate change has almost doubled in the past six years (Figure 4).

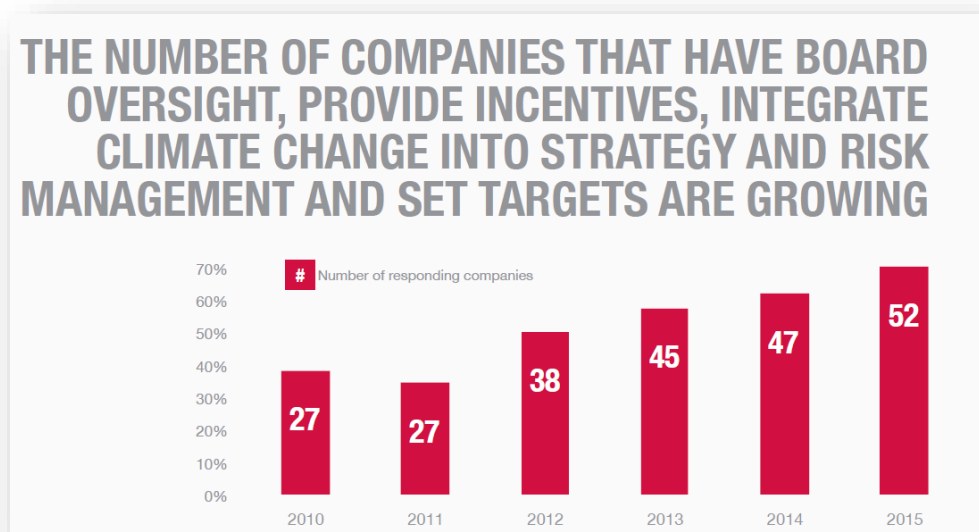


Figure 4: CDP 2015 – Number of companies displaying integrated approaches to climate change

It is clear that a number of South African organisations have already incorporated climate change into their existing risk and continuity management processes. They have also identified innovative solutions to reduce operational costs, use resources more efficiently, introduce new products and services and build resilience within their supply chains. They have collaborated with and continue to partner with their peers, government and civil society to strengthen their own resilience, as well as the resilience of the communities and environment that their businesses depend on. The private sector has an important role to play in both initiating but also maintaining collaboration efforts going forward.

While a number of South African companies have made good strides in building climate resilience, there remains a long way to go for many domestic businesses. Fortunately, certain companies have begun to take the lead in showing that climate resilience can lead to new business opportunities, foster economic growth and build competitive advantage. Key insights from these company efforts, as outlined in this report, are worth considering:

- Organisations will have to build a strong business case for adaptation planning
- In order to achieve desired outcomes going forward, businesses should scale up engagement with government and other stakeholders to create policy and institutional frameworks conducive to adaptation planning and project implementation
- Collaboration among businesses is key in providing economies of scale, as well as pooling skills and effort in addressing climate risks
- The use of existing company risk management frameworks is central to ensuring that climate risks are identified and managed

Business now operates in a new climate of risk, with many companies already facing up to climatic changes. Business resilience in the face of these changes is critical to operations, supply chains and the well-being of surrounding communities. Business is and must remain at the forefront of adaptation planning, including the financing and implementation of solutions to address a rapidly changing climate.

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The National Business Initiative is a voluntary coalition of South African and multinational companies, working towards sustainable growth and development in South Africa and the shaping of a sustainable future through responsible business action. Since our inception in 1995, the NBI has made a distinct impact in the spheres of housing delivery, crime prevention, local economic development, public sector capacity building, further education and training, schooling, public private partnerships, energy efficiency and climate change.

The NBI is a global network partner of the World Business Council for Sustainable Development (WBCSD), the focal point of the United Nations Global Compact (UNGC) Local Network in South Africa and an implementation partner of the CEO Water Mandate, We Mean Business and the CDP.

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