



THE COST ESTIMATE FOR IMPLEMENTATION OF THE NATIONAL CLIMATE CHANGE ADAPTATION STRATEGY SEPTEMBER 2019

FINAL REPORT



environment, forestry
& fisheries

Department:
Environment, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

Author: Department of Environment, Forestry and Fisheries
Editing and design: String Communication



**THE COST ESTIMATE FOR IMPLEMENTATION OF THE
NATIONAL CLIMATE CHANGE ADAPTATION STRATEGY**
SEPTEMBER 2019

FINAL REPORT

The report *The Cost Estimate for Implementation of the National Climate Change Adaptation Strategy* was produced by South Africa's Department of Environment, Forestry and Fisheries with financial and technical support from the NAP Global Network. The report was developed by Cowater International.

Any opinions stated herein are those of the author(s) and do not necessarily reflect the policies or opinions of the NAP Global Network, funders or Network participants.



United States In-Country National Adaptation Plan (NAP) Support Program

Gift of the United States Government



In collaboration with:



Implemented by:



Initial funding for the Network also provided by:



Federal Ministry
for Economic Cooperation
and Development

TABLE OF CONTENTS

1	INTRODUCTION	3
1.1	Approach and methodology	3
1.2	Scope.....	5
1.3	Linkages with other costings.....	6
1.4	Limitations.....	6
2	CONTEXT	7
3	COST ESTIMATE FOR THE STRATEGIC INTERVENTIONS.....	8
3.1	Intervention 1: Reduce human and economic vulnerability, ensure resilience of physical capital and ecological infrastructure and build adaptive capacity.....	8
3.2	Intervention 2: Develop a risk, early warning, vulnerability and adaptation monitoring system for key climate vulnerable sectors and geographic areas	12
3.3	Intervention 3: Develop vulnerability and resilience methodology framework that integrates biophysical and socio-economic aspects of vulnerability and resilience.....	14
3.4	Intervention 4: Facilitate mainstreaming of adaptation responses into sectoral planning and implementation.....	16
3.5	Intervention 5: Promote research application, technology development, transfer and adoption to support planning and implementation	18
3.6	Intervention 6: Build the necessary capacity and awareness for climate change response	20
3.7	Intervention 7: Establish effective governance and legislative processes to integrate climate change in development planning	22
3.8	Intervention 8: Enable substantial flows of climate change adaptation finance from various sources....	23
3.9	Intervention 9: Develop and implement an M&E system that tracks implementation of adaptation actions and their effectiveness.....	25
4	CONSOLIDATED COST ESTIMATE.....	27
5	DATA SOURCES.....	36

LIST OF TABLES

Table 1: NCCAS Strategic Interventions	7
Table 2: Estimated Costs for Strategic Intervention 1	9
Table 3: Strategic Intervention 1 Synergies	10
Table 4: Synergies between actions under Strategic Intervention 1	11
Table 5 Previous and current progress towards Strategic Intervention 1	12
Table 6: Estimated Costs for Strategic Intervention 2	13
Table 7: Strategic Intervention 2 Synergies	14
Table 8 Previous and current progress towards Strategic Intervention 2	14
Table 9: Estimated Costs for Strategic Intervention 3	15
Table 10 Strategic Intervention 3 Synergies	16
Table 11 Previous and current progress towards Strategic Intervention 3	16
Table 12: Estimated Costs for Strategic Intervention 4	17
Table 13 Strategic Intervention 4 Synergies	17
Table 14 Previous and current progress towards Strategic Intervention 4	18
Table 15: Estimated Costs for Strategic Intervention 5	19
Table 16 Strategic Intervention 5 Synergies	20
Table 17 Previous and current progress towards Strategic Intervention 5	20
Table 18: Estimated Costs for Strategic Intervention 6	21
Table 19 Previous and current progress towards Strategic Intervention 6	22
Table 20: Estimated Costs for Strategic Intervention 7	23
Table 21 Previous and current progress towards Strategic Intervention 7	23
Table 22: Estimated Costs for Strategic Intervention 8	24
Table 23 Previous and current progress towards Strategic Intervention 8	24
Table 24: Estimated Costs for Strategic Intervention 9	25
Table 25 Previous and current progress towards Strategic Intervention 9	26
Table 26: Consolidated estimate of costs for each Strategic Intervention	27

LIST OF FIGURES

Figure 1: Overview of the Strategy Costing Process	3
--	---

1 INTRODUCTION

The purpose of this report is to present an initial cost estimate for the implementation of strategic interventions defined in South Africa's National Climate Change Adaptation Strategy (NCCAS). The strategy, which elaborates the national adaptation planning for the country, will also be regarded as the National Adaptation Plan (NAP). The NAP is a key mechanism mandated under the United Nations Framework Convention on Climate Change, and acts as a common reference point for adaptation efforts in the short to medium term, providing guidance across all levels of government and informing national, provincial and local planning. The NCCAS also seeks to provide guidance to the private sector and civil society. It is overseen by the Department of Environmental Affairs (DEA).

To support the DEA in identifying the steps to be taken to facilitate a smooth transition to implementation when the NCCAS is approved and adopted, there is a need to develop an initial cost estimate. The purpose of the cost estimate is to contribute to building a business case for climate change adaptation in the country by providing a budget for the activities identified in the NCCAS as contributing towards adaptation in South Africa. The cost estimate outlines the estimated cost implications of the minimum required capacity to implement the nine strategic interventions and associated actions of the NCCAS, including human resources, infrastructure, equipment and technology, capacity development, and operational costs. The cost estimate provides a realistic breakdown of the total amount of funds that need to be secured from the government budget and donors to support the implementation of the NCCAS over the short (1-3 years) and medium (4-10 years) term, reflecting the

lifespan of the strategy and what can realistically be achieved over that period.

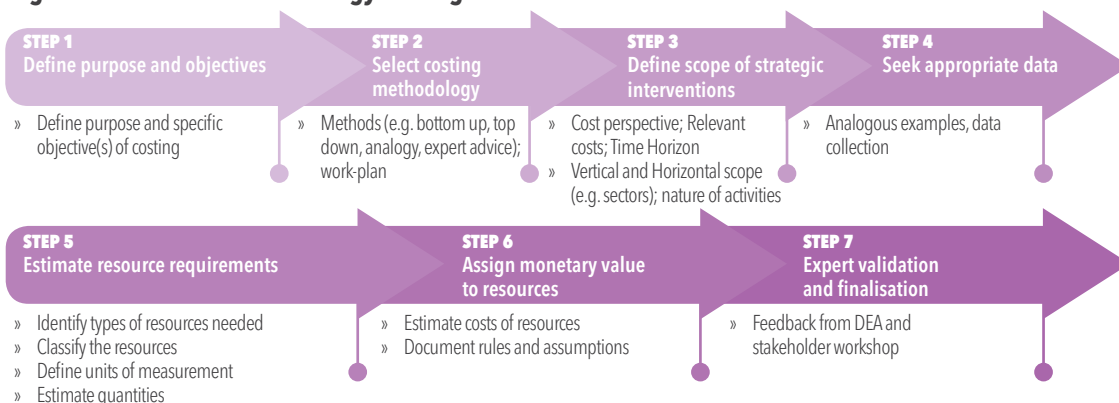
This assignment is commissioned by the South African Government through DEA, with technical support from the NAP Global Network through the US In-Country NAP Support Program. This program is designed to provide targeted technical support in order to facilitate NAP implementation, responding to capacity gaps identified by the DEA. The in-country support program is coordinated and administered by the International Institute for Sustainable Development (IISD), the Secretariat of the NAP Global Network, in collaboration with USAID colleagues.

1.1 Approach and methodology

This report outlines the resource requirements and associated costs for the implementation of strategic interventions defined in the NCCAS. At the strategy planning stage, costs are assigned to actions and associated activities identified from the strategic interventions. Recognizing that some sectors are more advanced than others and already have their own plans in place, whilst others are still in need of guidance, the purpose of the cost estimate for the NCCAS is to provide overall costing, taking into account that there are already some existing commitments in place to achieve the objectives. The approach taken has been realistic, taking into account the South African context and the minimum required capacity for the implementation of strategic interventions.

The approach to developing the cost estimate for strategic interventions is based on a phased approach, involving several stages, outlined in Figure 1.

Figure 1: Overview of the Strategy Costing Process



A mixed-methods approach, utilizing bottom-up, top-down (or parametric) costing and analogy costing was used to develop the cost estimate. For example, bottom-up costing was used for distinct activities with clear outputs; parametric costing for programs or activities for which less details were available; and analogy costing for the replication of similar programs. Data on types and quantities of resources were estimated by technical experts based on activities being costed and information on previous similar activities. Data on costs of resources were informed by desk research on donor budget documents, government expenditure and budget data from the National Treasury, market prices and various analyses and studies, and other relevant sources, where necessary and available.

The sources from which the data was collected include government departments, such as DEA, and donor agencies championing climate change projects, such as GIZ, as well as other donor-funded projects, research institutions, and implementing organizations (for more information on stakeholders consulted, see Annexure 3).

Budget information from project documents for analogic interventions supporting climate change adaptation in South Africa and similar contexts were also used to estimate resource requirements and associated costs. A focus was placed on collecting essential data that was feasible to collect to minimize the burden on all stakeholders, with attention on capturing large expenditure items, instead of focusing on data that is likely to have negligible impact on the results. If the data was not readily available, proxies or assumptions were used, assuming that validity was not compromised. In all cases, source information is available so that there is transparency in the reasoning applied, and credible lines of evidence to support the aggregated activity and strategic intervention-level estimates.

The calculation of costs for each strategic intervention is based in the estimation of types and quantities of resources required, in physical units of measurement, and the assignment of monetary value to estimated resources based on readily available data and proxies, either from South Africa or other countries with similar contexts in terms of scope, costing profile, and status with regards to adaptation planning and implementation.

This process first involved defining the scope of each strategic intervention and action based on information provided in the NCCAS, with particular attention placed on the definition of vertical (national, provincial, municipal), horizontal (sectors), and timeframe for implementation (short to medium term) for each action. Following the definition of

scope for each strategic intervention and associated action, resource requirements and associated costs for actions under each strategic intervention were estimated according to human resources, infrastructure, equipment and technology, capacity development, and operational costs, through the application of various costing methodologies to each action.

The estimated costs for associated actions were then aggregated to calculate costs at the strategic intervention level (e.g. resource requirements and costs associated with. Action 1.1.1 under Strategic Intervention 1; Action 1.1.2 under Strategic Intervention 1 etc.). Please refer to Annexure A for the detailed estimation of costs for actions under each strategic intervention and Annexure B for the methodology applied to calculate costs.

Note: These conversion rates have shifted substantially in COVID-19 and rating downgrade scenario.

All costs are reflected in South African Rand (ZAR) and in United States Dollar (USD). Depending on the data sources, the majority of data sources were in ZAR and the cost summary would be reflected in both ZAR and USD using an exchange rate of **USD 1: ZAR 14**. A small number of data sources were in Great British Pound (GBP) and in this instance a rate of GBP to USD of **GBP 1: USD 0.77** was used. A few data sources were in Euros and in this instance an exchange rate of **EUR 1: USD 0.9** was used. Costing has been undertaken using currently-available costing information. However, recognising that inflation will have an effect over the 10 year lifespan of the NCCAS, the overall costing in ZAR at an inflation rate of 6% and in US\$ at an inflation rate of 3% has also been calculated on the annual totals (compiled through aggregating the costs of each activity under each strategic intervention) in order to give an indication of how this amount will change over time.

South Africa has already commenced its adaptation journey and thus some progress has been made towards some of the strategic interventions and activities in the NCCAS. Where available, budgets have been used to inform costing and any such and any such progress has been taken into account when delineating a reasonable scope for activities in order to determine budgets. Reference to projects and programmes that contribute progress to each strategic intervention have been noted. Costing has been informed by where gaps exist, and the scale of these gaps.

The initial cost estimate has been revised following feedback from DEA and IISD in May 2019 and multiple stakeholders from within and outside government in August 2019.

1.2 Scope

The scope of the cost estimate is based on the latest version of the draft NCCAS (v.4), and considers the estimated costs and resource requirements for the implementation of strategic interventions across key sectors and by all levels of government, including national, provincial, district municipality, and municipality, in the short (1-3 years) and medium term (4-10 years). The definition of the scope of the cost estimate involved the establishment of several key parameters for each intervention, including the basis for costing, cost perspective, relevant costs, time horizon, and vertical scope.

The **basis for costing** is organized around the nine strategic interventions identified in the NCCAS. For each strategic intervention, the details of the estimated costs for each action were calculated, including costs associated with human resources, infrastructure, equipment and technology, capacity development; and operational costs. The cost estimate also identifies synergies across strategic interventions (e.g. places where investing in human resources for one intervention will also cover another), as well as linkages to existing government and donor funded projects and programmes.

The **cost perspective** considers costs incurred by the government/public sector for the purpose of estimating total costs for government resource planning.

The **relevant costs** included in the cost estimate considers the full financial costs (e.g. financial outlays for resources) that will be consumed for the purpose of the implementation of strategic interventions identified in the NCCAS. The relevant costs are not deducted where existing activities are already being (partly) implemented, but instead it is noted when this is the case.

The **time horizon** for the cost estimate considers relevant financial costs required for the implementation of strategic interventions outlined in the NCCAS over the short (1-3 years), and medium (4-10 years) term, costed according to the highest bracket of the timeframe for each action under strategic interventions, thereby allowing realistic annual contributions towards long-term goals that will not be completely met within the 10-year lifespan of the NCCAS. The total cost estimate therefore refers to the 10-year implementation lifespan, but should be reviewed and revisited every 5 years in line with the review of the NAP to reassess priority areas for resource allocation for adaptation planning.

As the NCCAS acts as a common reference point for adaptation efforts across all levels of government

in South Africa, the **vertical scope** considers costs of resource allocation for activities implemented by institutions at national, provincial and local levels (district municipality and local municipality).

Given the NCCAS's cross-sectoral and economy-wide approach to climate change adaptation, the **horizontal scope** of the cost estimate includes the estimated costs for actions associated with strategic interventions across all sectors. The horizontal scope considers the costs of resource allocation across government departments and is based on the implementation arrangements of the NCCAS.

The cost estimate includes all relevant costs of interventions across key adaptation sectors, including energy, mining, water, health, human settlements, agriculture, forestry, biodiversity and ecosystems, fisheries, disaster risk reduction, transportation and infrastructure and climate adaptation plans in local and provincial government, as well as administration.

Where it has arisen within the scope of our research for the costing, note has also been made of existing interventions and projects that have either taken place or are underway and are related to the strategic intervention and its scope. This review of past and current progress is indicative rather than exhaustive. Where available, costing information has been sought for projects that constitute past and current progress towards a strategic intervention and used in the costing of that intervention. However, costing has been estimated based on the scoping assumptions outlined, and no reduction has been made for any existing progress towards the strategic interventions.

As the NCCAS is a high level strategic document that outlines the proposed interventions for achieving adaptation goals across all sectors and levels in the country in the short and medium term, the purpose of the cost estimate is not to account for the full costs of implementation, but rather to serve as an initial estimate of required resources and associated costs. Since the NCCAS is a strategy and not an action plan, the scope and scale of many of the activities under the strategic interventions is not specified.

Activity 1.1.1, for example, is to "support the agricultural sector to implement more efficient climate-smart and conservation agriculture practices". It does not specify the scale of this activity in terms of the geographical area or number of farmers that should be covered. The process of costing required that assumptions be made with regard to delineating a realistic scope that shows progress towards the meeting the aims of the

NCCAS, whilst being cognisant of the realities that will govern implementation of the NCCAS. Unlike most costed estimates of adaptation strategies from other countries, here all assumptions and delineations of scope for the activities are transparent. The result of this methodological decision is that the total costing is conservative and realistic, bearing in mind the diverse range of activities in the NCCAS and need to make progress across all the strategic interventions in order to enable adaptation over the lifespan of the strategy. However, more ambitious scoping of activities where assumptions have been made would result in higher overall costs. Availability of greater resources would enable a broader scope of implementation of activities that are ongoing and can easily be scaled up beyond the realistic assumptions made here.

The NCCAS is a high-level strategic document and the cost estimate is based on application of a common approach and methodology as outlined in section 1 to provide an indication of the resources required to implement the specific strategic interventions over the 10-year lifespan. In coming up with the cost estimate it is beyond the scope to consider the modalities for implementation, including actors that should be involved and their capacity, and the relationship with other sector-specific policies, strategies and plans. The implementation plan, and its contextualisation through sectors and geographical units will determine how this takes place. The process of costing implementation at sector or local level and all that it entails is also beyond the scope of this initial high-level costing.

1.3 Linkages with other costings

Several other documents also exist which contain estimated costings for implementation of activities that have some complementarity with those outlined in the NCCAS, for example the Nationally Determined Contribution. The health sector adaptation plan also contains estimates of costs. Obviously costing for any intervention depends on the scope, and the scope differs depending on the purpose of the document. Many costings provide only bottom line figures without detail on how they are arrived at. As outlined in section 1.1, here we have been very transparent with the methods we have used, sources of data, assumptions, and decisions regarding scoping of strategic interventions. The purpose of the NCCAS is also to outline adaptation actions (and associated costs) for the coming 10-year period as opposed to the total anticipated costs of adaptation over the longer term, as in the NDC. Thus the costing of the NCCAS, as with the costing of other documents, should be evaluated within their scope. The costing of the NCCAS is consistent with the NDC bearing in mind the different scopes of the documents.

1.4 Limitations

The limitations of the cost estimate are informed in part by the high level of uncertainty in costing for adaptation, as well as strategy-level costing. As the NCCAS is a high-level strategic document that outlines the proposed interventions for achieving adaptation goals across all sectors and levels in the country in the short and medium term, the purpose of the cost estimate is not to account for the full costs of implementation, but rather to serve as an initial estimate of required resources and associated costs.

In addition, given that the estimation of resource requirements and costs associated with strategic interventions and actions is highly dependent on the definition of scope and relevant indicators (for example, the number of climate-resilient management plans developed and the number of climate-resilient projects implemented), the cost estimate is meant to be indicative of resource requirements and costs, and refined as the implementation strategies and approaches for strategic interventions of the NCCAS are elaborated, and the priorities are clarified.

To enable better understanding of cost information by decision makers and facilitate future revisions of cost calculations based on later versions of the NCCAS, the cost estimate explicitly states assumptions for all cost calculations at the action level. For this purpose, all calculation details have been documented in Annexure A for each action, stating information on resources requirements, estimated unit costs, and assumptions to support the NAP team in the DEA to adjust costs and resource requirements according to the desired scope of activities. In this way, the initial cost estimate will serve as a working document for the NAP team to adjust costs according to later versions of the NCCAS, refining the definition of resource requirements and costs over time.

Data on resource requirements and costs of resources were informed by donor budget documents, government staff salary data, market prices and various analyses and studies, and other relevant sources, where necessary and available. If the data was not readily available, proxies or assumptions were used, assuming that validity would not be compromised, and all assumptions stated in the cost calculations. The cost estimate has been developed using the best available data in view of the lack of precedents on how to cost adaptation strategies (and absence of transparent methodology in similar documents in other countries), the scope of the assignment to provide strategy-level costing that is realistic, applicable and appropriate to the South African context.

2 CONTEXT

South Africa's process to develop the National Climate Change Adaptation Strategy (NCCAS) began in 2014 and is intended to be presented shortly to the Minister (pending gazetting). The vision of the NCCAS is to "transition to a climate resilient South Africa, which will follow a sustainable development path, guided by anticipation, adaptation and recovery from a changing climate and environment to achieve our development aspirations". The NCCAS meets international obligations under the United Nations Framework Convention on Climate Change (UNFCCC), as well as implementing national policy commitments under the National Climate Change Response Policy (NCCRP). Related to the UNFCCC, as well as forming South Africa's NAP, the NCCAS also considers the six adaptation goals outlined in the Nationally Determined Contribution (NDC), and thus acts as an implementation strategy against which progress can be monitored. At the national level, the NCCAS has been developed to implement the NCCRP but also advances that by including additional sectors, such as energy, transportation and mining, that were previously only considered relevant to mitigation activities.

The NCCAS provides a framework for systematic and coordinated adaptation planning and response across the various sectors in the country, taking into account the urgent and immediate needs of vulnerable communities to adapt to the adverse effects of climate change. South Africa's NCCAS outlines the nine strategic interventions where the government needs to make investments in order to create an enabling environment and facilitate implementation of interventions for climate change adaptation and resilience building.

The NCCAS is based around four strategic objectives and nine strategic interventions with corresponding actions and outcomes, directed towards achieving the vision of the transition to a climate-resilient South African. Each strategic intervention has a dedicated Chapter to outline the envisaged actions associated with the intervention and the expected outcomes.

The strategic interventions of the NCCAS are presented below:

Table 1: NCCAS Strategic Interventions

I.1	Reduce human and economic vulnerability, ensure resilience of physical capital and ecological infrastructure and build adaptive capacity.
I.2	Develop a risk, early warning, vulnerability and adaptation monitoring system for key climate vulnerable sectors and geographic areas.
I.3	Develop a vulnerability and resilience methodology framework that integrates biophysical and socio-economic aspects of vulnerability and resilience.
I.4	Facilitate mainstreaming of adaptation responses into sectoral planning and implementation.
I.5	Promote research application, technology development, transfer and adoption to support planning and implementation.
I.6	Build the necessary capacity and awareness for climate change response.
I.7	Establish effective governance and legislative processes to integrate climate change in development planning.
I.8	Enable substantial flows of climate change adaptation finance from various sources.
I.9	Develop and implement a monitoring and evaluation (M&E) system that tracks implementation of adaptation actions and their effectiveness

These strategic interventions will put in place the knowledge, resources and systems to enable sectors, sub-national governments and relevant key stakeholders to implement adaptation strategies within the overarching framework of the NCCAS. The

development of a cost estimate for implementing the NCCAS has been identified as a priority to facilitate a smooth transition to implementation when the strategy is approved and adopted.

3 COST ESTIMATE FOR THE STRATEGIC INTERVENTIONS

The following section outlines the estimated costs associated for the implementation of strategic interventions defined in the NCCAS. The calculation of costs for each strategic intervention is based in the estimation of types and quantities of resources required, in physical units of measurement, and the assignment of monetary value to estimated resources based on readily available data.

The approach to developing the cost estimate for strategic interventions is based in a phased approach. This process first involved calculating the resource requirements and associated costs for actions under each strategic intervention according to human resources, infrastructure, equipment and technology, capacity development, and operational costs, applying various costing methodologies to each action.

The estimated costs for associated actions were then aggregated to calculate costs at the strategic intervention level (e.g. resource requirements and costs associated with. Action 1.1.1. under Strategic

Intervention 1; Action 1.1.2 under Strategic Intervention 1 etc.). Please refer to Section 4 which outlines the total costs of the NCCAS based on the consolidated cost estimate; Annexure A for the detailed estimation of costs for actions under each strategic intervention; and Annexure B for the methodology applied to calculate relevant costs.

The following section outlines the aggregated costs for each strategic intervention, providing an overview of what it involves, a description of the costs, and a table showing the details of the estimated costs, organized by the following categories:

- Human resources
- Infrastructure, equipment and technology
- Capacity development
- Operational costs

In addition, the estimate identifies synergies with other strategic interventions (e.g. places where investing in human resources for one intervention will also cover another) and linkages with existing interventions.

3.1 Intervention 1: Reduce human and economic vulnerability, ensure resilience of physical capital and ecological infrastructure and build adaptive capacity

South Africa is already experiencing the negative effects of climate change and is expected to suffer significant consequences in the future. To promote adaptive capacity and increase resilience to these impacts, it is necessary to scale up and replicate adaptation interventions that have been considered effective in reducing human and economic vulnerability, as well as the vulnerability of physical and ecological infrastructure to climate change. The key outcome for this strategic intervention is: Increased resilience and adaptive capacity achieved in human, economic, environment, physical and ecological infrastructure vulnerability (Strategic Outcome 1.1).

Actions under this strategic intervention require the development and implementation of projects and programmes for climate change adaptation across all sectors and at all levels of government, involving cooperation across line ministries and departments, research institutions, civil society, and the private sector. Investment in the necessary

human resources, capacity, infrastructure, equipment and technological requirements for climate change adaptation is therefore essential in order to equip and capacitate sector stakeholders and implementing partners in the implementation of actions supporting adaptation.

This involves a wide range of investments across different departments and sectors, from the scaling up of projects that promote climate smart agriculture and the increased uptake of water conservation technologies to building the capacity of departmental staff, farmer groups, and water-user associations in implementing resilient and adaptive practices for improved ecosystem and community resilience. Investment is also required to account for the additional costs associated with managing the impacts of climate change on different sectors, from investing in climate-resilient public infrastructure to addressing impacts on biodiversity and environmental protection. Across all actions, sectors, and levels, investment is required



to capacitate institutions in planning for and responding to climate change impacts, including ministries and departments responsible for disaster

risk management, agriculture, health, water, fisheries, forestry, transportation and infrastructure.

3.1.1 Description of costs and estimated resource requirements

The costs associated with Strategic Intervention 1 consider the wide range of adaptation projects that are currently being implemented in South Africa in different sectors by government role players such as DEA, provincial and local governments, and state entities such as SANBI, research commissions, non-governmental organisations (NGOs) and business among others, while accounting for synergies with other strategic interventions, as well as ongoing projects supporting similar objectives and outcomes.

capacity development, trainings and workshops, research, programme management, infrastructure, equipment and technology), sector (e.g. water, agriculture, health, disaster risk management, forestry, fisheries), timeframe of implementation (e.g. whether they will last for 1-3 years or 4-10 years) and scope (e.g. national, provincial, municipal).

Please refer to Annexure A for a detailed breakdown of resource requirements and costs associated with individual actions under Strategic Intervention 1.

These costs are informed by the breakdown of estimated resource requirements and costs at the action level, whereby resource requirements and associated costs have been aggregated to estimate the total costs of the intervention. The estimated resource requirements and costs varies across actions based on the nature of the activity (e.g.

The aggregated total costs for Strategic Intervention 1 are provided in Table 2, which outlines the estimated costs associated with the required human resources, infrastructure, equipment and technology, capacity development, and operational costs based on calculated costs at the action level.

Table 2: Estimated Costs for Strategic Intervention 1

Budget Category	Est. Costs (USD)	Est. Costs (ZAR)
Human resources	763,016,847.35	10,682,235,862.84
Infrastructure, equipment, and technology	1 993 327 251,41	27 906 581 519,73
Capacity development	207 818 423,77	2 909 457 932,74
Operational costs	314 178 942,51	4 398 505 195,15
Total costs	3,278,341,465.03	45,896,780,510.47
Total costs (inflation adjusted)	4,405,816,791.94	82,194,143,655.91

Human resources: This includes estimated resource requirements and associated costs for the implementation of specific actions under Strategic Intervention 1. This includes costs associated with staff salaries for finance, procurement, administration, and project coordination and management staff; funding to SANBI programming for biodiversity research, knowledge generation, and policy advice for supporting climate change adaptation; consultancy fees and expenses for commissioning research, conducting needs assessments, and supporting capacity development activities.

Infrastructure, equipment, and technology: This includes estimated resource requirements and associated costs for investments in required infrastructure, equipment and technology for the implementation of specific actions under Strategic Intervention 1. This includes costs associated with fencing and concrete; irrigation; rainwater water harvesting technologies and associated infrastructure; computers, equipment and office supplies; drilling and equipping of boreholes, soil cultivation and irrigation lay-out for the production of vegetables, storage facility, packaging material and mechanization; climate change-related disease

monitoring and surveillance systems; open data platforms, SMS-based alert system; additional costs associated with the development of climate resilient infrastructure; and renewable technologies for the development of small schemes for decentralised electrical production.

Capacity development: This includes estimated resource requirements and associated costs for the development of human and institutional capacity for the implementation of specific actions under Strategic Intervention 1. This includes costs associated with carrying out training and participatory workshops; costs associated with project implementation for climate adaptation

projects and activities; and technical capacity development support.

Operational costs: This includes estimated resource requirements and associated costs for the supply of training material (including papers, photocopying, printing, brochures); hiring of venues, transporting participants, and catering; administrative costs: printing, photocopying, telecoms and other costs related to office operations; development of communication products; production of research, translation, interpretation, and supporting documents and guidelines; vehicle operation and rental associated with project implementation; and miscellaneous expenses and contracts.

3.1.2 Synergies with other strategic interventions

At the strategic intervention level, identified synergies and opportunities for cost efficiencies include:

Table 3: Strategic Intervention 1 Synergies

Strategic Intervention			Actions	Synergies for cost efficiencies
SI	1	2	1.1.11 Support small-scale fishers to become more climate resilient through use of early warning systems and sea-safety training	Human resources, infrastructure, equipment and technology, and capacity development
			2.1.5 Improve/develop national early warning systems for key climate vulnerable sectors and risks	
SI	1	3	1.1.22 Identify individuals and communities at most risk from climate change within local municipalities and deliver targeted climate change vulnerability reduction programmes for these individuals and communities	Human resources and capacity development
			3.1.4 Use the NAVFR to guide local assessments.	
SI	1	4	1.1.18 Plan for the effects of climate change on infrastructure	Human resources and capacity development
			4.2.4 Mandate that all public infrastructure be planned, designed, operated and managed after explicitly taking current and predicted future climate change impacts into account	
S1	1	5	1.1.21 Develop a list of resilience-building projects that can easily be replicated	Human resources, capacity development, operational costs
			1.1.23 Investigate the potential for expanding sectors and kick-starting new industries that are likely to thrive as a direct or indirect result of climate change effects should be considered with actions	
			5.1.7: Continue to invest in research that aims to understand the different impacts of climate change on the environment and society	
			5.1.8 Invest in research on the most effective adaptation responses to different climate change impacts	
			5.1.10 Establish a programme to promote research into new climate change adaptation technologies	

In addition, there are several synergies identified between actions under Strategic Intervention 1. These include:

Table 4: Synergies between actions under Strategic Intervention 1

Actions	Synergies for cost efficiencies
1.1.1. Support the agricultural sector to implement more efficient climate-smart and conservation agriculture practices	Infrastructure, equipment, technology; human resources; capacity development
1.1.2. Support the agricultural sector to use and manage water more sustainably	
1.1.6 Monitor and control the spread of alien invasive species that benefit from climate change	Human resources, research, capacity development and operational costs
1.1.7 Ensure that climate change projections are integrated into long-term biodiversity management plans	
1.1.8 Capacitate and operationalise South Africa’s National Disaster Management Framework to strengthen proactive climate change adaptive capacity, preparedness, response and recovery	Human resources, capacity development
1.1.10 Create a more adaptive electricity system to reduce dependence on a centralised system and increase distributed generation, especially in rural areas	
1.1.9 Ensure that national, provincial and local disaster management plans address climate change	
1.1.1 Support the agricultural sector to implement more efficient climate-smart and conservation agriculture practices	
1.1.20 Ensure that water management institutions incorporate adaptive management responses	Human resources, capacity development
1.1.2 Support the agricultural sector to use and manage water more sustainably	

3.1.3 Linkages with existing programmes and other investments

Previous and current progress towards the activities include:

Table 5 Previous and current progress towards Strategic Intervention 1

Actions	Previous and current progress
1.1.10 Create a more adaptive electricity system to reduce dependence on a centralised system and increase distributed generation, especially in rural areas	In Feb 2019 DBSA was awarded \$100mn from the Green Climate Fund (which it will co-finance with another \$100mn) to generate 330MW
1.1.11 Support small-scale fishers to become more climate resilient through use of early warning systems and sea-safety training	CSIR has developed an SMS early warning system piloted for False Bay https://www.csir.co.za/csir-develops-innovative-sms-coastal-early-warning-system and the Benguela Current Commission
1.1.15 Develop climate change-related disease monitoring systems	The Department of Health has drafted a National Climate Change and Health Action Plan 2020-2024 which was recently out for comment; SAWS has undertaken a study on climate change and malaria; Department of Health has also developed climate adaptation health indicators
1.1.16 Equip and capacitate health-care facilities to manage climate change-related health effects.	The Department of Health has drafted a National Climate Change and Health Action Plan 2020-2024 which was recently out for comment
1.1.22 Identify individuals and communities at most risk from climate change within local municipalities and deliver targeted climate change vulnerability reduction programmes for these individuals and communities	Initiatives that have conducted vulnerability assessments include the South African Risk and Vulnerability Atlas, CSIR/NDMC Green Book, outputs of the Vulnerability Assessment Toolkit under the Local Government Climate Support Programme
1.1.23 Investigate the potential for expanding sectors and kick-starting new industries that are likely to thrive as a direct or indirect result of climate change effects	The Climate and Technology Centre and Network has developed TNAs for South Africa and roadmaps - although the primary aim is mitigation, some relate to water-use efficiency

3.2 Intervention 2: Develop a risk, early warning, vulnerability and adaptation monitoring system for key climate vulnerable sectors and geographic areas

South Africa experiences a wide range of weather and climate-related disasters that are projected to worsen with climate change, including drought, severe storms, flooding and heat waves. These disasters pose risks to human lives, infrastructure, and the economy. To enable more adaptive responses to increasing disaster risks, it is critical to put in place early warning systems that provide timely information to vulnerable sectors and communities in order to reduce their risk and plan suitable responses. The key outcome for this strategic intervention is: An early warning and monitoring system for key climate vulnerable sectors and geographic areas developed and implemented (Strategic Outcome 2.1).

Actions under this strategic intervention requires the development of climate information and early warning systems at national, provincial and local levels under the oversight of SAWS. This includes the identification of existing gaps in the climate monitoring and observation network and addressing these gaps to ensure that national climate data is reliable, comparable, up to date and accessible; developing a national climate information and early warning system that can interface with other information systems; improving and/or developing early warning systems at the national, provincial, and municipal levels, and setting up a climate change early warning and vulnerability network to promote collaboration and information sharing amongst different actors and levels of government.

3.2.1 Description of costs and estimated resource requirements

Investments in human resources, infrastructure, equipment and technology, and capacity development are required to equip and capacitate levels of government in the development and implementation of early warning and monitoring systems for key climate-vulnerable sectors and geographic areas.

The costs associated with Strategic Intervention 2 are informed by the breakdown of estimated resource requirements and costs at the action level, whereby resource requirements and associated costs have been aggregated to estimate the total

costs of the intervention. Please refer to Annexure A for a detailed breakdown of resource requirements and costs associated with individual actions under Strategic Intervention 5.

The aggregated total costs for Strategic Intervention 2 are outlined in Table 5, which outlines the estimated costs associated with the required human resources, infrastructure, equipment and technology, capacity development, and operational costs based on calculated costs at the action level.

Table 6: Estimated Costs for Strategic Intervention 2

Budget Category	Est. Costs (USD)	Est. Costs (ZAR)
Human resources	34 717 857,14	486 050 000,00
Infrastructure, equipment, and technology	17 053 690,48	238 751 666,67
Capacity development	2 820 000,00	39 480 000,00
Operational costs	5 452 369,05	76 333 166,67
Total costs	60 043 916,67	840 614 833,33
Total costs (inflation adjusted)	80,694,003.09	1,505,413,137.95

Human resources: This includes estimated resource requirements and associated costs for the implementation of specific actions under Strategic Intervention 2. This includes costs associated with staff salaries for technical grade staff at NDMC, PDMC, and municipal staff over the timeframe of the intervention; contracting technical experts to design and facilitate on-the-job workshops to be provided to staff for improved capacity for early warning systems, including costs for consultations, travel, and expenses, costs associated for contracting consultants to carry out research, conduct needs assessments, and support capacity development activities.

Infrastructure, equipment, and technology: This includes estimated resource requirements and associated costs for investments in required infrastructure, equipment and technology for the implementation of specific actions under Strategic Intervention 2. This includes costs associated with AWS systems; computer systems; software development; multi-hazard database and information management systems; two-way SMS-based alert system to cover national-provincial level; and open data platforms.

Capacity development: This includes estimated resource requirements and associated costs for the development of human and institutional capacity for the implementation of specific actions under Strategic Intervention 1. This includes

costs associated for carrying out trainings and participatory workshops for DMC staff at national, provincial and municipal levels and technical capacity development support.

Operational costs: This includes estimated resource requirements and associated costs for the supply of training material (including papers, photocopying, printing, brochures); Hiring of venues, transporting participants, catering; Administrative costs: Printing, photocopying, telecoms and other costs related to office operations; maintenance of infrastructure, equipment, and technology, the development of communication products; and miscellaneous expenses.

3.2.2 Synergies with other strategic interventions

At the strategic intervention level, identified synergies and opportunities for cost efficiencies include:

Table 7: Strategic Intervention 2 Synergies

Strategic Intervention			Actions	Synergies for cost efficiencies
SI	2	1	2.1.5 Improve/develop national early warning systems for key climate vulnerable sectors and risks	Capacity development; infrastructure, equipment and technology; human resources
			2.1.2 Improve the climate monitoring and observation network	
			1.1.11 Support small-scale fishers to become more climate resilient through use of early warning systems and sea-safety training	
SI	2	3	2.1.4 Develop municipal early warning systems for vulnerable geographical areas	Infrastructure, equipment and technology; capacity development; human resources
			3.1.4 Use the NAVRF to guide local assessments	

3.2.3 Linkages with existing programmes and other investments

Previous and current progress towards the activities include:

Table 8 Previous and current progress towards Strategic Intervention 2

Actions	Previous and current progress
Outcome 2.1 An early warning and monitoring system for key climate vulnerable sectors and geographic areas developed and implemented	Development of the National Framework for Climate Services
2.1.4 Develop municipal early warning systems for vulnerable geographical areas	Vulnerability assessments conducted through the South African Risk and Vulnerability Atlas, CSIR/NDMC Green Book and outputs of the Vulnerability Assessment Toolkit under the Local Government Climate Support Programme; multi-hazard early warning system developed as part of the Umngeni Resilience Project
2.1.6 Develop and support a climate change early warning and vulnerability network with the involvement of relevant stakeholders	Early warning systems are already in place for multiple hazards, including fire, drought (e.g. Umlindi)

3.3 Intervention 3: Develop vulnerability and resilience methodology framework that integrates biophysical and socio-economic aspects of vulnerability and resilience

Sector departments need to identify and map risks and vulnerabilities that are relevant to their sectors and to use this as a basis to develop climate change response implementation plans. In addition, provinces and municipalities also should undertake climate change needs and response

assessments based on the vulnerabilities of the respective provinces and municipalities and use this as a basis to develop climate change response implementation plans. Accordingly, there is a need to develop a framework to guide sectors, provinces and municipalities on the process of undertaking

vulnerability assessments and developing corresponding responses and plans. This will assist in guiding and framing the Risk and Vulnerability Assessment process and ensure consistency across sectors, and levels of government.

The key outcome for this strategic intervention is: An adaptation vulnerability and resilience framework developed and implemented across 100% of key adaptation sectors (Strategic Outcome 3.1).

In order to capacitate and operationalize a standardized approach to conducting climate change vulnerability assessments and support

the development of corresponding plans, there is a need to develop a vulnerability and resilience methodology framework to provide guidance at national, provincial and municipal levels. This involves investing in technical expertise to develop a National Adaptation Vulnerability and Resilience Framework (NAVRF), and using the NAVFR to guide national sector assessments, provincial assessments, and local assessments. Investment in human resources and technical expertise as well as capacity development activities is required to capacitate and operationalize this process.

3.3.1 Description of costs and estimated resource requirements

The costs associated with Strategic Intervention 3 are informed by the breakdown of estimated resource requirements and costs at the action level, whereby resource requirements and associated costs have been aggregated to estimate the total costs of intervention. Please refer to Annexure A for a detailed breakdown of resource requirements and costs associated with individual actions under Strategic Intervention 3.

The aggregated total costs for Strategic Intervention 3 are provided in Table 7, which outlines the estimated costs associated with the required human resources, infrastructure, equipment and technology, capacity development, and operational costs, based on calculated costs at the action level.

Table 9: Estimated Costs for Strategic Intervention 3

Budget Category	Est. Costs (USD)	Est. Costs (ZAR)
Human resources	2 739 285,71	38 350 000,00
Infrastructure, equipment, and technology	-	-
Capacity development	725 000,00	10 150 000,00
Operational costs	107 142,86	1 500 000,00
Total costs	3 571 428,57	50 000 000,00
Total costs (inflation adjusted)	4,799,701.35	89,542,384.83

Human resources: This includes estimated resource requirements and associated costs for the implementation of specific actions under Strategic Intervention 3. This includes costs associated with commissioning consultancy assignments to support the development of an overarching adaptation and vulnerability resilience framework, including costs for consultations, travel, and expenses; and fees and expenses for the purpose of carrying out sectoral, provincial, and local assessments.

Operational costs: This includes estimated resource requirements and associated costs for operational expenses for specific actions under Strategic Intervention 3. This includes publication and communication materials (including papers, photocopying, printing, brochures); administrative costs: printing, photocopying, telecoms and other costs related to office operations; and miscellaneous expenses.

Capacity development: This includes estimated resource requirements and associated costs for the development of human and institutional capacity for the implementation of specific actions under Strategic Intervention 3. This includes costs associated for carrying out stakeholder consultations and participatory workshops for validation workshops and feedback from stakeholders on frameworks and sectoral, provincial, and local assessments.

3.3.2 Synergies with other strategic interventions

At the strategic intervention level, identified synergies and opportunities for cost efficiencies include:

Table 10 Strategic Intervention 3 Synergies

Strategic Intervention			Actions	Synergies for cost efficiencies
SI	3	1	3.1.4 Use the NAVFR to guide local assessments	Human resources; capacity development
			1.1.22 Identify individuals and communities at most risk from climate change within local municipalities and deliver targeted climate change vulnerability reduction programmes	

3.3.3 Linkages with existing programmes and other investments

Previous and current progress towards the activities include:

Table 11 Previous and current progress towards Strategic Intervention 3

Actions	Previous and current progress
3.1.1 Develop a National Adaptation Vulnerability and Resilience Framework (NAVRF)	The South African Risk and Vulnerability Atlas, CSIR/NDMC Green Book and the Vulnerability Assessment Toolkit under the Local Government Climate Change Support Programme provide various methods for vulnerability assessment
3.1.2 Use the NAVRF to guide sector assessments	
3.1.3 Use the NAVRF to guide provincial assessments	
3.1.4 Use the NAVRF to guide local assessments	

3.4 Intervention 4: Facilitate mainstreaming of adaptation responses into sectoral planning and implementation

Climate change is a cross-cutting issue that impacts all spheres and sectors of society. Adapting to climate change therefore cannot be limited to the environmental sector and must be integrated into planning and implementation processes in different spheres of government, sectors, business and civil society. Developing standalone climate change strategies at different levels is essential to provide strategic guidance on responding to climate change in South Africa. However, these strategies need to be complimented by mainstreaming adaptation into national, provincial and local planning processes and sectoral strategies, while supporting the private sector in developing strategic plans that respond to climate change impacts as well as business opportunities.

In order to facilitate the mainstreaming of adaptation responses into sectoral planning and implementation, investments in human resources and capacity development are required to support stakeholders at national, provincial and local levels. At the national level, this includes supporting government ministries and departments in mainstreaming climate change adaptation into National Climate Change Sector Plans; providing technical assistance to amend development planning guidelines to include climate change adaptation; and providing capacity building and training to government staff to ensure sufficient

technical expertise in accounting for and responding to climate change impacts in different sectors and areas of public investment.

At the provincial level, investments are required to provide the necessary support and resources to provincial governments in updating provincial climate change adaptation strategies and implementation plans as well as Provincial Growth and Development Strategies through informed, inclusive, and participatory processes. Similarly, municipal governments also require technical expertise and resources to draft updated local government climate change adaptation strategies and implementation plans to integrate climate change into municipal strategic planning documents, such as Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs). Investment is also required to support private sector stakeholders in mainstreaming adaptation and resilience into strategic planning and business operations.

3.4.1 Description of costs and estimated resource requirements

The costs associated with Strategic Intervention 4 are informed by the breakdown of estimated resource requirements and costs at the action level, whereby resource requirements and associated costs have been aggregated to estimate the total costs of intervention. Please refer to Annexure A for a detailed breakdown of resource requirements and costs associated with individual actions under Strategic Intervention 4.

The aggregated total costs for Strategic Intervention 4 are provided in Table 9, which outlines the estimated costs associated with the required human resources, infrastructure, equipment and technology, capacity development, and operational costs based on calculated costs at the action level.

Table 12: Estimated Costs for Strategic Intervention 4

Budget Category	Est. Costs (USD)	Est. Costs (ZAR)
Human resources	14 697 670,73	205 767 390,20
Infrastructure, equipment, and technology	-	-
Capacity development	3 734 153,56	52 278 149,80
Operational costs	-	-
Total costs	18 431 824,29	258 045 540,00
Total costs (inflation adjusted)	24,770,830.56	462,120,260.91

Human resources: This includes estimated resource requirements and associated costs for the implementation of specific actions under Strategic Intervention 4. This includes costs associated with commissioning technical expertise to support national, provincial and local levels in updating adaptation strategies and implementation plans at respective levels; amending development planning guidelines to incorporate climate change impacts, and the provisioning of support to private sector businesses in incorporating climate change adaptation into strategic planning.

under Strategic Intervention 4. This includes costs associated with the organization of stakeholder consultations and participatory workshops for validation and feedback on sectoral, provincial, and local assessments; and the provision of capacity building and training to staff to ensure sufficient technical expertise in accounting for climate change impacts in sectoral strategies, planning processes, and public infrastructure.

Capacity development: This includes estimated resource requirements and associated costs for the development of human and institutional capacity for the implementation of specific actions

Operational costs: The operational costs associated with the contracting technical expertise and supporting capacity development activities have been accounted for under respective cost categories of human resources and capacity development.

3.4.2 Synergies with other strategic interventions

At the strategic intervention level, identified synergies and opportunities for cost efficiencies include:

Table 13 Strategic Intervention 4 Synergies

Strategic Intervention			Actions	Synergies for cost efficiencies
SI	4	1	4.2.4. Mandate that all public infrastructure be planned, designed, operated and managed after explicitly taking current and predicted future climate change	Human resources, capacity development, and operational costs
			1.1.18 Plan for the effects of climate change on infrastructure	

3.4.3 Linkages with existing programmes and other investments

Previous and current progress towards the activities include:

Table 14 Previous and current progress towards Strategic Intervention 4

Actions	Previous and current progress
4.1.1 Draft updated National Climate Change Sector Plans to include climate change adaptation	Sector support programme enabled mainstreaming of climate change adaptation into sectors with six sectors developing their adaptation plans (human settlement, water, agriculture, health, biodiversity and ocean and coast, mining, transport and energy)
4.1.2 Draft updated provincial climate change adaptation strategies and associated implementation plans 4.2.1 Integrate climate change adaptation into provincial growth and development strategies	Provincial support programme under the Local Government Climate Support Programme developed response plans for nine provinces
4.1.3 Draft updated local government climate change adaptation strategies and associated implementation plans 4.2.3 Integrate climate change adaptation into municipal development planning documents	Local Government Climate Change Support Programme: the Lets Respond Toolkit provided stakeholders with an introduction and overview on how to integrate climate change into municipal planning processes. GIZ further mainstreamed climate change into municipal Integrated Development Plans (IDPs) for 22 District Municipalities located within KwaZulu-Natal, Eastern Cape and Western Cape under the Climate Support Programme

3.5 Intervention 5: Promote research application, technology development, transfer and adoption to support planning and implementation

Climate change will result in significant physical and socio-economic effects in South Africa. It is important that decisions made in planning for these effects are based on robust evidence and informed by accurate and current data and research. Investment in high-quality climate modelling data and research on the projected impacts of climate change will help reduce risk and enable the development of more effective actions. Additionally, continued support to research that investigates the most effective adaptation responses and technological solutions for climate change adaptation will be important for replication and scale up in the years to come.

The key outcome for this strategic intervention is: Increased research output and technology uptake to support planning and implementation (Strategic Outcome 5.1).

In order to ensure that planning for climate change adaptation and the implementation of effective responses is informed by robust and reliable evidence, investment is required for supporting institutions involved in climate observation, modelling and climate research, as well as strengthening coordination between governmental agencies, government departments, research institutions, NGOs, and community groups. In addition, investment is required to support the development of a centralized database where climate-related data is shared to enable access to accurate and current data and encourage research uptake by different stakeholders, build on learning, and implement the most effective adaptation responses to climate impacts.

3.5.1 Description of costs and estimated resource requirements

The costs associated with Strategic Intervention 5 are informed by the breakdown of estimated resource requirements and costs at the action level, whereby resource requirements and associated costs have been aggregated to estimate the total costs of the intervention. Please refer to Annexure A for a detailed breakdown of resource requirements and costs associated with individual actions under Strategic Intervention 5.

The aggregated total costs for Strategic Intervention 5 are provided in Table 11, which outlines the estimated costs associated with the required human resources, infrastructure, equipment and technology, capacity development, and operational costs based on calculated costs at the action level.

Table 15: Estimated Costs for Strategic Intervention 5

Budget Category	Est. Costs (USD)	Est. Costs (ZAR)
Human resources	47 401 368,60	663 619 160,39
Infrastructure, equipment, and technology	5 684 289,29	79 580 050,00
Capacity development	21 428,57	300 000,00
Operational costs	5 221 462,41	73 100 473,77
Total Costs	58 328 548,87	816 599 684,16
Total Costs (Inflation Adjusted)	78,388,692.21	1,462,405,663.37

Human resources: This includes estimated resource requirements and associated costs for the implementation of specific actions under Strategic Intervention 5. This includes costs associated with staff salaries (or part thereof) for researchers, finance, procurement, administrative, project management, and communications, operations, and technical staff for climate observation and monitoring; costs of commissioning research and technical assistance; and costs of human resources required for the implementation of a communications campaign for increased research uptake.

Infrastructure, equipment, and technology: This includes estimated resource requirements and associated costs for the required infrastructure, equipment and technology for the implementation of specific actions under Strategic Intervention 5. This includes costs associated with computer systems; software and website development for establishing an interactive online climate service platform; and costs for the establishment of AWS systems for climate change prediction and modelling.

Capacity development: This includes estimated resource requirements and associated costs for the development of human and institutional capacity for the implementation of specific actions under Strategic Intervention 5. This includes costs associated for carrying out stakeholder consultations and participatory workshops for research validation; and costs associated with training government staff in climate observation, monitoring and analysis.

Operational costs: This includes estimated resource requirements and associated costs for operating expenses for the implementation of specific actions under Strategic Intervention 5. This includes administrative costs: printing, photocopying, telecoms and other costs related to office operations for the implementation of actions by implementing institutions; costs associated with hosting quarterly steering committee meetings and workshop costs; the development of communication products; and miscellaneous expenses.

3.5.2 Synergies with other strategic interventions

At the strategic intervention level, identified synergies and opportunities for cost efficiencies include:

Table 16 Strategic Intervention 5 Synergies

Strategic Intervention			Actions	Synergies for cost efficiencies
SI	5	1	5.1.10. Establish a programme to promote research into new climate change adaptation technologies	Human resources, operational costs
			1.1.18 Plan for the effects of climate change on infrastructure	
			1.1.9 Invest in high-quality, climate-resilient public infrastructure	
SI	5	2	5.1.5 Continue to enhance climate observation and monitoring	Human resources, infrastructure, equipment and technology, capacity development and operational costs
			2.1.1 Improve the climate monitoring and observation network	
SI	5	3	5.1.7 Continue to invest in research that aims to understand the different impacts of climate change on the environment and society	Human resources, operational costs
			3.1.1 Develop a National Adaptation Vulnerability and Resilience Framework (NAVRF)	
			3.1.2 Use the NAVRF to guide sector assessments	
			3.1.3 Use the NAVRF to guide provincial assessments	
			3.1.4 Use the NAVRF to guide local assessments	

3.5.3 Linkages with existing programmes and other investments

Previous and current progress towards the activities include:

Table 17 Previous and current progress towards Strategic Intervention 5

Actions	Previous and current progress
5.1.5 Continue and enhance climate observation and monitoring	National Framework for Climate Services outlines intentions to enhance climate observation and monitoring
5.1.6 Continue to invest in climate change prediction and modelling data	National Framework for Climate Services outlines intentions to enhance prediction and modelling data; the Long Term Adaptation Scenarios also improved climate change prediction and modelling data; various research institutions are attracting national and international funding to support modelling, e.g. CSIR, UCT, UP, Wits
5.1.7 Continue to invest in research that aims to understand the different impacts of climate change on the environment and society	National Research Foundation funded a Global Change Grand Challenge to look at different impacts of climate change on environment and society; the Long Term Adaptation Scenarios also included a component; other bodies have also funded climate change-related impact research, e.g. Medical Research Council.

3.6 Intervention 6: Build the necessary capacity and awareness for climate change response

In order to implement actions for climate change adaptation, there is need to build capacity at all levels. This involves investments in the development and roll out of programmes and activities that improve the awareness and capacity of public, private and civil society actors to understand the causes, impacts, and

key vulnerabilities associated with climate change, as well as how to respond to these vulnerabilities. One of the most effective ways of improving awareness is to mainstream climate change into different education and training curricula at different levels, such as schools and tertiary institutions. Awareness

and capacity are also particularly important in all three levels of government so that officials are equipped to guide climate change response in their respective jurisdictions.

The key outcome for this strategic intervention is: Capacity building and awareness for climate change response enhanced (Strategic Outcome 6.1).

To improve the awareness of and capacity of the wide range of stakeholders involved in climate change adaptation planning and response, investments are required in training, educational, and communication activities across multiple levels

and sectors. This involves investing in resources for the development and implementation of a communication campaign to promote awareness of climate change impacts, and the translation of science into actionable policy and plans. Additionally, building sufficient capacity of government officials will require the development and roll-out of a comprehensive training programme at national, provincial and local levels. This training programme will enable government to mainstream climate change adaptation into planning, programmes and new developments throughout all spheres of government, while integrating climate change adaptation into secondary and tertiary curricula.

3.6.1 Description of costs and estimated resource requirements

The costs associated with Strategic Intervention 6 are informed by the breakdown of estimated resource requirements and costs at the action level, whereby resource requirements and associated costs have been aggregated to estimate the total costs of the intervention. Please refer to Annexure A for a detailed breakdown of resource requirements and costs associated with individual actions under Strategic Intervention 6.

The aggregated total costs for Strategic Intervention 6 are provided in Table 13, which outlines the estimated costs associated with the required human resources, infrastructure, equipment and technology, capacity development, and operational costs based on calculated costs at the action level.

Table 18: Estimated Costs for Strategic Intervention 6

Budget Category	Est. Costs (USD)	Est. Costs (ZAR)
Human resources	3 815 202,86	53 412 840,00
Infrastructure, equipment, and technology	-	-
Capacity development	8 972 942,14	125 621 190,00
Operational costs	1 314 195,86	18 398 742,00
Total costs	14 102 340,86	197 432 772,00
Total costs (inflation adjusted)	18,952,366.87	353,572,024.96

Human resources: This includes estimated resource requirements and associated costs for the implementation of specific actions under Strategic Intervention 6. This includes costs associated with staff salaries (or part thereof) for communication specialists, finance, procurement, administrative, project management, and technical staff required for the implementation of specific actions, such as the development and roll-out of a communication and outreach programme; costs of consultancies required for technical assistance, curriculum development, needs assessments, and fees associated with carrying out training for national, provincial and local levels of government.

Infrastructure, equipment, and technology: This includes estimated resource requirements and associated costs for the required infrastructure, equipment and technology for the implementation of specific actions under Strategic Intervention 6. This includes costs associated with computer systems; software and website development for establishing

an interactive online climate service platform; and costs for the establishment of AWS systems for climate change prediction and modelling.

Capacity development: This includes estimated resource requirements and associated costs for the development of human and institutional capacity for the implementation of specific actions under Strategic Intervention 6. This includes costs associated for carrying out knowledge sharing events, costs associated with the organization of training at national, provincial, and municipal levels.

Operational costs: This includes estimated resource requirements and associated costs for operating expenses for the implementation of specific actions under Strategic Intervention 6. This includes administrative costs: printing, photocopying, telecoms and other costs related to office operations for the implementation of actions by implementing institutions; the development of communication products; and miscellaneous expenses.

3.6.2 Synergies with other strategic interventions

N/A

3.6.3 Linkages with existing programmes and other investments

Previous and current progress towards the activities include:

Table 19 Previous and current progress towards Strategic Intervention 6

Actions	Previous and current progress
6.1.2 Develop and implement a training programme for government officials	The South African Risk and Vulnerability Atlas Risk and Vulnerability Centres (RAVACs) and the Lets Respond Toolkit under the Local Government Climate Support Programme supported government training
6.1.3 Establish formally accredited training courses	The University of Cape Town is a Centre of Excellence in Climate and Development under the African Research Universities of Excellence. The Southern African Regional Universities Association has also developed a seven-module climate change curriculum that is implemented at UCT and Rhodes University (a more complete overview is available in theme f of South Africa’s First Climate Change Report)

3.7 Intervention 7: Establish effective governance and legislative processes to integrate climate change in development planning

South Africa’s international climate change commitments and changes experienced in climate have resulted in many government sectors and departments as well as private organisations and communities implementing projects for climate change adaptation. In order to establish effective governance for climate change across different spheres and sectors, there is a need to develop clear roles and mandates between various institutions as well as mechanisms for coordinated action. This involves drafting and enacting Climate Change legislation, strengthening coordination between national, provincial and municipal governments, and supporting collaboration across public, private and civil society actors through multi-stakeholder forums, knowledge sharing platforms, and collaborative projects for enhanced resilience.

The key outcomes for this strategic intervention are:

- Adaptation governance defined and legislated through the Climate Change Act, once approved by Parliament (Strategic Outcome 7.1)

- Institutional support structures for climate change adaptation strengthened (Strategic Outcome 7.2)
- Enhanced public-private-civil society collaboration and stewardship (Strategic Outcome 7.3)

In order to enable these outcomes, there is need for continued investment in communication channels and multi-stakeholder platforms that strengthen coordination between ministries and levels of government in the planning and implementation of effective responses for climate change. Additionally, investment is required to support projects and multi-stakeholder forums that enhance collaboration between public, private and civil society actors, providing opportunities to build on existing knowledge, promote learning, and implement innovative interventions that are based in collaborative climate action.

3.7.1 Description of costs and estimated resource requirements

The costs associated with Strategic Intervention 7 are informed by the breakdown of estimated resource requirements and costs at the action level, whereby resource requirements and associated costs have been aggregated to estimate the total costs of intervention. Please refer to Annexure A for a detailed breakdown of resource requirements and costs associated with individual actions under Strategic Intervention 7.

The aggregated total costs for Strategic Intervention 7 are provided in Table 14, which outlines the estimated costs associated with the required human resources, infrastructure, equipment and technology, capacity development, and operational costs based on calculated costs at the action level.

Table 20: Estimated Costs for Strategic Intervention 7

Budget Category	Est. Costs (USD)	Est. Costs (ZAR)
Human resources	6 878 490,63	96 298 868,80
Infrastructure, equipment, and technology		
Capacity development	35 471 159,24	496 596 229,33
Operational costs	4 542 628,10	63 596 793,33
Total costs	46 892 277,96	656 491 891,47
Total costs (inflation adjusted)	63,019,300.42	1,175,676,991.63

Human resources: This includes estimated resource requirements and associated costs for the implementation of specific actions under Strategic Intervention 7. This includes costs associated with staff salaries (or part thereof) for government staff involved in drafting legislation; organizing and facilitating multi-stakeholder forums; research and management; and technical and communications staff.

Capacity development: This includes estimated resource requirements and associated costs for the development of human and institutional capacity for the implementation of specific actions under Strategic Intervention 7. This includes costs associated with carrying out stakeholder consultations and participatory workshops; multi-stakeholder committee meetings at national,

provincial, and municipal levels, including venue, catering, and transport costs; training and capacity building activities associated with the implementation of collaborative pilot resilience-building projects; small-grants; and costs associated with hosting knowledge-sharing workshops and platforms.

Operational costs: This includes estimated resource requirements and associated costs for operating expenses for the implementation of specific actions under Strategic Intervention 7. This includes administrative costs: printing, photocopying, telecoms and other costs related to office operations for the implementation of actions by implementing institutions; project execution costs; the development of communication products; and miscellaneous expenses.

3.7.2 Synergies with other strategic interventions

N/A

3.7.3 Linkages with existing programmes and other investments

Previous and current progress towards the activities include:

Table 21 Previous and current progress towards Strategic Intervention 7

Actions	Previous and current progress
7.3.3 Continue to support knowledge sharing platforms	Flanders provided support to the South African Adaptation Network; DEA hosts a South Africa Climate Change Response database (including adaptation and research activities); various technical working groups, an Inter-ministerial Committee on Climate Change, and a National Committee on Climate Change are in existence

3.8 Intervention 8: Enable substantial flows of climate change adaptation finance from various sources

The projected cost range for South African adaptation response from 2020 to 2030 under the low mitigation scenario is between US\$0.42 bn and US\$30.8 bn (DEA 2015a 5) and US\$3.4 bn to US\$29.8 bn for the moderate to high mitigation scenario (DEA 2015a). In order to finance appropriate adaptation response, there is need to establish mechanisms and capacitate institutions to gain access to climate financing for the implementation of objectives identified in the NCCAS.

The key outcome for this strategic intervention is: Adequate financial resources for national adaptation priorities from the national fiscus and international sources (Strategic Outcome 8.1)

In order to enable outcomes for increased access to climate finance, investments are required to develop appropriate strategies, institutional frameworks, and capacity for resource mobilization. This involves

carrying out a cost-benefit analysis of the NCCAS to determine full implementation costs, as well as developing an investment plan that outlines the way forward for the implementation of robust and financeable adaptation projects and programmes

that leverage domestic and international funds. To achieve these aims, investment is required to build the institutional capacity of government and implementing entities in accreditation to secure sustainable sources of international climate funds.

3.8.1 Description of costs and estimated resource requirements

The costs associated with Strategic Intervention 8 are informed by the breakdown of estimated resource requirements and costs at the action level, whereby resource requirements and associated costs have been aggregated to estimate the total costs of intervention. Please refer to Annexure A for a detailed breakdown of resource requirements and costs associated with individual actions under Strategic Intervention 8.

The aggregated total costs for Strategic Intervention 8 are provided in Table 15, which outlines the estimated costs associated with the required human resources, capacity development, and operational costs based on calculated costs at the action level.

Table 22: Estimated Costs for Strategic Intervention 8

Budget Category	Est. Costs (USD)	Est. Costs (ZAR)
Human resources	2 342 115,80	32 789 621,21
Infrastructure, equipment, and technology		
Capacity development	2 201 430,78	30 820 030,91
Operational costs	337 159,09	4 720 227,27
Total costs	4 880 705,67	68 329 879,39
Total costs (inflation adjusted)	6,559,260.29	122,368,407.12

Human resources: This includes estimated resource requirements and associated costs for the implementation of specific actions under Strategic Intervention 8. This includes costs associated with commissioning consultancy assignments to support evidence-based research, plans, and strategies for climate financing; as well as staff salaries (or part thereof) for government staff involved in managing activities of actions under this strategic intervention.

accreditation of government and local implementing entities; establishing a project preparation fund to assist entities in preparing applications to access climate funds; and costs associated with knowledge exchange and capacity building to the private sector for climate adaptation.

Capacity development: This includes estimated resource requirements and associated costs for the development of human and institutional capacity for the implementation of specific actions under Strategic Intervention 8. This includes costs associated for carrying out stakeholder consultations and participatory validation workshops; training and capacity building activities associated with the

Operational costs: This includes estimated resource requirements and associated costs for operating expenses for the implementation of specific actions under Strategic Intervention 8. This includes administrative costs: printing, photocopying, telecoms and other costs related to office operations for the implementation of actions by implementing institutions; project execution costs; the development of communication products; and miscellaneous expenses.

3.8.2 Synergies with other strategic interventions

N/A

3.8.3 Linkages with existing programmes and other investments

Previous and current progress towards the activities include:

Table 23 Previous and current progress towards Strategic Intervention 8

Actions	Previous and current progress
8.1.4 Expand the list of government entities accredited for climate financing	SANBI is currently accredited as a National Implementing Entity for the Adaptation Fund and Accredited Entity for the Green Climate Fund; the Development Bank of Southern Africa is a Regional Accredited Entity for the Green Climate Fund, and other bodies are undergoing the process of accreditation.

3.9 Intervention 9: Develop and implement an M&E system that tracks implementation of adaptation actions and their effectiveness

Since the effects of climate change differ across geographies and will shift over time, adaptation actions will work in some locations and time periods, and not in others. A ‘learning by doing’ approach is therefore needed. This approach will help South Africa progressively improve the NCCAS, and as a result, its ability to deal with the inherent uncertainty of climate change science. In order to implement a learning by doing approach, the strategic outcomes of the NCCAS must be monitored and evaluated to understand whether progress has been made towards achieving these strategic interventions. The results of this monitoring and evaluation can then be used to determine if any shifts are required in terms of the strategic outcomes of the NCCAS.

The key outcome for this strategic intervention is: A national M&E system developed and implemented (Strategic Outcome 9.1).

In order to implement a ‘learning by doing’ approach to the achievement of the objectives of the NCCAS, investment is required to establish, operationalize, and capacitate effective systems for monitoring and evaluation. This involves setting up an effective M&E system to track and assess success in achieving the strategic outcomes of the NCCAS, including investments in required human resources, information systems, equipment to operationalize these systems, and disseminate learning to inform policy, planning, and implementation.

3.9.1 Description of costs and estimated resource requirements

The costs associated with Strategic Intervention 9 is informed by the breakdown of estimated resource requirements and costs at the action level, whereby resource requirements and associated costs have been aggregated to estimate the total costs of intervention. Please refer to Annexure A for a detailed breakdown of resource requirements and costs associated with individual actions under Strategic Intervention 9.

The aggregated total costs for Strategic Intervention 9 is provided in Table 16, which outlines the estimated costs associated with the required human resources, capacity development, and operational costs based on calculated costs at the action level.

Table 24: Estimated Costs for Strategic Intervention 9

Budget Category	Est. Costs (USD)	Est. Costs (ZAR)
Human resources	1 967 842,86	27 549 800,00
Infrastructure, equipment, and technology	156 546,43	2 191 650,00
Capacity development	526 782,14	7 374 950,00
Operational costs	327 735,71	4 588 300,00
Total costs	2 978 907,14	41 704 700,00
Total costs (inflation adjusted)	4,003,402.10	74,686,765.93

Human resources: This includes estimated resource requirements and associated costs for the implementation of specific actions under Strategic Intervention 9. This includes costs associated with staff salaries (or part thereof) for government staff involved in monitoring and evaluation activities, and costs of commissioning consultancy assignments to support the development of annual reports based

on information collected from the monitoring and evaluation system, and costs for updated the NCCAS based on learning.

Capacity development: This includes estimated resource requirements and associated costs for the development of human and institutional capacity for the implementation of specific actions

under Strategic Intervention 9. This includes costs associated for carrying out stakeholder consultations and participatory validation workshops; and training and capacity building activities associated with monitoring and evaluation activities.

Operational costs: This includes estimated resource requirements and associated costs for operating expenses for the implementation

of specific actions under Strategic Intervention 9. This includes administrative costs: printing, photocopying, telecoms and other costs related to office operations for the implementation of actions by implementing institutions; project execution costs; the development of communication products; and miscellaneous expenses.

3.9.2 Synergies with other strategic interventions

The costs associated with monitoring and evaluation are not covered under costs of other strategic, interventions, but have been accounted for under Strategic Intervention 9.

3.9.3 Linkages with existing programmes and other investments

Previous and current progress towards the activities include:

Table 25 Previous and current progress towards Strategic Intervention 9

Actions	Previous and current progress
9.1.1 Establish a M&E system to track progress in achieving the strategic outcomes of the NCCAS	Climate Change Response M&E System (Climate Change Information Management System-CCIMS) is in operation by DEA

4 CONSOLIDATED COST ESTIMATE

The following section outlines the estimated costs associated for the implementation of strategic interventions defined in the NCCAS. Table 26 shows aggregated estimate of costs for each strategic intervention, organized according to human resources, infrastructure, equipment, and technology, capacity development, and operational costs.

Table 26: Consolidated estimate of costs for each Strategic Intervention

ID	Strategic Interventions and Actions	Human resources	Infrastructure, Equipment and technology	Capacity development	Operational costs	TOTAL	Inflation Adjusted Figures
		Strategic Intervention 1: Reduce human and economic vulnerability, ensure resilience of physical capital and ecological infrastructure and build adaptive capacity					
		Outcome 1.1: Increased resilience and adaptive capacity achieved in human, economic, environment, physical and ecological infrastructure vulnerability					
1.1.1.	Support the agricultural sector to implement more efficient climate-smart and conservation agriculture practices	54 825 271,20	19 479 726,00	40 679 982,00	10 325 366,35	125 310 345,55	
1.1.2	Support the agricultural sector to use and manage water more sustainably	54 825 271,20	524 379 618,00	40 679 982,00	10 325 366,35	630 210 237,55	
1.1.3	Promote the expansion of food garden programmes outside land classified as agricultural land or farmland to reduce food insecurity and hunger	1 315 440 000,00	1 808 730 000,00	1 808 730 000,00	548 100 000,00	5 481 000 000,00	
1.1.4	Adopt climate-resilient approaches to natural resource management to restore and maintain ecosystem goods and services	127 925 632,80	99 733 284,00	276 948 000,00	108 045 000,00	612 651 916,80	
1.1.5	Protect and conserve South Africa's most vulnerable ecosystems and landscapes	324 828 000,00	54 138 000,00	108 276 000,00	54 138 000,00	541 380 000,00	
1.1.6	Monitor and control the spread of alien invasive species that benefit from climate change	5 583 083 633,40	-	156 239 998,74	573 932 363,21	6 313 255 995,35	

CONSOLIDATED COST ESTIMATE

ID	Strategic Interventions and Actions	Human resources	Infrastructure, Equipment and technology	Capacity development	Operational costs	TOTAL	Inflation Adjusted Figures
1.1.7	Ensure that climate change projections are integrated into long-term biodiversity management plans	342 854 001,00	-	1 800 000,00	34 465 400,10	379 119 401,10	
1.1.8	Capacitate and operationalise South Africa's National Disaster Management Framework to strengthen proactive climate change adaptive capacity, preparedness, response and recovery	30 250 000,00	-	6 550 000,00	3 680 000,00	40 480 000,00	
1.1.9	Ensure that national, provincial and local disaster management plans address climate change	87 300 000,00	-	15 360 000,00	10 266 000,00	112 926 000,00	
1.1.10	Create a more adaptive electricity system to reduce dependence on a centralised system and increase distributed generation, especially in rural areas	1 696 969 696,80	13 575 757 574,40	-	1 696 969 696,80	16 969 696 968,00	
1.1.11	Support small-scale fishers to become more climate resilient through use of early warning systems and sea-safety training	750 000,00	4 565 000,00	7 800 000,00	1 311 500,00	14 426 500,00	
1.1.12	Investigate the potential effects of an expanded forestry sector on water availability	10 508 636,44	1 313 517,33	-	1 313 517,33	13 135 671,11	
1.1.13	Support the integration of climate-smart and ecosystem-based approaches in forestry practices	86 400 000,00	118 800 000,00	118 800 000,00	32 400 000,00	356 400 000,00	
1.1.14	Launch an enhanced climate change public health flagship programme to build a healthier, more resilient population	936 000 000,00	156 000 000,00	312 000 000,00	156 000 000,00	1 560 000 000,00	

ID	Strategic Interventions and Actions	Human resources	Infrastructure, Equipment and technology	Capacity development	Operational costs	TOTAL	Inflation Adjusted Figures
1.1.15	Develop climate change-related disease monitoring systems	4 140 720,00	10 351 800,00	4 140 720,00	2 070 360,00	20 703 600,00	
1.1.16	Equip and capacitate healthcare facilities to manage climate change-related health effects	750 000,00	-	4 050 000,00	480 000,00	5 280 000,00	
1.1.17	Develop guidelines on environmentally responsible mining practices that promote climate adaptation	750 000,00	-	400 000,00	115 000,00	1 265 000,00	
1.1.18	Plan for the effects of climate change on infrastructure	1 460 000,00	-	1 383 250,00	284 325,00	3 127 575,00	
1.1.19	Invest in high-quality, climate resilient, public infrastructure	-	11 533 333 000,00	-	1 153 333 300,00	12 686 666 300,00	
1.1.20	Ensure that water management institutions incorporate adaptive management responses	5 700 000,00	-	3 800 000,00	950 000,00	10 450 000,00	
1.1.21	Develop a list of resilient-building projects that can easily be replicated	225 000,00	-	-	-	225 000,00	
1.1.22	Identify individuals and communities at most risk from climate change within local municipalities and deliver targeted climate change vulnerability reduction programmes for these individuals and communities	16 500 000,00	-	1 820 000,00	-	18 320 000,00	
1.1.23	Investigate the potential for expanding sectors and kick-starting new industries that are likely to thrive as a direct or indirect result of climate change effects	750 000,00	-	-	-	750 000,00	
ZAR		10,682,235,862.84	27 906 581 519,73	2 909 457 932,74	4 398 505 195,15	45,896,780,510.47	82,194,143,655.91
USD		763,016,847.35	1 993 327 251,41	207 818 423,77	314 178 942,51	3,278,341,465.03	4,405,816,791.94

CONSOLIDATED COST ESTIMATE

ID	Strategic Interventions and Actions	Human resources	Infrastructure, Equipment and technology	Capacity development	Operational costs	TOTAL	Inflation Adjusted Figures
		Intervention 2: Develop a risk, early warning, vulnerability and adaptation monitoring system for key climate vulnerable sectors and geographic areas					
		Outcome 2.1: An early warning and monitoring system for key climate vulnerable sectors and geographic areas developed and implemented					
2.1.1	Improve the climate monitoring and observation network	35 000 000,00	2 340 000,00	100 000,00	3 744 000,00	41 184 000,00	
2.1.2	Develop a national climate information and early warning system	35 400 000,00	15 390 000,00	12 750 000,00	6 354 000,00	69 894 000,00	
2.1.3	Develop provincial early warning systems for vulnerable geographical areas	35 100 000,00	69 660 000,00	8 820 000,00	11 358 000,00	124 938 000,00	
2.1.4	Develop municipal early warning systems for vulnerable geographical areas	354 900 000,00	140 291 666,67	10 500 000,00	50 569 166,67	556 260 833,33	
2.1.5	Improve/develop national early warning systems for key climate vulnerable sectors and risks	21 400 000,00	10 840 000,00	150 000,00	3 239 000,00	35 629 000,00	
2.1.6	Develop and support a climate change early warning and vulnerability network with the involvement of relevant stakeholders	3 500 000,00	230 000,00	6 960 000,00	1 069 000,00	11 759 000,00	
2.1.7	Investigate alternative technologies that can be used	750 000,00	-	200 000,00	-	950 000,00	
ZAR		486 050 000,00	238 751 666,67	39 480 000,00	76 333 166,67	840 614 833,33	1,505,413,137.95
USD		34 717 857,14	17 053 690,48	2 820 000,00	5 452 369,05	60 043 916,67	80,694,003.09
		Intervention 3: Develop vulnerability and resilience methodology framework that integrates biophysical and socio-economic aspects of vulnerability and resilience					
		Outcome 3.1: An adaptation vulnerability and resilience framework developed and implemented from 2020 across 100% of key adaptation sectors					
3.1.1	Develop a National Adaptation Vulnerability and Resilience Framework (NAVRF)	600 000,00	-	1 600 000,00	1 500 000,00	3 700 000,00	
3.1.2	Use the NAVRF to guide sector assessments	8 250 000,00	-	2 200 000,00	-	10 450 000,00	
3.1.3	Use the NAVRF to guide provincial assessments	6 750 000,00	-	1 800 000,00	-	8 550 000,00	

ID	Strategic Interventions and Actions	Human resources	Infrastructure, Equipment and technology	Capacity development	Operational costs	TOTAL	Inflation Adjusted Figures
3.1.4	Use the NAVRF to guide local assessments	22 750 000,00	-	4 550 000,00	-	27 300 000,00	
ZAR		38 350 000,00	-	10 150 000,00	1 500 000,00	50 000 000,00	89,542,384.83
USD		2 739 285,71	-	725 000,00	107 142,86	3 571 428,57	4,799,701.35
Intervention 4: Facilitate mainstreaming of adaptation responses into sectoral planning and implementation							
Outcome 4.1: Effective adaptation planning that covers at least 80% of the South African sectors identified in the NCCAS by 2025							
4.1.1	Draft updated National Climate Change Sector Plans to include climate change adaptation	5 500 000,00	-	1 540 000,00	-	7 040 000,00	
4.1.2	Draft updated provincial climate change adaptation strategies and associated implementation plans	4 500 000,00	-	1 260 000,00	-	5 760 000,00	
4.1.3	Draft updated local government climate change adaptation strategies and associated implementation plans	83 400 000,00	-	13 900 000,00	-	97 300 000,00	
		93 400 000,00	-	16 700 000,00	-	110 100 000,00	
Outcome 4.2: Achieve a 100% coverage of climate change considerations in NCCAS relevant sectoral operational plans by 2025							
4.2.1	Integrate climate change adaptation into provincial growth and development strategies	3 150 000,00	-	1 260 000,00	-	4 410 000,00	
4.2.2	Amend development planning guidelines to incorporate climate change adaptation considerations	750 000,00	-	200 000,00	-	950 000,00	
4.2.3	Integrate climate change adaptation into municipal development planning documents	97 300 000,00	-	27 800 000,00	-	125 100 000,00	
4.2.4	Mandate that all public infrastructure be planned, designed, operated and managed after explicitly taking current and predicted future climate change impacts into account	750 000,00	-	200 000,00	-	950 000,00	

CONSOLIDATED COST ESTIMATE

ID	Strategic Interventions and Actions	Human resources	Infrastructure, Equipment and technology	Capacity development	Operational costs	TOTAL	Inflation Adjusted Figures
4.2.5	Mainstream climate change adaptation in business strategic implementation plans	10 417 390,20	-	6 118 149,80	-	16 535 540,00	
		112 367 390,20	-	35 578 149,80	-	147 945 540,00	
ZAR		205 767 390,20	-	52 278 149,80	-	258 045 540,00	462,120,260.91
USD		14 697 670,73	-	3 734 153,56	-	18 431 824,29	24,770,830.56
Intervention 5: Promote research application, technology development, transfer and adoption to support planning and implementation							
Outcome 5.1: Increased research output and technology uptake to support planning and implementation							
5.1.1	Set up a National Climate Centre in an existing institution	238 487 900,00	12 167 750,00	-	17 034 850,00	267 690 500,00	
5.1.2	Establish an Interactive Online Climate Service Platform	14 400 000,02	1 800 000,00	-	1 800 000,00	18 000 000,02	
5.1.3	Establish a Climate Change Science Advisory Technical Council	339 560,37	-	-	1 768 123,77	2 107 684,14	
5.1.4	Develop a research roadmap for climate change adaptation	625 000,00	-	200 000,00	82 500,00	907 500,00	
5.1.5	Continue and enhance climate observation and monitoring	35 000 000,00	2 340 000,00	100 000,00	3 744 000,00	41 184 000,00	
5.1.6	Continue to invest in climate change prediction and modelling data	102 209 100,00	29 202 600,00	-	14 601 300,00	146 013 000,00	
5.1.7	Continue to invest in research that aims to understand the different impacts of climate change on the environment and society	272 557 600,00	34 069 700,00	-	34 069 700,00	340 697 000,00	
5.1.8	Invest in research on the most effective adaptation responses to different climate change impacts	1 600 000,00	200 000,00	-	200 000,00	2 000 000,00	
5.1.9	??	-	-	-	-	-	
5.1.10	Establish a programme to promote research into new climate change adaptation technologies	750 000,00	-	-	75 000,00	825 000,00	

ID	Strategic Interventions and Actions	Human resources	Infrastructure, Equipment and technology	Capacity development	Operational costs	TOTAL	Inflation Adjusted Figures
5.1.11	Establish a knowledge dissemination programme to encourage research uptake	7 209 166,67	-	6 470 940,00	-	13 680 106,67	
ZAR		663 619 160,39	79 580 050,00	300 000,00	73 100 473,77	816 599 684,16	1,462,405,663.37
USD		47 401 368,60	5 684 289,29	21 428,57	5 221 462,41	58 328 548,87	78,388,692.21
		Intervention 6: Build the necessary capacity and awareness for climate change response					
		Outcome 6.1: Capacity building and awareness for climate change response enhanced					
6.1.1	Develop and implement an effective communication and outreach programme	450 000,00	-	2 250 000,00	300 000,00	3 000 000,00	
6.1.2	Develop and implement a training programme for government officials	25 042 500,00	-	25 650 000,00	5 069 250,00	55 761 750,00	
6.1.3	Establish formally accredited training courses	9 306 780,00	-	32 573 730,00	4 653 390,00	46 533 900,00	
6.1.4	Incorporate climate change adaptation into relevant secondary and tertiary curricula	18 613 560,00	-	65 147 460,00	8 376 102,00	92 137 122,00	
ZAR		53 412 840,00	-	125 621 190,00	18 398 742,00	197 432 772,00	353,572,024.96
USD		3 815 202,86	-	8 972 942,14	1 314 195,86	14 102 340,86	18,952,366.87
		Intervention 7: Establish effective governance & legislative processes to integrate climate change in development planning					
		Outcome 7.1: Adaptation governance defined and legislated through the Climate Change Act once approved by parliament					
7.1.1	Create formal climate change legislation for adaptation	800 000,00	-	100 000,00	100 000,00	1 000 000,00	
		Outcome 7.2: Institutional support structures for climate change adaptation strengthened					
7.2.1	Continue to facilitate the meeting of the Inter-Ministerial Committee on Climate Change	5 356 506,00	-	42 852 048,00	5 356 506,00	53 565 060,00	
7.2.2	Continue to facilitate the meeting of the Intergovernmental Committee on Climate Change (IGCCC)	5 356 506,00	-	42 852 048,00	5 356 506,00	53 565 060,00	

CONSOLIDATED COST ESTIMATE

ID	Strategic Interventions and Actions	Human resources	Infrastructure, Equipment and technology	Capacity development	Operational costs	TOTAL	Inflation Adjusted Figures
7.2.3	Establish a functioning Provincial Committee on Climate Change for each province	810 000,00	-	6 480 000,00	810 000,00	8 100 000,00	
7.2.4	Establish a functioning Municipal Committee on Climate Change for each municipality	16 680 000,00	-	66 720 000,00	16 680 000,00	100 080 000,00	
		28 203 012,00	-	158 904 096,00	28 203 012,00	215 310 120,00	
Outcome 7.3: Enhanced public-private-civil society collaboration and stewardship							
7.3.1	Continue to facilitate the meeting of the National Committee on Climate Change (NCCC), a multi-stakeholder climate change forum.	60 000,00	-	600 000,00	60 000,00	720 000,00	
7.3.2	Implement collaborative pilot resilience-building projects	67 095 856,80	-	329 338 800,00	34 454 448,00	430 889 104,80	
7.3.3	Continue to support knowledge-sharing platforms	140 000,00	-	7 653 333,33	779 333,33	8 572 666,67	
		67 295 856,80	-	337 592 133,33	35 293 781,33	440 181 771,47	
ZAR		96 298 868,80	-	496 596 229,33	63 596 793,33	656 491 891,47	1,175,676,991.63
USD		6 878 490,63	-	35 471 159,24	4 542 628,10	46 892 277,96	63,019,300.42
Intervention 8: Enable substantial flows of climate change adaptation finance from various sources							
Outcome 8.1: Adequate financial resources of national adaptation priorities from national fiscus and international sources							
8.1.1	Carry out a cost-benefit analysis of the NCCAS	625 000,00	-	200 000,00	82 500,00	907 500,00	
8.1.2	Develop resource mobilisation strategy	625 000,00	-	200 000,00	82 500,00	907 500,00	
8.1.3	Develop a national climate investment plan	625 000,00	-	200 000,00	82 500,00	907 500,00	
8.1.4	Expand the list of government entities accredited for climate financing	21 000 000,00	-	16 800 000,00	4 200 000,00	42 000 000,00	
8.1.5	Build capacity of local accredited implementing entities to access adaptation finance	545 454,55	-	1 909 090,91	272 727,27	2 727 272,73	
8.1.6	Develop a project preparation assistance fund	560 000,00	-	5 040 000,00	-	5 600 000,00	

ID	Strategic Interventions and Actions	Human resources	Infrastructure, Equipment and technology	Capacity development	Operational costs	TOTAL	Inflation Adjusted Figures
8.1.7	Mainstream NCCAS priorities into the Medium-Term Strategic Framework and assign implementation responsibilities	825 000,00	-	-	-	825 000,00	
8.1.8	Investigate options to include climate change adaptation parameters in the equitable share allocations of state revenue calculations	825 000,00	-	-	-	825 000,00	
8.1.9	Promote knowledge exchange on the economic benefits of private sector adaptation action	7 159 166,67	-	6 470 940,00	-	13 630 106,67	
ZAR		32 789 621,21	-	30 820 030,91	4 720 227,27	68 329 879,39	122,368,407.12
USD		2 342 115,80	-	2 201 430,78	337 159,09	4 880 705,67	6,559,260.29
Intervention 9: Develop and implement an M&E system that tracks implementation of adaptation actions and their effectiveness							
Outcome 9.1: A national M&E system developed and implemented by 2025.							
9.1.1	Establish a M&E system to track progress in achieving the strategic outcomes of the NCCAS	78 899 400,00	6 574 950,00	19 724 850,00	13 149 900,00	118 349 100,00	
9.1.2	Report on success in achieving the strategic outcomes of the NCCAS	625 000,00	-	600 000,00	122 500,00	1 347 500,00	
9.1.3	Update the NCCAS based on the M&E learnings	625 000,00	-	200 000,00	82 500,00	907 500,00	
ZAR		80,149,400.00	6,574,950.00	20,524,850.00	13,354,900.00	120,604,100.00	215,983,574.68
USD		5,724,957.14	469,639.29	1,466,060.71	953,921.43	8,614,578.57	11,577,273.24
CONSOLIDATED TOTAL ZAR		12,338,673,143.45	28,231,488,186.40	3,685,228,382.78	4,649,509,498.19	48,904,899,210.82	87,581,226,101.36
CONSOLIDATED TOTAL USD		881,333,795.96	2,016,534,870.46	263,230,598.77	332,107,821.30	3,493,207,086.49	4,694,578,219.97

5 DATA SOURCES

- Building Resilience in the Greater uMngeni Catchment Project. Adaptation Fund. South African National Biodiversity Institute. South Africa. Retrieved from: <https://www.sanbi.org/wp-content/uploads/2018/03/sa-nie-umngeni-resilience-projectfull-project-proposalapproved-oct-14-2.pdf>
- Building resilience to climate change in the water and sanitation sector. GEF, Project ID 5204. Uganda. LCDF. Retrieved from <https://www.thegef.org/project/building-resilience-climate-change-water-and-sanitation-sector>
- C.A.P.E. Biodiversity and Sustainable Development Project. World Bank. UNDP. South Africa. Retrieved from: <https://www.thegef.org/project/cape-biodiversity-conservation-and-sustainable-development-project>
- Climate Adaptation and Forestry Project. Moldova. (GEF 5). Retrieved from: <http://documents.worldbank.org/curated/en/617551497232845961/Moldova-Climate-Adaptation-Project>
- “Closing the Water Cycle Gap – Sustainable Management of Water Resources” (15.2M). European Union. Retrieved from: <http://www.waterjpi.eu/joint-calls/joint-call-2018>
- DEA-Adaptive Capacity Facility. Government of Flanders. Department of Environmental Affairs. Final Project Document. 2017.
- Estimate of National Expenditure. (2019) Budget Vote 27. Environmental Affairs. Department: National Treasury. Republic of South Africa. Retrieved from <http://www.treasury.gov.za/documents/national%20budget/2019/enebooklets/Vote%2027%20Environmental%20Affairs.pdf>
- Estimate of National Expenditure. (2019) Budget Vote 24. Agriculture, Forestry, and Fisheries. Department: National Treasury. Republic of South Africa. Retrieved from: <http://www.treasury.gov.za/documents/national%20budget/2018/ene/Vote%2024%20Agriculture%20Forestry%20and%20Fisheries.pdf>
- Integration of Climate Change Risk and Resilience into Forestry Management (ICCRIFS) (GEF 4). Climate-resilient Infrastructure in Northern Mountain Province of Vietnam. UNDP-GEF/SCCF. Retrieved from: <https://www.thegef.org/project/integration-climate-change-risk-and-resilience-forestry-management-iccrifs>
- Jiangxi Fuzhou Urban Integrated Infrastructure Improvement Project in China (GEF-5). ASTUD. Retrieved from: <https://www.adb.org/projects/44007-013/main>
- Kwazulu-Natal Estimates of Provincial Revenue and Expenditure 2018/2019. Retrieved from: <http://www.treasury.gov.za/documents/provincial%20budget/2018/3.%20Estimates%20of%20Prov%20Rev%20and%20Exp/NW/1.%20Budget%20Overview/NW%20-%20EPRE%20-%20Budget%20Overview.pdf>
- National Research Foundation Strategy 2020. National Research Council. Department of Science and Technology. Republic of South Africa. Retrieved from: National Research Foundation Strategy 2020. National Research Council. Department of Science and Technology. Republic of South Africa.
- Reaping the Potential of Entrepreneurship for a Climate-Smart Inclusive Green Economy in South Africa Government of Flanders.
- Strengthening capacity for climate change adaptation through support to Integrated Watershed Management in Lesotho. LCDF. GEF. 5124. Retrieved from: <https://www.thegef.org/project/strengthening-capacity-climate-change-adaptation-through-support-integrated-watershed>
- Strengthening knowledge sharing partnerships for effective adaptation to climatic variability and change in South Africa. Environmental Monitoring Group Trust.
- Strengthening the Resilience of Small Scale Rural Infrastructure and Local Government Systems to Climatic Variability and Risk in Timor Leste. LDCF.



Strengthening Climate Information And Early Warning Systems In Zambia. LDCF. Retrieved from: <https://www.adaptation-undp.org/projects/ldcf-ews-zambia>

Somda, Z. C., Meltzer, M. I., Perry, H. N., Messonnier, N. E., Abdumumini, U., Mebrahtu, G., ... Sow, I. (2009). Cost analysis of an integrated disease surveillance and response system: case of Burkina Faso, Eritrea, and Mali. *Cost effectiveness and resource allocation* : C/E, 7, 1. doi:10.1186/1478-7547-7-1

Southern Africa Climate Finance Partnership. DFID. Retrieved from https://southsouthnorth.org/portfolio_page/southern-africa-climate-finance-partnership-sacfp/

South African Medical Research Council. 2016/2017 Annual Report. Retrieved from: <http://www.mrc.ac.za/sites/default/files/attachments/2017-10-04/SAMRCAnnualReport2017.pdf>,

South African Risk and Vulnerability Atlas (SARVA). Department of Science and Technology (DST). CSIR. Retrieved from: <http://www.csag.uct.ac.za/sarva/>

Taking Adaptation to the Ground: A Small Grants Facility for Enabling Local Level Responses to Climate Change implemented by SANBI and South South North Trust. Retrieved from: <https://www.adaptation-fund.org/project/taking-adaptation-to-the-ground-a-small-grants-facility-for-enabling-local-level-responses-to-climate-change/>

Towards Enhanced Climate Change Adaptation and an Inclusive Adaptive Green Economy in South Africa. Government of Flanders. Retrieved from: <https://www.bing.com/search?q=Towards+Enhanced+Climate+Change+Adaptation+and+an+Inclusive+Adaptive+Green+Economy+in+South+Africa.+Government+of+Flanders.&form=CMNTDF&pc=CMNTDF&src=IE-SearchBox>

South African Government. Forestry. Republic of South Africa. Retrieved from: www.gov.za/about-sa/forestry

ANNEXURES

TABLE OF CONTENTS

ANNEXURE 1

Intervention 1: Reduce human and economic vulnerability, ensure resilience of physical capital and ecological infrastructure and build adaptive capacity	40
Outcome 1.1: Increased resilience and adaptive capacity achieved in human, economic, environment, physical and ecological infrastructure vulnerability	40
Intervention 2: Develop a risk, early warning, vulnerability and adaptation monitoring system for key climate vulnerable sectors and geographic areas.....	59
Outcome 2.1: An early warning and monitoring system for key climate vulnerable sectors and geographic areas developed and implemented.....	59
Intervention 3: Develop vulnerability and resilience methodology framework that integrates biophysical and socio-economic aspects of vulnerability and resilience	66
Outcome 3.1: An adaptation vulnerability and resilience framework developed and implemented from 2020 across 100% of key adaptation sectors	66
Intervention 4: Facilitate mainstreaming of adaptation responses into sectoral planning and implementation	69
Outcome 4.1: Effective adaptation planning that covers at least 80% of the South African sectors identified in the NCCAS by 2025	69
Outcome 4.2: Achieve a 100% coverage of climate change considerations in NCCAS relevant sectoral operational plans by 2025	71
Intervention 5: Promote research application, technology development, transfer and adoption to support planning and implementation.....	74
Outcome 5.1: Increased research output and technology uptake to support planning and implementation.....	74
Intervention 6: Build the necessary capacity and awareness for climate change response	82
Intervention 7: Establish effective governance and legislative processes to integrate climate change in development planning	85
Outcome 7.1: Adaptation governance defined and legislated through the Climate Change Act once approved by parliament	85
Outcome 7.2: Institutional support structures for climate change adaptation strengthened	85
Outcome 7.3: Enhanced public-private-civil society collaboration and stewardship	88
Intervention 8: Enable substantial flows of climate change adaptation finance from various sources	90
Intervention 9: Develop and implement an M&E system that tracks implementation of adaptation actions and their effectiveness.....	94
Outcome 9.1: A national M&E system developed and implemented by 2025.....	94



ANNEXURE 2

1	Introduction	96
2	Context	96
3	Approach and Key Principles	97
3.1	Approach	97
3.2	Key Principles.....	97
4	Strategy Costing Methodology	99
4.1	Define Purpose and Objectives	99
4.2	Select Costing Methodology	99
4.3	Define Scope of Strategic interventions	101
4.4	Seek Appropriate Data	102
4.5	Estimate Resource Requirements	102
4.6	Assign Monetary Value to Resources	103
4.7	Expert Validation and Finalization	104
5	Cost Estimate Workplan	104

APPENDIX 1

Costing team.....	105
-------------------	-----

APPENDIX 2

Meeting minutes - initial meeting.....	106
--	-----

APPENDIX 3

List of stakeholders consulted.....	108
-------------------------------------	-----

LIST OF TABLES

Table 1: NCCAS Strategic Interventions	96
Table 2: Key Principles for the Development of the Cost Estimate.....	97

LIST OF FIGURES

Figure 1: Overview of the Strategy Costing Process.....	99
---	----

ANNEXURE 1: COST ESTIMATE FOR ACTIONS UNDER STRATEGIC INTERVENTIONS

Intervention 1: Reduce human and economic vulnerability, ensure resilience of physical capital and ecological infrastructure and build adaptive capacity

Outcome 1.1: Increased resilience and adaptive capacity achieved in human, economic, environment, physical and ecological infrastructure vulnerability

1.1.1 Support the agricultural sector to implement more efficient climate-smart and conservation agriculture practices

This will involve setting up programmes to provide support to the sector to implement climate-smart and conservation agricultural practices. These are sustainable agricultural practices that work with the environment and help to increase productivity, build resilience of farmers to stresses, and lower carbon emissions.

Budget Line	Unit Cost (USD)	Multiplier	Total Cost (USD)
Human Resources			3,916,090.80
Staff salaries (or part thereof) for finance, procurement, admin and project management staff	43,121.40	9 provinces	388,092.60
Component Coordinator, Field Assistants	177,142.80	9 provinces	1,594,285.20
Project Leader (Additional Staff) Senior Level (Provincial Agricultural Coordinator)	63,428	9 provinces	570,855.60
2 Extension Officers	79,999.80	9 provinces	719,998.20
Financial and Procurement Manager (PT) (20%)	71,428.80	9 provinces	642,859.20
Infrastructure, Equipment and Technology			1,391,409.00
Fencing and concrete	107,143.50	9 provinces	964,291.50
Set up irrigation, labour, supplies (including hand hoes, garden forks), consumables, maintenance	35,714.50	9 provinces	321,430.50
Costs associated with the provision of equipment to the NIE secretariat, including computers and associated peripherals (total costs from implementing entity budget)	11,743.00	9 provinces	105,687.00
Capacity Development			2,905,713.00
Enhance the capacity of DAEA staff to mainstream climate change considerations into their activities	37,143.00	9 provinces	334,287.00
Farmer training days: develop training material, brochures, transport for participants	28,571.40	9 provinces	257,142.60
Develop survey material, conduct participatory workshops to develop production plans, undertake participatory research trials and disseminate results	114,285.60	9 provinces	1,028,570.40
Convert, collaboratively with farmers, production plans into five-year business plans, implement plans and establish resilient seed production and storage systems of identified climate-resilient crops	142,857.00	9 provinces	1,285,713.00
Operational Costs			737,526.17

Budget Line	Unit Cost (USD)	Multiplier	Total Cost (USD)
Operating costs, including inception workshop	22,876.80	9 provinces	205,891.20
Supply of training material (including papers, photocopying, printing, brochures); hiring of venues, transporting participants, catering; short course and a workshop/symposium, including trainers and caterers	37,143.00	9 provinces	334,287.00
Travel, S&T, workshop and catering costs associated with project oversight and governance activities (20% of operating costs)	17,615.40	9 provinces	158,538.60
Administrative costs: printing, photocopying, telecoms and other costs related to office operations	4,312.15	9 provinces	38,809.37
Total Costs (USD)			8,950,738.97
Total Costs (ZAR)			125,310,345.55

Methodology and assumptions

The above cost estimate is based on a bottom up costing methodology and data sources derived from the Building Resilience in the Greater uMngeni Catchment Project (Adaptation Fund, USD 7,495,055) implemented by the South African National Biodiversity Institute in uMgungundlovu District Municipality (UMDM), in KwaZulu-Natal, South Africa. The costs are based on scaling up activities implemented under Component 3: Small scale farmers have improved resilience and reduced vulnerability to existing and anticipated impacts of climate variability and change (USD 1,410,476) in nine provinces.

The above cost estimate is based on a five-year project. The total costs were calculated by (i) dividing total costs of the analogic unit costs by the total number of years of the project (five years) to calculate annual costs; (ii) multiplying annual costs by the upward timeframe of this action as defined in the NCCAS (three years); and (iii) multiplying total costs by the estimated scale of the project (nine provinces).

Synergies with other strategic interventions

The costs associated with monitoring and evaluation are not covered in project costs, but rather allocated to total costs associated with Strategic Intervention 9.

Investments under this Action 1.1.1 could be linked to investments under Action 1.1.2, resulting in cost efficiencies. For example, investing in human

resources and supporting capacity development in climate smart and conservation agriculture could be linked to activities promoting water conservation in the agricultural sector under 1.1.2. It is therefore advised that investments under Action 1.1.1 and 1.1.2 be considered together to enable complimentary and maximize cost efficiencies.

1.1.2 Support the agricultural sector to use and manage water more sustainably

This will involve the promotion and subsidisation of water conservation technologies.

Budget Line	Unit costs (USD)	Multiplier	Total Cost (USD)
Human Resources			3,916,090.80
Staff salaries (or part thereof) for finance, procurement, admin and project management staff	43,121.40	9 provinces	388,092.60
Component Coordinator, Field Assistants	177,142.80	9 provinces	1,594,285.20
Project Leader (Additional Staff) Senior Level	63,428	9 provinces	570,855.60
Extension Officer #1 Swayimane and #2 Vulindlela	79,999.80	9 provinces	719,998.20
Financial and Procurement Manager (part time) 20%	71,428.80	9 provinces	642,859.20
Infrastructure, Equipment and Technology			37,455,687.00

Budget Line	Unit costs (USD)	Multiplier	Total Cost (USD)
Rainwater harvesting technology (800), community rainwater harvesting tanks (10), extension of gravity schemes, valley tanks (10)	4,150,000	9 provinces	37,350,000
Costs associated with the provision of equipment to the NIE secretariat including computers and associated peripherals (total costs from implementing entity budget)	11,743	9 provinces	105,687
Capacity Development			2,905,713.00
Enhance the capacity of DAEA staff to mainstream climate change water conservation/ considerations into their activities	37,143.00	9 provinces	334,287.00
Training days: training for water harvesting technology and maintenance, develop training material, brochures, and transport for participants	28,571.40	9 provinces	257,142.60
Develop survey material, conduct participatory workshops to develop production plans, undertake participatory research trials and disseminate results	114,285.60	9 provinces	1,028,570.40
Convert, collaboratively with farmers, production plans into five-year business plans, implement plans and establish resilient seed production and storage systems of identified climate-resilient crops	142,857.00	9 provinces	1,285,713.00
Operational Costs			737,526.17
Operating costs, including inception workshop	22,876.80	9 provinces	205,891.20
Supply of training material (including papers, photocopying, printing, brochures); hiring of venues, transporting participants, catering; short course and a workshop/symposium, including trainers and caterers	37,143.00	9 provinces	334,287.00
Travel, S&T, workshop and catering costs associated with project oversight and governance activities (20% of operating costs)	17,615.40	9 provinces	158,538.60
Administrative costs: printing, photocopying, telecoms and other costs related to office operations	4,312.15	9 provinces	38,809.37
Total Costs (USD)			45,015,016.97
Total Costs (ZAR)			630,210,237.55

Methodology and assumptions

The above cost estimate is based on a bottom up and analogic costing and data sources derived from are the Building Resilience in the Greater uMngeni Catchment Project (Adaptation Fund, USD 7,495,055) implemented by the South African National Biodiversity Institute in uMgungundlovu District Municipality (UMDM), in KwaZulu-Natal, South Africa and the Uganda-LCDF Building resilience to climate change in the water and sanitation sector, GEF, Project ID 5204 (36 months / 800 households/ 10 communities across 3 districts). The costs are based on scaling up activities to nine provinces.

The total costs were calculated by (i) dividing total costs of the analogic unit costs by the total number of years of the project (five years) and (three years) to calculate annual costs; (ii) multiplying annual costs by the upward timeframe of this action as defined in the NCCAS (three years); and (iii) multiplying total costs by the estimated scale of the project (nine provinces).

Synergies with other strategic interventions

As stated above in Action 1.1.1, investments under Action 1.1.2 could be linked to investments under Action 1.1.1, resulting in cost efficiencies. For example, investing in human resources and supporting capacity development for the promotion of water conservation in the agricultural sector could

be linked to activities promoting climate smart and conservation agriculture under Action 1.1.1. It is therefore advised that investments under Action 1.1.1 and 1.1.2 be considered together to enable complimentary and maximize cost efficiencies.

1.1.3 Promote the expansion of food garden programmes outside of land classified as agricultural land or farmland to reduce food insecurity and hunger

This will involve the promotion of urban agriculture, including community and household food gardens, in areas not classified as agricultural. Growing food will help to reduce the potential food security risks associated with changes in climate.

Budget Line	Percentage	Unit costs (3 years)	Units of measurement	Total Cost (ZAR)
Human Resources				
Staff salaries (or part thereof) for finance, procurement, admin and project management staff	24%	146,160,000	9 provinces	1,315,440,000
Infrastructure, Equipment and Technology				
Debushing, fencing, drilling and equipping of borehole, soil cultivation and irrigation layout for the production of vegetables, storage facility, packaging material and mechanization	33%	200,970,000	9 provinces	1,808,730,000
Capacity Development				
Farmer training, capacity building and mentorship	33%	200,970,000	9 provinces	1,808,730,000
Operational Costs				
Operating costs, including administrative costs: printing, photocopying, telecoms and other costs related to office operations; supply of training material (paper, photocopy, printing, brochures)	10%	60,900,000	9 provinces	548,100,000
TOTAL COSTS (USD)				391,000,000
TOTAL COSTS (ZAR)				5,481,000,000

Methodology and Assumptions

The above cost estimate is based on top-down costing and data sources derived from Kwazulu-Natal Estimates of Provincial Revenue and Expenditure 2018/2019. KZN has embarked on the roll-out of a Food and Nutrition Security programme and in 2018/19, the department has budgeted R203 million for interventions including one-home-one-garden, one-hectare one-household, one-household-one-fruit-tree (or more), institution gardens, indigenous goats, indigenous chickens, as well as mushrooms.

The total costs were calculated by multiplying the annual cost of R203 million by three years (timeframe

of this action), equivalent to R609,000,000. This was then distributed by percentage allocation across cost categories (human resources; infrastructure, equipment and technology; operational costs), and multiplied by nine provinces to calculate total costs. The calculation is based on R203 million (one year) * three years = 609,000,000 * nine provinces = 5,481,000,000

1.1.4 Adopt climate resilient approaches to natural resource management to restore and maintain ecosystem goods and services

This will involve using climate-smart and ecosystem-based approaches to restore ecological integrity of natural resources and improve community resilience to climate change.

Budget Line	Unit cost (USD) (7 years)	Unit of measurement	Total Cost (USD)
Human Resources			9,137,545.20
Staff salaries (or part thereof) for finance, procurement, admin and project management staff	100,616.60	9 provinces	905,549.40
Component Coordinator, Field Assistants	413,333.20	9 provinces	3,719,998.80
Project Leader (Additional Staff) Senior Level	147,999.60	9 provinces	1,331,996.40
Extension officer (2 districts)	186,666.20	9 provinces	1,679,995.80
Financial and Procurement Manager (part time) 20%	166,667.20	9 provinces	1,500,004.80
Infrastructure, Equipment and Technology			7,123,806.00
Support PMU and district office (desk top computers, multi-media sets, projector, printer, photocopier, essential furniture)	65,534.00	9 provinces	589,806.00
Implementation of improved water harvesting structures 50 households in each district (total 150 households)	510,000.00	9 provinces	4,590,000.00
Establishment of multi-purpose agroforestry systems in 24 communities	216,000.00	9 provinces	1,944,000.00
Capacity Development			19,782,000.00
Training, workshops, (national, district municipality level) on climate change adaptation and watershed management, IWRM, rangeland management, and communication materials	189,000.00	9 provinces	1,701,000.00
Implementation of sustainable land and water management practices in 24 communities	504,000.00	9 provinces	4,536,000.00
Implementation of improved vegetative cover and range land management and development of rangeland management plans	420,000.00	9 provinces	3,780,000.00
Implementation of small-scale income generating activities (24 communities)	378,000.00	9 provinces	3,402,000.00
Implementation of crop and livestock systems and training in 24 communities	462,000.00	9 provinces	4,158,000.00
Technical and capacity development support	245,000.00	9 provinces	2,205,000.00
Operational Costs			7,717,500.00
Vehicle/operation/rental	210,000	9 provinces	1,890,000.00
Utilities (telephone, internet, cleaner, fuel and vehicle maintenance, etc) for PMU and DPU	70,000	9 provinces	630,000.00
Miscellaneous expenses	35,000.00	9 provinces	315,000.00
Travel, S&T, workshop/training costs	192,500.00	9 provinces	1,732,500.00
Miscellaneous contracts, including quantitative and qualitative assessments, inventory, screening, evaluations	315,000.00	9 provinces	2,835,000.00
Development of communication strategy and awareness products and communication at all levels	35,000.00	9 provinces	315,000.00
Total Costs (USD)			43,760,851.20
Total Costs (ZAR)			612,651,916.80

Methodology and assumptions

The cost estimate for this action is based on a bottom up costing methodology and based on data derived from the Building Resilience in the Greater uMngeni Catchment Project (Adaptation Fund, USD 7,495,055) implemented by the South African National Biodiversity Institute in uMgungundlovu District Municipality (UMDM), in KwaZulu-Natal, South Africa and the Global Environment Facility (GEF) 5124 Strengthening capacity for climate change adaptation through support to Integrated Watershed Management in Lesotho (48 months, USD 3,592,694, LCDF).

HR costs were derived from the Building Resilience in the Greater uMngeni Catchment Project, whereby total costs were divided by the duration of the

project (five years) to calculate annual costs, then multiplied by the timeframe of this action (seven years), and multiplied by nine (scope) to calculate total costs.

The budget from the Global Environment Facility (GEF) 5124 Strengthening capacity for climate change adaptation through support to Integrated Watershed Management in Lesotho was used to calculate the costs associated for infrastructure, equipment and technology; capacity development, and operational costs), whereby costs were divided by total number years of the project (four years) to calculate annual costs, multiplied by the timeframe of this action (seven years), and multiplied by nine (scope) to calculate total costs.

1.1.5 Protect and conserve South Africa's most vulnerable ecosystems and landscapes

This will involve identifying vulnerable ecosystems that need further protection from impacts of climate change. Enforcement action is required against illegal harvesting of coastal and offshore fish stock, ecosystem-based approaches are also recommended to ensure the recovery of freshwater and marine fish stocks. Monitoring and controlling alien invasive species that benefit from climate change will reduce the risk of biodiversity loss.

Budget Line	% Allocation	Unit Costs	Years	Total Costs (ZAR)
Human Resources				
	60%	23,202,000.00	23,202,000.00	324,828,000
		46,404,000	7 years	
Infrastructure, Equipment and Technology				
	10%	7,734,000	7 years	54,138,000
Capacity Development				
	20%	15,468,000	7 years	108,276,000
Operational Costs				
	10%	7,734,000	7 years	54,138,000
TOTAL COSTS (USD)				38,670,000
TOTAL COSTS (ZAR)				541,380,000

Methodology and assumptions

The cost estimate for this action is based on top-down, or parametric costing, using data sources derived from the DEA environment budget document (2018/2019). According to the environment budget document, the 2018-19 budget for the biodiversity and conservation programme was 773,400,000. To account for adaptation costs, the principle of additionality was applied based on the additionality of 10% on total costs to account for adaptation costs. This equates to approximately 77,340,000 per year for CC-related management costs. This figure was then multiplied by the timeframe of the action according to the NCCAS (seven years). The total figure was then distributed across costing categories according to estimated resource requirements.

The costing of this action is based on the consideration of the additional management costs required due to climate change. This would likely require an element of legislation plus management fees involved here.

The calculation of costs is based on the following cost calculation:

- Total costs over 7-year timeframe = 541,380,000
- HR: 60% = 46,404,000 * 7 years = 324,828,000
- EIT: 10% = 7,734,000 * 7 years = 54,138,000
- CD: 20% = 15,468,000 * 7 years = 108,276,000
- OC: 10% 7,734,000 * 7 years = 54,138,000

1.1.6 Monitor and control the spread of alien invasive species that benefit from climate change

This will involve conducting research into identifying the alien invasive species that will benefit from climate change and developing responses to prevent these species from spreading. Different stakeholders in the biodiversity sector need to work together continuously to control the spread of these species and minimize the risk of biodiversity loss.

Budget Line	% Allocation / Unit costs (3 years)	Units of measurement	Total costs (USD)
Human Resources			
SANBI: assess, monitor and report on the state of biodiversity and increase knowledge for decision making (including adaptation to climate change)	132,815,333 per year*	3 years	398,445,999
Programme coordination and management,	38,410	9 biomes / ecosystems	345,690
Capacity Development			
Improve management of invasive alien species and create an IAS management strategy and business plan for the entire CFR: - Establish centres of excellence for IAS prevention and management in the CFR - Pilot the control of invasive alien fish in priority freshwater ecosystems	1,240,000	9 (8 terrestrial biomes and marine ecosystems)	11,160,000
Operational Costs			
Production of research, translation, interpretation, and supporting documents, including manuals, guidelines on the management of IAS that will benefit from climate change	10%	Total costs	40,995,168.80
TOTAL COSTS (USD)			450 946 856,81
TOTAL COSTS (ZAR)			6 313 255 995,35

Methodology and assumptions

The cost estimate for this action is based on top-down, or parametric costing and bottom-up costing. Data sources include the MTEF (2019/20-2021/22), the DEA MTEF (2019/20-2021/22), and budget information from the World Bank-funded C.A.P.E. Biodiversity and Sustainable Development Project. According to the environment budget document, the 2018-19 average expenditure estimate for South African National Biodiversity Institute over a three-year period (2019/20-20/22) to assess monitor and report on the state of biodiversity and increase knowledge for decision making (including adaptation to climate change) was 132,815,333 per year¹. This figure was then allocated to the HR component of this action based on the assumption that research activities and technical assistance will be provided from SANBI in the implementation of this action.

Budget data from the IAS project component of the C.A.P.E. Biodiversity and Sustainable Development Project was used to calculate costs associated with management actions for the control of invasive alien species that benefit from climate change. Costs were calculated by calculating annual costs of the IAS component and project management components of the C.A.P.E Biodiversity and Sustainable Development Project, then multiplying by the number of years of this action (three years) to calculate total costs. Total project management and implementation costs were then multiplied by nine provinces, to estimate the scale of the intervention.

1 146 818 000 (19/20) 125 095 000 (20/21) 126 533 000 (21/22) (AVG) = 132,815,333 per year

The cost calculation for bottom-up costing is provided below:

Project implementation costs: 1,240,000

- 2,480,000 (IAS project component) / six years (project duration) = 413,333.33 (annual cost) x 3 (timeframe of action) = 1,240,000

Project management costs: 76,820

- 2,480,000 (IAS project component) / 53,490,000 (total program costs) = 0.046 (% of project)
- 1,670,000 (management and monitoring budget of total program) * 0.046 (% of project) = 76,820

To calculate operational costs, 10% of total costs of this action was used as a proxy.

Synergies with other interventions

Investments under this action in terms of human resources, research, capacity development and operational should be considered together with investments under action 1.1.7, given that research and capacity development related identifying the alien invasive species that will benefit from climate

change and developing responses to prevent these species from spreading is highly related to actions under 1.1.7 in the integration of climate change projections and its consequences into long-term biodiversity management plans.

1.1.7 Ensure that climate change projections are integrated into long-term biodiversity management plans

This will involve ensuring that climate change projections are integrated into long-term biodiversity management plans so that the implications of climate change are considered.

Budget Line	% Allocation / Unit costs	Units of measurement	Total costs (ZAR)
Human Resources			
SANBI: provide biodiversity policy advice and access to biodiversity information; and support for climate change adaptation	114,284,667	3 years	342,854,000
Capacity Development			
Workshops, stakeholder consultations, etc.	200,000	9 provinces	1,800,000
Operational Costs			
Production of research, translation, interpretation, and supporting documents, including manuals, guidelines on climate change adaptation in biodiversity management plans	10%	Total costs	34,465,400
TOTAL COSTS (USD)			27 079 957,22
TOTAL COSTS (ZAR)			379 119 401,10

Methodology and assumptions

The cost estimate for this action is based on top-down, or parametric costing and bottom-up costing. Data sources include the DEA MTEF (2019/20-2021/22), and proxies for stakeholder consultation workshops. According to the environment budget document, the 2018-19 average expenditure estimate for South African National Biodiversity Institute over a three-year period (2019/20-20/22) to provide biodiversity policy

advice and access to biodiversity information; and, support for climate change adaptation is 114,284,667 per year.² This figure was then allocated to the HR component of this action based on the assumption that research activities and technical assistance will be provided from SANBI in the implementation of this action.

2 112,849,000 (19/20) 111,578,000 (20/21) 118,427,000 (2021/21) = Avg = 114,284,667

To calculate costs associated with capacity development, costs associated with carrying out stakeholder consultations and workshops would be carried out in each of the nine provinces for the integration of climate change considerations into biodiversity sector plans.

To calculate operational costs, 10% of total costs of this action was used as a proxy.

1.1.8 Capacitate and operationalise South Africa's National Disaster Management Framework to strengthen proactive climate change adaptive capacity, preparedness, response and recovery

This will involve conducting an assessment of gaps and needs with regard to the National Disaster Management Framework to identify elements of the framework that have not yet been achieved. In particular all Disaster Management Centres will need to integrate climate change within their terms of reference.

Budget Line	Cost calculation	Total Cost (ZAR)
Human Resources		30,250,000
Consultancy fees, including TA for needs assessment and support to DMC staff in action plan development, includes travel, inception, consultations and feedback (NDMC national)	500,000 fees (50*10,000) + 250,000 travel (inception, consultations, feedback)	750,000
Consultancy fees, including TA for needs assessment and support to DMC staff in strategy/action plan development (DMC provincial)	750,000 to include 500,000 fees (50*10,000) + 250,000 travel (inception, consultations, feedback) * 9 provinces	6,750,000
Consultancy fees, including TA for needs assessment and support to MDMC staff in action plan development, includes travel, inception, consultations and feedback (municipal level)	250,000 to include 200,000 fees (20*10000) + 50,000 travel (inception, consultations, feedback) * 91 municipalities	22,750,000
Capacity Development		6,550,000
National workshop (1 large national workshop, broken down into multiple sector working groups)	200,000	200,000
Provincial workshop, to include travel	200,000 *9 provinces	1,800,000
Municipal disaster management centres (MDMCs) workshop, to include travel	50,000 * 91 municipalities	4,550,000
Operational Costs		
	10% on top of total costs	3,680,000
TOTAL COSTS (USD)		2 891 428,57
TOTAL COSTS (ZAR)		40 480 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing using estimated costs for consultancy fees and expenses required for carrying out a needs assessment of implementing institutions of the NDMF (national, provincial and municipal levels). To calculate costs associated with carrying out a needs assessment at the municipal level, it was assumed

that municipalities could be grouped together under one consultancy (e.g. approximately three municipalities per consultancy= 91).

1.1.9 Ensure that national, provincial and local disaster management plans address climate change

This will involve the inclusion of climate change impacts in disaster management plans in national, provincial and local spheres.

Budget Line	Cost calculation	Total Costs (ZAR)
Human Resources		87,300,000
Consultancy fees/TA (national)	750,000 to include 500,000 fees (50*10,000) + 250,000 travel (inception, consultations, feedback)	750,000
Consultancy fees/TA (provincial)	350,000 per provincial plan (9) (comprising fees of 200,000 (20*10,000) and 150,000 travel)	3,150,000
Consultancy fees/TA (municipal)	300,000 per municipal plan (comprising fees of 200,000 (20*10,000) and 100,000 travel)* 278	83,400,000
Capacity Development		15,360,000
1 national level workshop, including travel	200,000	200,000
9 provincial workshops	140,000 - to cover provincial level sector staff attending) * 9	1,260,000
Municipal workshops	278 municipal workshops (50,000 to cover staff attending) 1 per municipality)	13,900,000
Operational Costs		
	10% of total costs	10,266,000
Total Costs (USD)		8 066 142,86
Total Costs (ZAR)		112,926,000

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing using estimated costs for consultancy fees and expenses required for the provision of

technical assistance to national (1), provincial (9), and municipal (278) in the inclusion of climate change impacts in disaster management plans.

1.1.10 Create a more adaptive electricity system to reduce dependence on a centralised system and increase distributed generation, especially in rural areas

This will involve encouraging the development of an adaptive and decentralised electricity system so that the system is more resilient to climate disruptions. Total cost is USD 1,212,121,212 (1.2Bn) per year to generate 2000MW.

Budget Line	Total Costs (USD)
Human Resources	
10%	121,212,121.2
Infrastructure, Equipment and Technology	
80%	969,696,969.6
Operational Costs	
10%	121,212,121.2
Total Costs (USD)	1 212 121 212,00
Total Costs (ZAR)	16 969 696 968,00

Methodology and assumptions

The cost estimate for this action is based on top-down or parametric costing using multiple data sources used as proxies. The Eskom website states that net energy generation capacity is 34 952 MW from coal. CIA fact book says 2015 annual production was 229,200 gigawatt-hours (825,000 TJ)-or 229,200,000MW. What we buy in from Cahora Bassa is approx. equivalent to what we sell to the Southern African Power Pool.

The cost estimate is based in the assumption that anything new would need to be renewable to be in keeping with the NCD and LTMS. Increasing distributed generation assumes a larger number of small schemes. The Integrated Resource Plan (IRP 2010) which was promulgated in May 2011 set a more ambitious target of 17 800 MW of renewable energy to be achieved by 2030 in respect of the

electricity generation mix. Approximately 1900MW is coming online in 2019 and 2000MW in 2020. However, in Feb 2019 DBSA was awarded \$100mn (which it will co-finance with another 100mn) to generate 330MW (<https://www.dbsa.org/EN/DBSA-in-the-News/NEWS/Pages/20190227-DBSA-US100m-climate-targets.aspx>)

It is therefore assumed that South Africa can aim to generate 2000MW per year or 200000MW over the lifetime of the strategy. The cost per MW is \$6060.60 per MW. Therefore, to generate 200000MW would cost R\$1,212,121,212 (1.2bn). This figure is costed as a yearly figure. The NCCAS provides no timeframe for this specified action, therefore, there is no consideration of timeframe in the cost calculation.

1.1.11 Support small-scale fishers to become more climate resilient through use of early warning systems and sea-safety training

This will involve the development of sea-safety and early warning systems training programmes targeted at small-scale fishers.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
0.5 technical grade staff at NDMC (could be linked with 2.5)		750,000
Infrastructure, Equipment and Technology		
Open data platform		855,000
2 way SMS-based alert system		3,680,000
1 computer at NDMC		30,000
Capacity Development		
Capacity development workshops at provincial level (1000 participants per province, per year)	130,000 per provincial workshop, (5) workshops per province, (4) per year =(130,000*5*4 provinces)*3 years)	7,800,000
Operational Costs		
	10% of total costs	1,311,500
Total Costs (USD)		1 030 464,29
Total Costs (ZAR)		14 426 500,00

Methodology and assumptions

The cost estimate for this action is based on analogic costing from CSIR in developing an SMS early warning system for fishermen piloted in False Bay.³ Costs associated with infrastructure, equipment and technology are based on budget information from the Zambia LDCF project to strengthen climate monitoring capabilities, EWS and available information for responding to climate shocks and planning adaptation to CC". Infrastructure, equipment and technology were treated as once-off

costs. Costs associated with capacity development is based in the assumption that there are "30 000 fishers in 147 fishing communities" (Young, 2013, Achieving equity in the fishing industry: The fate of informal fishers in the context of the policy for the small-scale fisheries sector in South Africa) in four provinces: Eastern, Western, Northern Cape and KwaZulu-Natal. Based on this understanding, costs associated for capacity development were calculated by estimating that five workshops would

need to be held per year (three years) in the four coastal provinces to reach target beneficiaries (30,000). Estimated costs for one provincial

workshop were estimated at R130,000. To calculate operational costs, 10% of total costs of this action.

Synergies with other strategic interventions

2.1.5 Improve/develop national early warning systems for key climate vulnerable sectors and risks.

1.1.12 Investigate the potential effects of an expanded forestry sector on water availability

This will involve conducting research on the potential effects of an expanded forestry sector on water availability within the context of climate change impacts on water availability.

Budget Line	
Human Resources	
80% allocation of total costs	EUR 675,555.20
Infrastructure, Equipment, Technology	
10% allocation of total costs	EUR 84,444.40
Operational Costs	
10% allocation of total costs	EUR 84,444.40
Total Costs (USD)	938 262,22
Total Costs (ZAR)	13 135 671,11

Methodology and Assumptions

The cost estimate for this action is based on top down costing or parametric costing, using data derived from the EU-funded "Closing the Water Cycle Gap - Sustainable Management of Water Resources" (15.2M). To calculate costs, the total funding for the research programme (EUR 15.2M) was divided by the number of projects funded (18), to calculate the average funding grant per

project. This figure was then allocated based on the estimated percentage allocation to each costing category. The cost calculation is provided below:

- €15.2M/ 18 = 844,444M EUR per project
- HR: 80% = 675,555.20
- EIT: 10% = 84,444.40
- OC: 10% = 84,444.40

1.1.13 Support the integration of climate-smart and ecosystem-based approaches in forestry practices

This will involve the integration of climate-smart and ecosystem-based approaches in forestry training curricula.

Budget Line	Total Costs (ZAR)
Human Resources	
24%	86,400,000
Infrastructure, Equipment and Technology	
33%	118,800,000
Capacity Development	
33%	118,800,000
Operational Costs	
10%	32,400,000
Total Costs (USD)	25 457 142,86
Total Costs (ZAR)	356 400 000,00

Methodology and assumptions

The cost estimate for this action is based on top-down costing or parametric costing, using data derived from the Department of Agriculture, Forestry, and Fisheries (DAFF). Based on data derived from the DAFF website⁴, an amount of R1.2 billion from the department's budget has been allocated to forestry and natural resources management. To account for adaptation costs in the forestry sector, the principle of additionality was applied based on the

additionality of 10% on total costs for integrating climate-smart and ecosystem-based approaches.⁵ This equates to approximately R120,000,000 per year. This figure was then multiplied by the timeframe of this action (3 years) to estimate total costs (R360,000,000). This figure was then allocated by percentage across costing categories according to estimated resource requirements.

1.1.14 Launch an enhanced climate change public health flagship programme to build a healthier, more resilient population

This will involve the development of an evidence-based white paper on National Climate Change and a Health Flagship Programme as well as establishing key implementation nodes in provinces and municipalities.

Budget Line	Cost calculation	Total costs (ZAR)
Human Resources		
60%	312,000,000 * 3 years	936,000,000
Infrastructure, Equipment and Technology		
10%	52,000,000 * 3 years	156,000,000
Capacity Development		
20%	104,000,000 * 3 years	312,000,000
Operational Costs		
10%	52,000,000 * 3 years	156,000,000
Total Costs (USD)		111 428 571,43
Total Costs (ZAR)		1 560 000 000,00

Methodology and assumptions

The cost estimate for this action is based on top-down costing or parametric costing, using data derived from the MRC flagship programme on climate and health. According to the MRC 2017 annual report, (<http://www.mrc.ac.za/sites/default/files/attachments/2017-10-04/SAMRCAnnualReport2017.pdf>), projected research spend in 2019/20 was 520,000,000. This figure was then allocated according to cost categories and multiplied by the timeframe of the action (3 years).

- HR: 60% = 312,000,000 * 3 years = 936,000,000
- CD: 20% = 104,000,000 * 3 years = 312,000,000
- IET: 10% = 52,000,000 * 3 years = 156,000,000
- OC: 10% = 52,000,000 * 3 years = 156,000,000

- Capacity-building interventions (e.g. awareness and education campaigns)
- Monitoring and surveillance
- National vulnerability assessments
- Research and development (this is most closely aligned with the strategy)
- Health impact assessments
- Intersectoral action for climate change and health
- Health system readiness
- Model and pilot climate change and health adaptation projects
- Scale up existing public health interventions and address the social determinants of health
- International information exchange and cooperation

Note the draft National Climate Change and Health Action Plan 2020-2024 contains the following in its plan:

- National climate change and health steering committee

4 www.gov.za/about-sa/forestry

5 Other climate change and forestry projects were considered based on the principle of additionality to account for climate change adaptation projects. These include climate adaptation and forestry project (Moldova)(GEF 5) Integration of Climate Change Risk and Resilience into Forestry Management (ICCRIFS) (GEF 4).

1.1.15 Develop climate change-related disease monitoring systems

This will involve the development of climate change-related disease monitoring and surveillance systems.

Budget Line	Total Costs (ZAR)
Human Resources	
20%	4,140,720
Infrastructure, Equipment and Technology	
50%	10,351,800
Capacity Development	
20%	4,140,720
Operational Costs	
10%	2,070,360
Total Costs (USD)	1 478 828,57
Total Costs (ZAR)	20 703 600,00

Methodology and assumptions

The cost estimate for this action is based on top-down costing or parametric costing, using data derived from the cost analysis of an integrated disease surveillance and response system: case of Burkina Faso, Eritrea, and Mali.⁶ According to this study, the average cost to implement the IDSR program in Eritrea was \$0.16 per capita, \$0.04 in Burkina Faso and \$0.02 in Mali. In each country, the mean annual cost of IDSR was dependent on the health structure level, ranging from \$35,899 to \$69,920 at the region level, \$10,790 to \$13,941 at the district level, and \$1,181 to \$1,240 at the primary health care centre level. The proportions spent on each IDSR activity varied due to demand for special items (e.g., equipment, supplies, drugs

and vaccines), service availability, distance, and the epidemiological profile of the country." The mean annual cost of IDSR, ranging from \$35,899 to \$69,920 at the region level was used as a proxy for South Africa. Despite South Africa being more developed in health infrastructure than the case examples it is also larger. The cost was calculated as follows: $(\$69,920 + 35,899) / 2 = 52,909.5 = R766,800 * 9(\text{annual cost}) * 3 = R20,703,600$. The total cost was then allocated by percentage according to cost categories as follows: human resources 20%, equipment and technology 50%, capacity development 20%, and operational costs 10%.

1.1.16 Equip and capacitate healthcare facilities to manage climate change-related health effects

This will involve continued capacity building of healthcare workers to provide them with the skills to respond to and manage climate change related incidences. It will also include equipping the healthcare infrastructure.

Budget Line	Cost calculations	Total Costs (ZAR)
Human Resources		
Consultant fees, including travel costs (inception, consultations, feedback)	500,000 fees (50*10000) + 250,000 (travel, accommodation, expenses, etc)	750,000
Capacity Development		
Annual provincial workshops for healthcare facility staff	150,000*9 provinces*3 years	4,050,000
Operational Costs		
Operating costs	10% of total costs	480,000
Total Costs (USD)		377 142,86
Total Costs (ZAR)		5 280 000,00

6 Somda, Z. C., Meltzer, M. I., Perry, H. N., Messonnier, N. E., Abdulmumini, U., Mebrahtu, G., ... Sow, I. (2009). Cost analysis of an integrated disease surveillance and response system: case of Burkina Faso, Eritrea, and Mali. Cost effectiveness and resource allocation : C/E, 7, 1. doi:10.1186/1478-7547-7-1

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing, using estimated costs and resource requirements for the development and implementation of a training programme for healthcare facility staff at the provincial level. The cost estimate is based on the assumption that this programme is focused on a government training programme for staff focused on supporting government priority areas on health risk factors including: population migration and environmental refugees, land-use change, violence and human conflict, and vulnerable groups. Western Cape government priority focus areas for further research on health impacts include: mental ill-health, non-

communicable diseases, injuries, poisonings (e.g. pesticides), food and nutrition insecurity-related diseases, water- and food-borne diseases and reproductive health.⁷

To address these priority areas, this action was costed based on the assumption that annual provincial workshops will be carried out for the duration of the timeframe (three years). Estimated unit costs for one provincial workshop were estimated at costed at R150,000. Human resource costs have been calculated on the basis of a consultancy assignment, while operational costs were calculated at 10% of total costs of the action.

1.1.17 Develop guidelines on environmentally responsible mining practices that promote climate adaptation

This will involve the development of guidelines to promote environmentally responsible mining practices that contribute towards climate change adaptation. The aim is to ensure that mining operations as well as mine closures consider surrounding ecosystems that will help to build resilience to climate change. The guidelines should take learnings into account from global case studies.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees, including travel (inception, consultations, feedback), expenses	500,000 fees (50*10000) + 250,000 travel and expenses	750,000
Capacity Development		
Validation workshop (including travel)	200,000	200,000
Industry workshop to launch and publicize guidelines	200,000	200,000
Operational Costs		
Operating expenses	10% of total costs	115,000
Total Costs (USD)		90 357,14
Total Costs (ZAR)		1 265 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing, using estimated costs for a consultancy assignment based on level of effort and fees and expenses for developing guidelines on environmentally responsible practices for climate change adaptation. Costs associated with capacity

development are based on carrying out a validation workshop to verify the results and findings of the consultancy, as well as facilitating an industry workshop to publicize guidelines and sensitize stakeholders. Operating costs were calculated based on allocating 10% of total costs.

1.1.18 Plan for the effects of climate change on infrastructure

This will involve incorporating climate change into asset management plans to ensure climate adaptive infrastructure.

7 Godsmark et al 2019. 'Priority focus areas for a sub-national response to climate change and health: A South African provincial case study.' Environment International, 122: 31-51

Budget Line	Cost calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees, including travel (inception, consultations, feedback)	1,060,000 fees (106*10,000) + 400,000 travel (inception, consultations, feedback)	1,460,000
Capacity Development		
2*Workshops per sector that would require plans-energy (1.1.10), health, settlements, water, transport, agriculture	138,325 (consultative workshop costs) * 2 workshops * 5 sectors	1,383,250
Operational Costs		
Operations, coordination and administrative costs	10% of total costs	284,325
Total Costs (USD)		223 398,21
Total Costs (ZAR)		3 127 575,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing, based on a commissioning a study that investigates the precise nature of planned infrastructure type (e.g. schools, hospitals, roads, storm protection and location) and develops technical recommendations for developing climate resilient infrastructure. The costs associated with this action are based on the commissioning of

a consultancy assignment and carrying out two workshops per sector that would require asset management plans, including energy, health, settlements, water, transport, and agriculture. Unit costs associated with the consultative workshop are based on data derived from the DEA-Adaptive Capacity Facility. Operating costs were calculated based on allocating 10% of total costs.

Synergies with other strategic interventions

Capacity development activities under this action in the form of workshops with sector stakeholders in developing climate resilient infrastructure plans

should be considered in light of other sectoral capacity building activities in energy (1.1.10) and (1.1.9) and agriculture (1.1.1).

1.1.19 Invest in high-quality, climate resilient, public infrastructure

This will involve investing in high quality, climate resilient public infrastructure, including transport infrastructure, that will withstand disasters and have an extended lifespan.

Budget Line	Rand (ZAR)
Infrastructure, Equipment and Technology	
4% additional costs associated with planned investments in public infrastructure	11,533,333,000
Operational Costs	
Operations, maintenance, and repair	1,153,333,300
Total Costs (USD)	906 190 450,00
Total Costs (ZAR)	12 686 666 300,00

Methodology and assumptions

The cost estimate for this action is based on parametric costing based on proxies from government strategies and national development plans and the principle of the additionality of accounting for climate change adaptation. Based on the 2019 budget, R865bn is stated to be spent on infrastructure over next 3 years on infrastructure, or 288,333,333,000 per year.

The basis of additionality was then applied to account for the additional costs required to account

for climate adaptation in infrastructure. GEF-funded projects are costed on the basis of additionality i.e. the GEF covers the additional costs of climate change. This was done by taking an average of the proportion of GEF funds to baselines on three projects to calculate the percentage of additional costs that should be budgeted. The three projects and their basis of additionality is as follows:

- Climate-resilient Infrastructure in Northern Mountain Province of Vietnam (SCCF)

- \$3,400,000 compared to \$145,165,000 = 2.34%
- Strengthening the Resilience of Small Scale Rural Infrastructure and Local Government Systems to Climatic Variability and Risk in Timor Leste (LDCF) \$4,600,000 compared to \$52,265,399 = 8.8%
- ASTUD: Jiangxi Fuzhou Urban Integrated Infrastructure Improvement Project in China (GEF-5) \$2,546,300 compared to \$226,460,000 = 1.1%

Accordingly, the additional costs of investing in climate resilient infrastructure based on projected investment, 4% of 288,333,333,000 is equivalent to 11,533,333,000 per year of additional costs. These costs have been allocated to costs associated with infrastructure. It is assumed that there is no need to allocate funding to human resource costs, as infrastructure will already be managed by whichever departments are commissioning it. Operating costs were calculated based on allocating 10% of total costs.

The average percentage of additional costs for climate change across these three projects is 4.08%.

1.1.20 Ensure that water management institutions incorporate adaptive management responses

This will involve providing continued support and advice to water management institutions on how to incorporate adaptive management responses.

Budget Line	Cost calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees and travel costs (accommodation, expenses, feedback)	300,000 to include 200,000 fees (20*10,000) + (100,000) travel (inception, consultations, feedback)*19 WUAs	5,700,000
Infrastructure, Equipment and Technology		
Capacity Development		
Training workshop for each CMA, including WUAs	200,000*19	3,800,000
Operational Costs		
Operational costs, including operations and administrative support	10% of total costs	950,000
Total Costs (USD)		746 428,57
Total Costs (ZAR)		10,450,000

Methodology and assumptions

The cost estimate for this action is based on bottom up costing. Costs associated with this action are based on using estimated costs for a consultancy assignment based on level of effort and fees and expenses for the provision of technical assistance and trainings to Catchment Management Agencies (CMAs) in adaptive water management. Based on

information derived from the Department of water, there are 19 CMAs, 92 Water User Associations, and 129 irrigation boards. Capacity development costs are based on the assumption that each CMA will hold a training workshop for its WUAs costed at a unit cost of R200,000*19. Operating costs were calculated based on allocating 10% of total costs.

Synergies with other actions

Costs associated for human resources and capacity development under this action should be considered together with investments made

under Action 1.1.2, specifically as it relates to the agricultural sector.

1.1.21 Develop a list of resilience-building projects that can easily be replicated

This will involve developing a list of recent successful resilience-building programmes and projects that can easily be replicated in other areas or sectors. This action stresses the importance of learning from

successfully implemented programmes to identify key elements that have provided best results in resilience-building in order to replicate them in similar environments.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees, based on background research and possibly site visits	200,000 fees (20*10,000) + 25,000 travel	225,000
Total Costs (USD)		16 071,43
Total Costs (ZAR)		225,000

Methodology and Assumptions

The cost estimate for this action is based on bottom-up costing. The calculation is based on commissioning research through a consultancy to conduct a stock take of resilience-building programmes and projects that can easily be replicated in other areas

or sectors. The cost calculation is based on 20 days level of effort, including travel and expenses for site visits, consultations, and production of a research report outlining findings.

Synergies with other strategic interventions

Costs associated with this action should be considered with actions under Strategic Intervention 5: promote research application, technology development, transfer and adoption to support planning and implementation to ensure complimentary between research actions and maximise cost efficiencies. Specifically, the commissioning of research under this activity is recommended to be linked to research

costs associated with 5.1.7 Continue to invest in research that aims to understand the different impacts of climate change on the environment and society; 5.1.8 Invest in research on the most effective adaptation responses to different climate change impacts; and 5.1.10 Establish a programme to promote research into new climate change adaptation technologies.

1.1.22 Identify individuals and communities at most risk from climate change within local municipalities and deliver targeted climate change vulnerability reduction programmes for these individuals and communities

This will involve the identification of at-risk individuals and communities within local municipalities. Based on this identification, targeted vulnerability reduction programmes can be designed and delivered.

Budget Line	Cost calculation	Total Costs (ZAR)
Human Resources		
Staff fees (team of field researchers) and travel costs (car hire, fuel etc.)	450,000 staff fees + 100,000 travel and expenses	16,500,000
Feedback meeting with the municipality	20,000*91 most vulnerable municipalities	1,820,000
Total Costs (USD)		1,308,571.43
Total Costs (ZAR)		18,320,000

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. The calculation is based on commissioning a consultancy to conduct a municipal level risk assessment, prioritizing the third very vulnerable municipalities (e.g. 91 municipalities that are considered as the most vulnerable to climate change impacts). This is consistent with actions under Strategic Intervention

2. The cost calculation for this action is based on commissioning a team of field researchers to conduct municipal level assessments, inclusive of travel and expenses, assuming each team could cover approximately three municipalities at a time; and carrying out a feedback/consultation meeting with each municipality to validate findings.

Synergies with other strategic interventions

Human resource and capacity development costs under this action are linked to actions under Strategic Intervention 3, specifically Action 3.1.4: Use the NAVFR to guide local assessments. Therefore, costs for these activities should be considered together to

maximise efficiencies in costs and complementarity between actions.

1.1.23 Investigate the potential for expanding sectors and kick-starting new industries that are likely to thrive as a direct or indirect result of climate change effects

This will involve identifying climate change impacts that will bring about new industries and opportunities and then piloting sector specific projects with high-opportunity potential. The process will kick off with the design of these projects and carry through to compiling lessons derived from final evaluation of the project.

Budget Line	Cost calculation	Total Costs (ZAR)
Human Resources		
Staff fees (team of field researchers) and travel costs	500,000 fees (50*10000) + 250,000 travel (inception, consultations, feedback)	750,000
Total Costs (USD)		53 571.43
Total Costs (ZAR)		750,000

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. The calculation is based on commissioning a consultancy study to conduct background research and possibly site visits for

identifying climate change impacts that will bring about new industries and opportunities and then piloting sector specific projects with high opportunity potential.

Synergies with other strategic interventions

Costs associated with this action should be considered with actions under Strategic Intervention 5: Promote research application, technology development, transfer and adoption to support planning and implementation to ensure complimentary between research actions and maximise cost efficiencies. Specifically, the commissioning of research under this activity is recommended to be linked to research

costs associated with 5.1.7 Continue to invest in research that aims to understand the different impacts of climate change on the environment and society; 5.1.8 Invest in research on the most effective adaptation responses to different climate change impacts; and 5.1.10 Establish a programme to promote research into new climate change adaptation technologies.

Intervention 2: Develop a risk, early warning, vulnerability and adaptation monitoring system for key climate vulnerable sectors and geographic areas

Outcome 2.1: An early warning and monitoring system for key climate vulnerable sectors and geographic areas developed and implemented

2.1.1 Improve the climate monitoring and observation network

This will involve identifying existing gaps in the monitoring and observation network and addressing these gaps to ensure that national climate data is reliable, comparable, up to date and accessible.

Budget Line	Cost Calculations	Total Costs (ZAR)
Human Resources		
10 technical grade staff within SAWS over a seven-year period.	Mid-level 500,000 pa *10 staff members * 7 years	35,000,000
Infrastructure, Equipment and Technology		
60 AWS	300,000*60	1,800,000
18 new computer systems for SARS	30,000*18	540,000
Capacity Development		
Training 20 new staff in using and analysing data	5,000*20	100,000
Operational Costs		
Maintenance of equipment, operational and administrative costs	10% on total costs	3,744,000
Total Costs (USD)		2 941 714,29
Total Costs (ZAR)		41 184 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. Cost information data was derived from the Zambia LDCF project "to strengthen climate monitoring capabilities, EWS and available info for responding to climate shocks and planning adaptation to CC" (US\$3,600,000 over four years 2015-2019 with a scope of three districts for local-level systems) and cost information for capacity development workshops from the DEA-ACF facility funded by the Government of Flanders.

The estimated resource requirements is based on using AWS for climate monitoring and observation, which are considered the "gold standard" for monitoring. The unit cost of an AWS is costed at \$15,000 each, plus \$6,000 to ensure power supply, housing etc. (total units costs R300,000). South Africa currently has 231 AWS. Based on the assumption that 60 additional AWS are purchased,

Synergies with other strategic interventions

Investments in human resources, infrastructure, equipment, and technology, capacity development, and operational costs under this activity are linked to investments under Strategic Intervention 5,

the estimated costs for this action were calculated as follows:

- Equipment and technology: R300,000*60=R1,800,000 (60 AWS)
- Infrastructure: R30,000*18=R540,000 (18 new computer systems for SARS)
- CD: R5,000*20=R100,000 (training 20 new staff in using and analysing data)
- HR: 10% of total operating costs

The cost estimate has accounted for human resources of staff required to manage the systems but has not accounted for the in-kind contributions of staff who will receive warnings etc.

Additionally, costs have been calculated as individual project lines, but there is some overlap between (e.g. national with provincial with risk-based EWS).

Action 5.1.5: Continue and enhance climate observation and monitoring. It is recommended to link interventions and maximize cost efficiencies across interventions.

2.1.2 Develop a national climate information and early warning system

This will involve developing a national climate information and early warning system that can interface with other information systems.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
10 technical grade staff to cover hazard sectors/DMC	Mid-level 500,000 pa *10 staff members	35,000,000
Consultancy fees to design on-the-job workshops that are provided to staff, includes costs for consultations, travel, and expenses	20 * 10,000 fees + 200,000 (consultations, travel, expenses)	400,000
Infrastructure, Equipment and Technology		
Five high-performance computer systems to run the system	30,000*5	150,000
Developing, hosting and maintaining a multi-hazard database and information management system		4,200,000
Two-way SMS-based alert system to cover national-provincial level	3,680,000 * 3 (scale of national and provincial system required)	11,040,000
Capacity Development		
Two reps per hazard sector/DMC to be trained in use and maintenance	15,000*10	150,000
National workshops to train/raise awareness/show functionality	200,000 (based on Flanders figures)*9*7 (1 per province every year)	12,600,000
Operational Costs		
	10% on total costs	6,354,000
Total Costs (USD)		4 992 428,57
Total Costs (ZAR)		69 894 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. Cost information data was derived from the Zambia LDCF project "to strengthen climate monitoring capabilities, EWS and available info for responding to climate shocks and planning adaptation to CC" (US\$3,600,000 over four years 2015-2019 - with a scope of three districts for local level systems) and cost information for capacity

development workshops from the DEA-ACF facility funded by the Government of Flanders.

The cost estimate is based on the understanding that South Africa already has multi-hazard early warning systems (flood, fire, drought, storm surge) in operation but these can be improved. The cost estimate is based on the following cost calculation:

Human Resources:

- 10 technical grade staff to cover hazard sectors/DMC

- Consultancy (20*10,000 fees and 200,000) to design on-the-job workshops provided to staff

Infrastructure, Equipment and Technology:

- Developing, hosting and maintaining a multi-hazard database and information management system costed at R4,200,000
- Two-way SMS-based alert system R11,040,000

- (roughly three times the Zambia example to cover national-provincial level)
- R30,000*5 (five high-performance computer systems to run the system)

Capacity Development:

- R15,000*10 (two reps per hazard sector/DMC to be trained in use and maintenance)
- National workshops to train/raise awareness/

show functionality: R200,000 (based on Flanders figures) *9*7 (one per province every year)

Operational Costs:

- 10% of total costs

2.1.3 Develop provincial early warning systems for vulnerable geographical areas

This will involve provinces improving or developing early warning systems for risks that have been identified in their respective areas, particularly for vulnerable groups.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Nine technical grade staff in each PDMC	9* 500,000*7 Years	31,500,000
Consultancy to design on-the-job workshops provided to staff.	20*10,000 fees and 200,000)* 9 provinces	3,600,000
Infrastructure, Equipment and Technology		
Open data platform	350,000 (province bigger than district) *9	3,150,000
Two-way SMS-based alert system	7,360,000 (twice the Zambia example to cover provincial-district level)*9	66,240,000
1 computer per province	R30,000*9	270,000
Capacity Development		
1 workshop per province every year to train/raise awareness/show functionality	140,000*9*7	8,820,000
Operational Costs		
	10% on total costs	11,358,000
Total Costs (USD)		8 924 142,86
Total Costs (ZAR)		124 938 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. Cost information data was derived from the Zambia LDCF project "to strengthen climate monitoring capabilities, EWS and available info for responding to climate shocks and planning

adaptation to CC" (US\$3,600,000 over four years 2015-2019 - with a scope of three districts for local level systems) and cost information for capacity development workshops from the DEA-ACF facility funded by the Government of Flanders.

Human Resources:

- Nine technical grade staff in each PDMC
- Consultancy (20*10,000 fees and 200,000

expenses) to design on-the-job workshops that are provided to staff * 9 provinces

Infrastructure, Equipment and Technology:

- Open data platform R350,000*9 provinces
- Two-way SMS-based alert system R7,360,000 (twice the Zambia example to cover provincial-

- Infrastructure: R30,000*9 (1 computer per province)

Capacity Development:

- CD: R140,000*9*7 (1 workshop per province every year to train/raise awareness/show functionality)

Operational Costs:

- 10% of total costs

2.1.4 Develop municipal early warning systems for vulnerable geographical areas

This will involve municipalities improving or developing early warning systems for risks that have been identified in their respective areas, particularly for vulnerable groups.

Budget Line	Cost calculation	Total Costs (ZAR)
Human Resources		
91 technical grade staff in municipalities	Annual salary 500,000*91* (*7 years)	318,500,000
Consultancy to design on-the-job workshops that are provided to staff.	(20*10,000 fees and 200,000) * multiplied 91 (municipalities, assuming 3 could be done together)	36,400,000
Infrastructure, Equipment and Technology		
Open data platform	285,000*91	25,935,000
Two-way SMS-based alert system	3,680,000/3 *91	111,626,667
1 computer per municipality	30,000*91	2,730,000
Capacity Development		
Capacity building/training: smaller than provincial workshop due to less travel, no need for accommodation etc; assuming three municipalities can club together for each one	50,000*30*7	10,500,000
Operational Costs		
	10% on total costs	50,387,166,67
Total Costs (USD)		39 732 916,67
Total Costs (ZAR)		556 260 833,33

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. Cost information data was derived from the Zambia LDCF project "to strengthen climate monitoring capabilities, EWS and available information for responding to climate shocks and planning adaptation to CC" (US\$3,600,000 over four years 2015-2019 - with a scope of three districts for local level systems) and cost information

for capacity development workshops from the DEA-ACF facility funded by the Government of Flanders.

The cost calculation is based on the assumption that 40% of 226 provinces have vulnerable geographical areas (multi-hazard) = 91 (based on SARVA atlas risk and vulnerability map).

Human Resources:

- 91 technical grade staff in municipalities
- Consultancy (20*10,000 fees and 200,000) to design on-the-job workshops that are provided

to staff. * multiplied 91 (municipalities, assuming 3 could be done together)

Infrastructure, Equipment and Technology:

- Open data platform R285,000*91
- Two-way SMS-based alert system (R3,680,000/3 *91 = R111,626,667

- Infrastructure: R30,000* 91 (1 computer per municipality)

Capacity Development:

- R50,000*30*10. Smaller than provincial workshop due to less travel, no need for accommodation etc; assuming three

municipalities can be grouped together for each workshop.

Operational Costs:

- 10% of total costs

2.1.5 Improve/develop national early warning systems for key climate vulnerable sectors and risks

This will involve developing/improving early warning systems for key sectors, such as agriculture, and risks, such as flooding, in order to provide guidance on responding to climate-related risk.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
6 technical grade staff at NDMC	Annual salary 500,000 * 6 staff * 7 years	21,000,000
Consultancy fees to design on-the-job workshops that are provided to staff.	20*10,000 fees + 200,000 (consultations, travel, expenses)	400,000
Infrastructure, Equipment and Technology		
Open data platform	855,000 per risk *4	3,420,000
Two-way SMS-based alert system (national-provincial-local)		7,360,000
2 computers at NDMC	30,000*2	60,000
Capacity Development		
2 reps per hazard sector/DMC to be trained in use and maintenance	15,000*10	150,000
Operational Costs		
Operating, maintenance, and administrative costs	10% on total costs	3,239,000
Total Costs (USD)		2 544 928,57
Total Costs (ZAR)		35 629 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. Cost information data was derived from the Zambia LDCF project "to strengthen climate monitoring capabilities, EWS and available info for responding to climate shocks and planning adaptation to CC" (US\$3,600,000 over four years 2015-2019 - with a scope of three districts for local level systems) and cost information for capacity development workshops from the DEA-ACF facility

Human Resources:

- Six technical grade staff at NDMC
- Consultancy (20*10,000 fees and 200,000) to design on-the-job workshops that are provided

Infrastructure, Equipment and Technology:

- Open data platform R855,000 per risk = 3,420,000
- Two-way SMS-based alert system R7,360,000 (national-provincial-local)

Capacity Development:

- Two reps per hazard sector/DMC to be trained in use and maintenance R15,000*10

Operational Costs:

- 10% of total costs

funded by the Government of Flanders.

The cost calculation is based on the assumption that national early warning systems will be developed according to four risks (flood, fire, drought, storm surge) as opposed to sectors (11). Therefore, four systems will be developed, one for each risk.

The cost calculation is as follows:

- to staff. * multiplied 91 municipalities, assuming three could be done together
- Infrastructure: R30,000*2 (2 computers at NDMC)

Synergies

Investments in capacity development and training under this action are linked to Action 1.1.11 for fishers and Action 2.1.2. Therefore, it is suggested to account for cost efficiencies in training and capacity development activities.

2.1.6 Develop and support a climate change early warning and vulnerability network with the involvement of relevant stakeholders

This will involve setting up a climate change early warning and vulnerability network to promote collaboration and sharing of information on preparing for different climate related risks. Role

players should include government and research institutions, as well as community organisations and neighbouring states.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
1 technical grade staff at NDMC	500,000*7 years	3,500,000
Infrastructure, Equipment and Technology		
1 computer for NDMC	30,000	30,000
Software to set up databases, allow alerts to be issued by emails etc (similar to Umlindi but multi-hazard and more coordinated)		200,000
Capacity Development		
1 national workshop (200,000) and 11 sector workshops (140,000 - to cover provincial level sector staff attending) every other year (*4)	800,000= (200,000* 4 years) (national level workshops) 6,160,000= 140,000 *(11 sector workshops) * (4)	6,960,000
Operational Costs		
10% on total costs	10% on total costs	1,069,000
Total Costs (USD)		839 928,57
Total Costs (ZAR)		11 759 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. Cost information data was derived from the Zambia LDCF project "to strengthen climate monitoring capabilities, EWS and available information for responding to climate shocks and planning adaptation to CC" (US\$3,600,000 over four years 2015-2019 - with a scope of three districts for local level systems) and cost information

for capacity development workshops from the DEA-ACF Facility funded by the Government of Flanders.

The cost calculation is based on the assumption that this would be a virtual network that could be housed by the NDMC and linked to the CIEWS (2.2).

The cost calculation is as follows:

Human Resources:

- 1 technical grade staff at NDMC

Infrastructure, Equipment and Technology:

- Software to set up databases, allow alerts to be issued by emails etc (similar to Umlindi but multi-

- hazard and more coordinated) costed at R200,000
- Infrastructure: R30,000*1 (1 computer at NDMC)

Capacity Development:

- 1 national workshop (200,000) every other year (*4)

- 11 sector workshops (140,000 - to cover provincial level sector staff attending) every other year (*4)

Operational Costs:

- 10% of total costs

2.1.7 Investigate alternative technologies that can be used

This will involve researching and investigating alternative technologies that can be used in developing effective and efficient early warning systems

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees, including (inception, consultations, feedback)	500,000 fees (50*10,000) + 250,000 travel	750,000
Capacity Development		
Option for validation workshop (includes travel)	200,000	200,000
Total Costs (USD)		67 857,14
Total Costs (ZAR)		950 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. The cost calculation is based on commissioning a consultancy study to investigate alternative technologies to support early warning systems and application options. The costs associated with this action are based on consultancy fees for an estimated level of effort of 50 days, including travel and expenses for inception, consultations, and feedback, and the option to carry out a validation workshop of research findings to verify findings with stakeholders.

Intervention 3: Develop vulnerability and resilience methodology framework that integrates biophysical and socio-economic aspects of vulnerability and resilience

Outcome 3.1: An adaptation vulnerability and resilience framework developed and implemented from 2020 across 100% of key adaptation sectors

3.1.1 Develop a National Adaptation Vulnerability and Resilience Framework (NAVRF)

This will involve developing an overarching adaptation and vulnerability resilience framework that provides guidance on the development of vulnerability assessments and climate change response plans developed by sectors and spheres of government. Since there is variability among sectors and geographic areas the framework should not be prescriptive. Instead it should provide broad guidance with the aim of promoting improved coherence between assessments and plans, as well as allowing for comparisons and aggregation of the results of the assessments and plans. The framework should also provide a platform to assess trade-offs across sectors so as to further inform sector strategies and plans. The process to develop the framework should be done in consultation with various sectors, provinces, local government and other relevant entities. The process should also build on work that has already been done on developing assessments and response plans.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees		600,000
Capacity Development		
Finalisation and launch of framework at national workshop, and provincial consultations	250,000 + (150,000*9)	1,600,000
Operational Costs		
Research costs for background paper, including printing, communications, and publication		1,500,000
Total Costs (USD)		264 285,71
Total Costs (ZAR)		3 700 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. The cost calculation is based on commissioning a consultancy assignment performed by researchers to develop a National Adaptation Vulnerability and Resilience Framework (NAVRF). Data was derived from budget costs for the development of the 2nd edition of the Southern African Risk and Vulnerability Handbook (R500,000). The budget was multiplied by three to cover the estimated range of expertise required for this assignment - estimated to be R1,500,000. The cost calculation is based on the following assumptions:

- **Human resources:** consultancy fees costed at R600,000 for the development of background paper and framework
- **Capacity development:** provincial consultations (R150,000*9), finalisation and launch of framework at national workshop (R250,000)
- **Operational costs:** Research costs for background paper, including printing,

communications, and publication estimated at R1,500,000

3.1.2 Use the NAVRF to guide sector assessments

This will involve sector departments using the NAVRF as guidance when undertaking initial assessments and developing response plans. Sector departments should also use the NAVRF as guidance when reviewing and revising existing assessments and response plans.

Budget Line	Cost calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees	750,000 to include 500,000 fees (50*10,000) + 250,000 travel (inception, consultations, feedback)* 11 sectors	8,250,000
Capacity Development		
Validation workshop to include travel	200,000*11 sectors	2,200,000
Total Costs (USD)		746 428,57
Total Costs (ZAR)		10 450 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. The cost calculation is based on commissioning a consultancy to carry out sector assessments based on the developed NAVFR across 11 key adaptation sectors. Costs were calculated based on the following assumptions:

- **Human resources:** consultancy fees costed at R750,000 to include R500,000 fees

(50*10,000) and R250,000 travel (inception, consultations, feedback)

- **Capacity development:** option for validation workshop R200,000 to include travel per sector (11 sectors)
- **Operational costs:** covered by the costs allocated to the consultancy

3.1.3 Use the NAVRF to guide provincial assessments

This will involve provinces using the NAVRF as guidance when reviewing and revising existing assessments and response plans.

Budget Line	Cost calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees	750,000 to include 500,000 fees (50*10,000) + 250,000 travel (inception, consultations, feedback) * 9	6,750,000
Capacity Development		
validation workshop to include travel	200,000*9	1,800,000
Total Costs (USD)		610 714,29
Total Costs (ZAR)		8 550 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom up costing. The cost calculation is based on commissioning a consultancy to carry out provincial assessments based on the developed NAVFR in each of the nine provinces. Costs were calculated based on the following assumptions:

- **Human resources:** consultancy fees costed at R750,000 to include R500,000 fees (50*10,000) and 250,000 travel (inception, consultations, feedback)
- **Capacity development:** option for validation workshop R200,000 to include travel per sector (9 provinces)

- **Operational costs:** covered by the costs allocated to the consultancy

3.1.4 Use the NAVRF to guide local assessments (link with 2.4 Develop municipal early warning systems for vulnerable geographical areas)

This will involve local governments using the NAVRF as guidance when undertaking initial assessments and developing response plans. Local governments should also use the NAVRF as guidance when reviewing and revising existing assessments and response plans.

Budget Line	Cost calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees, including travel, inception, consultations and feedback	250,000 to include 200,000 fees (20*10000) + 50,000 travel (inception, consultations, feedback)	22,750,000
Capacity Development		
Validation workshop to include travel	50,000* 91 municipalities	4,550,000
Total Costs (USD)		1 950 000,00
Total Costs (ZAR)		27 300 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. The cost calculation is based on commissioning a consultancy to carry out municipal assessments based on the developed NAVFR in 91 municipalities (prioritizing the third most vulnerable municipalities, consistent with Action 2.1.4).

Costs were calculated based on the following assumptions:

- **Human resources:** consultancy fees costed at R250,000 to include R200,000 fees (20*10000)

and 50,000 travel (inception, consultations, feedback) and R750,000 to include R500,000 fees (50*10,000) and 250,000 travel (inception, consultations, feedback)

- **Capacity development:** option for validation workshop R50,000 to include travel to 91 municipalities
- **Operational costs:** covered by the costs allocated to the consultancy

Linkages with other strategic interventions

- Using the NAVFR to guide local assessments is linked to investments in human resources and capacity development under Strategic Intervention 1, specifically under 1.1.22 Identify individuals and communities at most risk from climate change within local municipalities and deliver targeted climate change vulnerability reduction programmes.

Intervention 4: Facilitate mainstreaming of adaptation responses into sectoral planning and implementation

Outcome 4.1: Effective adaptation planning that covers at least 80% of the South African sectors identified in the NCCAS by 2025

4.1.1 Draft updated National Climate Change Sector Plans to include climate change adaptation

This will involve ensuring that key sectors have drafted updated national climate change sector plans. Sector plans identified for inclusion of climate change adaptation interventions include: water, agriculture, forestry, fisheries, health, biodiversity and ecosystems, human settlements, and disaster risk reduction and management sectors, as well as, energy, mining, transportation and infrastructure. These sector plans must be reviewed and published every five years.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees	500,000 per sector plan (comprising fees of 300,000 (30*10,000) and 200,000 * 11	5,500,000
Capacity Development		
11 sector workshops	140,000 - to cover provincial level sector staff attending) every five years (so one per province in 10 year NCCAS) revised calculation is 140,000* 11	1,540,000
Total Costs (USD)		502 857,14
Total Costs (ZAR)		7 040 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. The cost calculation is based on commissioning a consultancy to update national climate change sector plans to include climate change adaptation in the 11 key adaptation sectors. Costs were calculated based on the following assumptions:

- **Human resources:** consultancy fees costed at R400,000 per sector plan (comprising fees of R300,000 (30*10,000) and R200,000 travel) * 11 key adaptation sectors
- **Capacity development:** R140,000 - to cover provincial level sector staff attending) every five years (one per province in seven-year timeframe) revised calculation is R140,000* 11 sector plans
- **Operational costs:** covered by the costs allocated to the consultancy

The timeframe for this activity is 4-10 years. Based on the understanding that plans will be revised every five years, costs for the revision of plans were not accounted for.

4.1.2 Draft updated provincial climate change adaptation strategies and associated implementation plans

This will involve each province drafting updated climate change strategies that include adaptation responses and drafting associated implementation plans to guide climate response in their province. These strategies and associated implementation plans should be reviewed and updated every five years.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees	500,000 per provincial plan (comprising fees of 300,000 (30*10,000) and 200,000 travel)* 9 provinces	4,500,000
Capacity Development		
9 provincial workshops	140,000 to cover provincial level sector staff attending * 9 provinces -	1,260,000
Total Costs (USD)		411 428,57
Total Costs (ZAR)		5 760 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. The cost calculation is based on commissioning a consultancy to support the drafting of updated climate change strategies that include adaptation responses and drafting associated implementation plans to guide climate response in their province. Costs were calculated based on the following assumptions:

- **Human resources:** consultancy fees costed at R500,000 per provincial plan (comprising fees of R300,000 (30*10,000) and R200,000 travel) * Nine provinces

- **Capacity development:** Nine provincial workshops costed at 140,000 to cover provincial level sector staff attending) * Nine provinces
- **Operational costs:** covered by the costs allocated to the consultancy

The timeframe for this activity is 4-10 years. Based on the understanding that plans will be revised every five years, costs for the revision of plans were not accounted for.

4.1.3 Draft updated local government climate change adaptation strategies and associated implementation plans

This will involve each municipality drafting updated climate change strategies that include adaptation responses and drafting associated implementation plans to guide climate response in the respective municipality. Local municipalities should use the district municipal plans as resources. These strategies and associated implementation plans must be reviewed and updated every five years.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees	300,000 per municipal plan (comprising fees of 200,000 (20*10,000) and 100,000 travel)* 278	83,400,000
Capacity Development		
Municipal workshops	278 municipal workshops (50,000 to cover staff attending) every five years - one per municipality	13,900,000
Total Costs (USD)		6 950 000,00
Total Costs (ZAR)		97 300 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. The cost calculation is based on commissioning a consultancy to support municipalities in drafting updated climate change

strategies that include adaptation responses and drafting associated implementation plans to guide climate response in the respective municipality. Local government was considered to account for

district municipality and municipalities.⁸ Costs were calculated based on the following assumptions:

- **Human resources:** consultancy fees costed at R300,000 per municipal plan (comprising fees of 200,000 (20*10,000) and 100,000 travel) * 278
- **Capacity development:** 278 municipal workshops (50,000 to cover staff attending)

- **Operational costs:** Covered by the costs allocated to the consultancy.

The timeframe for this activity is 4-10 years. Based on the understanding that plans will be revised every 5 years, costs for the revision of plans were not accounted for.

Outcome 4.2: Achieve a 100% coverage of climate change considerations in NCCAS relevant sectoral operational plans by 2025

4.2.1 Integrate climate change adaptation into Provincial Growth and Development Strategies

This will involve each province ensuring that climate change projects and programmes are reflected in their strategic Provincial Growth and Development Strategies.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees	R350,000 per provincial plan (9) (comprising fees of 200,000 (20*10,000) and 150,000 travel)	R3,150,000
Capacity Development		
Provincial level workshops	9 provincial workshops (140,000 to cover staff attending) every 5 years - so 1 per province	R1,260,000
Total Costs (USD)		315 000,00
Total Costs (ZAR)		4 410 000,00

Methodology and Assumptions

The cost estimate for this action is based on bottom up costing. The cost calculation is based on commissioning a consultancy to support provinces in integrating climate change adaptation into provincial growth and development strategies. Costs were calculated based on the following assumptions:

- **Human resources:** consultancy fees costed at: R300,000 per provincial plan (comprising fees of 200,000 (20*10,000) and 150,000 travel) * 9 provinces

- **Capacity development:** 9 provincial workshops (140,000 to cover staff attending)
- **Operational costs:** Covered by the costs allocated to the consultancy

The timeframe for this activity is 4-10 years. Based on the understanding that plans will be revised every 5 years, costs for the revision of plans were not accounted for.

4.2.2 Amend development planning guidelines to incorporate climate change adaptation considerations

This will involve establishing a working group involving the National Planning Commission, DEA, provincial representatives, and South African Local Government Association to amend existing development planning guidelines, at all levels, to include climate change adaptation.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees	R500,000 fees (50*10,000) + 250,000 travel (inception, consultations, feedback)	R750,000
Capacity Development		
Validation workshop	R200,000 to include travel	R200,000
Total Costs (USD)		67 857,14
Total Costs (ZAR)		950 000,00

8 44 DM and 226 municipalities, and 8 metros (total 278)

Methodology and Assumptions

The cost estimate for this action is based on bottom up costing. The cost calculation is based on commissioning a consultancy to facilitate a working group of stakeholders in support stakeholder in to amending existing development planning guidelines, at all levels, to include climate change adaptation. The cost estimate is based in the assumption that there is one set of development planning guidelines. Costs were calculated based on the following assumptions:

- **Human resources:** consultancy fees costed at: R750,000 to include R500,000 fees (50*10,000) + 250,000 travel (inception, consultations, feedback)
- **Capacity development:** option for validation workshop R200,000 to include travel

- **Operational costs:** Covered by the costs allocated to the consultancy

Investments under this action are linked to activities under Action 4.2.4.2.4 Mandate that all public infrastructure be planned, designed, operated and managed after explicitly taking current and predicted future climate change. It is advised to combine consultancy assignments to maximize cost efficiencies between amending planning guidelines and the provision of training to the Office of the President. There is potential to combine consultancy assignments to account for one set of costs.

4.2.3 Integrate climate change adaptation into municipal development planning documents

This will involve each municipality ensuring that climate change projects and programmes are reflected in municipal strategic development planning documents, including Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs).

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
	350,000 per municipal plan (comprising fees of 200,000 (20*10,000) and 150,000 travel)* 278	97,300,000
Capacity Development		
Municipal workshops	278 municipal workshops (50,000 to cover staff attending) every five years – two per municipality)	27,800,000
Total Costs (USD)		8 935 714,29
Total Costs (ZAR)		125 100 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. The cost calculation is based on commissioning a consultancy to support municipal governments in integrating climate change adaptation into municipal planning documents. Costs were calculated based on the following assumptions:

- **Human resources:** consultancy fees costed at:

R350,000 per municipal plan (comprising fees of 200,000 (20*10,000) and 150,000 travel)* 278 municipalities

- **Capacity development:** 278 municipal workshops (50,000 to cover staff attending) every five years – so two per municipality)
- **Operational costs:** covered by the costs allocated to the consultancy

Synergies with other strategic interventions

Link to GIZ-funded project: GIZ phase 3 of the CSP “the objective of the assignment is to build capacity and develop/update local adaptation responses that are mainstreamed into municipal

Integrated Development Plans (IDPs) for 22 district municipalities in KwaZulu-Natal, Eastern Cape and Western Cape provinces.”

4.2.4 Mandate that all public infrastructure be planned, designed, operated and managed after explicitly taking current and predicted future climate change impacts into account

This will involve the Office of the President ensuring that all sectors factor climate change into infrastructure planning and development. It will entail capacity building and training of staff to ensure sufficient technical expertise in this transition.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees, including consultations, expenses	500,000 fees (50*10,000) + 250,000 travel (inception, consultations, feedback)	750,000
Capacity Development		
Training workshops to include travel	200,000	200,000
Total Costs (USD)		67 857,14
Total Costs (ZAR)		950 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. The cost calculation is based on commissioning a consultancy to support the Office of the President in ensuring that all sectors factor climate change into infrastructure planning and development, including capacity building and training of staff to ensure sufficient technical expertise in this transition. Costs were calculated based on the following assumptions:

- **Human resources:** consultancy fees costed at: R750,000 to include R500,000 fees (50*10,000) and R250,000 travel (inception, consultations, feedback)
- **Capacity development:** training workshops at R200,000 to include travel
- **Operational costs:** covered by the costs allocated to the consultancy

Synergies with other strategic interventions

Investments under this action are linked to activities under Action 4.2.2, which involves amending planning guidelines. It is advised to combine consultancy assignments to maximize cost efficiencies between amending planning guidelines and the provision of training to the Office of the President. There is potential to combine consultancy assignments to account for one set of costs.

In addition, investments in training and capacity development under this action are linked to Action 1.1.18: Plan for the effects of climate change on infrastructure. Therefore, activities and investments should be considered together to maximize cost efficiencies.

4.2.5 Mainstream climate change adaptation in business strategic implementation plans

This will involve the provision of support to private sector businesses to incorporate climate change adaptation into their strategic implementation plans.

Budget Line	Cost calculation	Total Costs (EUR)
Human Resources		
Consultancy fees/services	63% of total budget	EUR 669,689.37
Capacity Development		
Capacity building, helpdesk facility services, training, workshops	37% of total budget	EUR 393,309.63
Total Costs (USD)		1 181 110,00
Total Costs (ZAR)		16 535 540,00

Methodology and assumptions

The cost estimate for this action is based on top-down costing, using data derived from the "Towards Enhanced Climate Change Adaptation and an Inclusive Adaptive Green Economy in South Africa" project funded by the Government of Flanders, with a total subsidy of €1.062.999,00. The cost calculation is based in commissioning a consultancy to manage a technical assistance facility to support private sector businesses to incorporate

climate change adaptation into their strategic implementation plans. The cost calculation is based on the percentage allocation of 63% of total budget to consulting fees and 37% to capacity development activities. Operational costs are accounted for in the commissioning of the consultancy.

Intervention 5: Promote research application, technology development, transfer and adoption to support planning and implementation

Outcome 5.1: Increased research output and technology uptake to support planning and implementation

5.1.1 Set up a National Climate Centre in an existing institution

This will involve identifying a suitable institutional home for a National Climate Centre. The National Climate Centre should coordinate the central collation of climate data, information, products and applications, and facilitate climate related research and development in South Africa. Since there are a number of existing institutions that play an important role in climate services in South Africa and already perform some of the functions associated with the proposed centre there is no need to establish a new institution.

Budget Line	Cost Calculation	Total Cost (ZAR)
Human Resources		
Staff salaries (or part thereof) for finance, procurement, admin and project management staff	70% of annual total budget costs = 34,069,700 * 7 years	238,487,900
Infrastructure, Equipment and Technology		
Infrastructure, equipment and technology	25% of annual total budget cost (once-off costs)	12,167,750
Operational Costs		
Operating costs, including administrative costs: printing, photocopying, telecoms and other costs related to office operations	5% of total cost= 2,433,550* 7 years	17,034,850
Total Costs (USD)		19 120 750,00
Total Costs (ZAR)		267 690 500,00

Methodology and assumptions

The above cost estimate is based on parametric costing and data sources derived from the NRF Global Change Grand Challenge. Based on the annual budget 2017-20 for national research facilities, the budget allotted for the Global Grand Challenge is R146,013,000 per year. This figure was divided by three to calculate total annual cost, equivalent to R48,671,000. This amount has been multiplied according to number of years of operation under the NAS (7) and distributed across budget categories as follows:

- **Human resources:** 70% (annual cost) * 7 years
- **Infrastructure, equipment and technology:** 25% of annual cost (once off costs)
- **Operational costs:** 5% of annual budget cost * 7 years

5.1.2 Establish an Interactive Online Climate Service Platform

This will involve the development of a specially designed website to act as a climate service knowledge portal. It will present information, research and data stored and archived in the national climate services database and data from various climate service providers. The platform will allow for various users to access sectoral climate services on the site or to be directed to service providers who can provide customised climate services or products.

Budget Line	Cost Calculation	Total Cost (ZAR)
Human Resources		
Staff salaries (or part thereof) for finance, procurement, admin and project management staff	80% of total annual cost (2,057,142.86* 7 years)	14,400,000
Infrastructure, Equipment and Technology		
Infrastructure, equipment and technology, including software development	10% of total annual cost (257,142.857 * 7 years)	1,800,000
Operational Costs		
Operating costs, including administrative costs: printing, photocopying, telecoms and other costs related to office operations	10% of total annual cost (257,142.857 * 7 years)	1,800,000
Total Costs (USD)		128 571,43
Total Costs (ZAR)		1 800 000,00

Methodology and assumptions

The above cost estimate is based on analogy costing and parametric costing, using estimated budget costs for the development of the South African Risk and Vulnerability Atlas (three phases, with each phase approximately 2-3 years and R6 million for each phase). This was used as a proxy to estimate the costs for the development of an interactive online climate service platform over a seven-year timeframe. The cost calculation is as follows:

R6million (2-3-year timeframe) * three years to roughly equal seven years across three phases equivalent to timeframe of this activity. Total costs spread across seven years = R18,000,000

- **Human resources:** 80% = R14,400,000/seven years (R2,057,142.86) annual cost
- **Infrastructure, equipment and technology:** 10% = R1,800,000/seven years (R257,142.857) annual cost
- **Operational costs:** 10% = R1,800,000/seven years (R257,142.857) annual cost

5.1.3 Establish a Climate Change Science Advisory Technical Council

This will involve the establishment of an expert advisory group consisting of climate change professionals and economic planning professionals as well as science and technology advisors. This group will provide advice to the National Climate Centre.

Budget Line		Total Cost (ZAR)
Human Resources		
Senior Manager DEA (PT)	DEA Grade 12 Annual Salary – 1,000,000 (PT role: two weeks/year (*3 years)	115,384.59
Climate Change Specialist DEA (PT)	DEA Grade 12 Annual Salary 1,000,000.00 (PT role: two weeks/year (*3 years)	115,384.59
Admin and Operations support DEA (PT)	44 days per year (*3 years) -Annual Salary 300,000	108,791.19
Operational Costs		
Establish steering committee	R0.00	
Host quarterly steering committee meetings, includes workshop venue for 40 people and an allocation to sponsor travel and accommodation for key stakeholders	138,140.78 * 12 meetings	1,657,689.36
Hosting and maintenance of communication channels	Annual cost 36,811.47 (annual cost)*3	110,434.41
Total Costs (USD)		150 548,87
Total Costs (ZAR)		2 107 684,14

Methodology and assumptions

The above cost estimate is based on bottom-up costing methodology and cost information derived from the project document for the DEA Adaptive Capacity Facility (DEA, 2018-2024, €3,999,942.03). The cost calculation is as follows:

- **Human resources:** Requires attendance and high-level oversight by DEA senior staff. This calculation assumes the human resource requirements from the DEA to support this activity are: One part-time Senior Manager from the DEA is required for approximately 12 days per year (3 days per meeting); One Climate Change Specialist DEA for approximately 12 days per year (3 days per meeting); and one administrative staff for 10 days per meeting (40 days per year to support administration and operations).
- **Operational Costs:** Quarterly meetings (4) * (3 years) = 12 meetings with (40 members); DEA ACF has budgeted R138,140.78 per meeting. R36,811.47 has been budgeted to maintain communication channels across technical advisory council members. This has calculated based on the annual cost for this activity under the DEA ACF budget.

5.1.4 Develop a research roadmap for climate change adaptation

This will involve developing a roadmap for climate change research in South Africa, and will involve identifying areas where new and additional research is required in South Africa, and recommending priorities for research and development funding.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees, including inception, consultations, feedback	500,000 fees (50*10000) + 125,000 travel (inception, consultations, feedback)	625,000
Capacity Development		
Validation workshop	200,000 to include travel	200,000
Operational Costs		
	10% of total costs	82,500
Total Costs (USD)		64 821,43
Total Costs (ZAR)		907 500,00

Methodology and assumptions

The above cost estimate is based on bottom up-costing methodology based on the estimated resource requirements for commissioning a consultancy study to carry out background research to develop a research roadmap for climate change adaptation. The costing is based on the following cost calculations:

- **Human resources:** R625,000 to include R500,000 fees (50*10000) and 125,000 travel (inception, consultations, feedback)
- **Capacity development:** option for validation workshop R200,000 to include travel
- **Operating costs:** 10% of total costs

5.1.5 Continue and enhance climate observation and monitoring

This will involve identifying existing gaps in the monitoring and observation network and addressing these gaps to ensure that national climate data is reliable, comparable, up to date and accessible.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
10 technical grade staff within SAWS over a seven-year period.	Annual Salary 500,000*7years*10	35,000,000
Infrastructure, Equipment and Technology		
60 AWS	300,000*60	1,800,000
18 new computer systems for SARS	30,000*18	540,000
Capacity Development		
Training 20 new staff in using and analysing data	5,000*20	100,000
Operational Costs		
	10% of total costs	3,744,000
Total Costs (USD)		2 941 714,29
Total Costs (ZAR)		41 184 000,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing. Cost information data was derived from

the Zambia LDCF project "to strengthen climate monitoring capabilities, EWS and available info

for responding to climate shocks and planning adaptation to CC" (US\$3,600,000 over four years (2015-2019) - with a scope of 3 districts for local level systems, and cost information for capacity development workshops from the DEA-ACF Facility funded by the Government of Flanders.

The estimated resource requirements are based on using AWS for climate monitoring and observation, which are considered the "gold standard" for monitoring. The unit cost of an AWS is costed at \$15,000 each, plus \$6,000 to ensure power supply, housing etc. (total units costs R300,000).

Synergies with other strategic interventions

Investments in human resources, infrastructure, equipment, and technology, capacity development, and operational costs under this activity are linked to investments under Strategic Intervention 5 and linked to investments under Strategic Intervention

South Africa currently has 231 AWS. Based on the assumption that 60 additional AWS are purchased, the estimated costs for this action were calculated as follows:

- **Equipment and technology:** R300,000*60=R1,800,000 (60 AWS)
- **Infrastructure:** R10,000*18=R180,000 (18 new computer systems for SARS)
- **Capacity development:** R5,000*20=R100,000 (training 20 new staff in using and analysing data)
- **Operating costs:** 10% of total costs

2, Action 2.1.1. Improve the climate monitoring and observation network. It is recommended to link interventions and maximize cost efficiencies across interventions.

5.1.6 Continue to invest in climate change prediction and modelling data

This will involve the continued investment in, and support for, the development of climate change predictions and modelling.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
	70% of total costs = 34,069,700 * 3 years	102,209,100
Infrastructure, Equipment and Technology		
	20% of total costs = 9,734,200* 3 years	29,202,600
Operational Costs		
	10% of total costs = 4,867,100 *3 years	14,601,300
Total Costs (USD)		10 429 500,00
Total Costs (ZAR)		146 013 000,00

Methodology and assumptions

The above cost estimate is based on parametric costing and data sources derived from the NRF Global Change Grand Challenge. Based on the annual budget 2017-20 for national research facilities, the budget allotted for the Global Grand Challenge is R146,013,000 per year. This figure was divided by three to calculate total annual cost, equivalent to R48,671,000. This amount has

been multiplied according to the timeframe of this activity (three years) and distributed across budget categories as follows:

- **Human resources:** 70% = 34,069,700 * 3 years
- **Infrastructure, equipment and technology:** 20% = 9,734,200* 3 years
- **Operating costs:** 10% = 4,867,100 *3 years

5.1.7 Continue to invest in research that aims to understand the different impacts of climate change on the environment and society

This will involve continued support for different research institutions that are developing an understanding of the impacts of climate change on the environment and society, as well as the opportunities for different sectors. These include research reports, such as the Long Term Adaptation Scenarios (LTAS), which outline adaptation scenarios for South Africa under projected future climate conditions.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
	80% of total costs = 38,936,800 * 7 years	272,557,600
Infrastructure, Equipment and Technology		
	10% of total costs = 4,867,100* 7 years	34,069,700
Operational Costs		
	10% of total costs = 4,867,100* 7 years	34,069,700
Total Costs (USD)		24 335 500,00
Total Costs (ZAR)		340 697 000,00

Methodology and assumptions

The above cost estimate is based on parametric costing and data sources derived from the NRF Global Change Grand Challenge. Based on the annual budget 2017-20 for national research facilities, the budget allotted for the Global Grand Challenge is R146,013,000 per year. This figure was divided by three to calculate total annual cost, equivalent to R48,671,000. This amount has

been multiplied according to the timeframe of this activity (seven years) and distributed across budget categories as follows:

- **Human resources:** 80% = 38,936,800 * 7 years
- **Infrastructure, equipment and technology:** 10% = 4,867,100* 7 years
- **Operating costs:** 10% = 4,867,100 *7 years

Synergies with other strategic interventions

Investments in human resources, infrastructure, equipment, and technology, and operational costs under this action are linked to investments under Strategic Intervention 3: Develop vulnerability and resilience methodology framework that integrates biophysical and socio-economic aspects of

vulnerability and resilience. Investment under this action are supportive of actions under Strategic Intervention 3, whereby investments in research to understand the different impacts of climate change on society can help inform sectoral, provincial, and municipal assessments.

5.1.8 Invest in research on the most effective adaptation responses to different climate change impacts

This will involve continued support for research into the most effective adaptation responses and new technological solutions that can be replicated.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
	80% of total costs	1,600,000
Infrastructure, Equipment and Technology		
	10% of total costs	200,000
Operational Costs		
	10% of total costs	200,000
Total Costs (USD)		142 857,14
Total Costs (ZAR)		2 000 000,00

Methodology and Assumptions

The above cost estimate is based on parametric costing and estimated research costs associated with the development of the GIZ-funded Long Term Adaptation Scenarios research document. This amount has been distributed across budget categories as follows:

- **Human resources:** 80%
- **Infrastructure, equipment and technology:** 10%

- **Operational costs:** 10%

There is no timeframe indicated in the NCCAS for this activity. The cost calculation has therefore been calculated as once-off costs for supporting research outcomes.

5.1.9 Action Undefined and Unknown

This action has not been defined in the NCCAS. Therefore, estimated resource requirements and associated costs have not been calculated for this action.

5.1.10 Establish a programme to promote research into new climate change adaptation technologies

This will involve establishing a programme to promote research into new climate change adaptation technologies.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees, including (inception, consultations, feedback)	500,000 fees (50*10,000) + 250,000 travel	750,000
Operational Costs		
10% of total costs for DEA staff to manage research activity	75,000	75,000
Total Costs (USD)		58 928,57
Total Costs (ZAR)		825 000,00

Methodology and assumptions

The above cost estimate is based on estimated costs associated with commissioning a research

consultancy to promote research into new climate change adaptation technologies.

Synergies with other strategic interventions

Investments in research under this action links with Action 1.1.18 Plan for the effects of climate change on infrastructure and 1.1.9 Invest in high-quality, climate resilient, public infrastructure. Synergies between interventions are not related to costing

efficiencies, but rather in the contents of outputs. It is recommended to link interventions to ensure synergy between research outputs under 5.1.10 and the design of actions under Action 1.1.18 and Action 1.1.19.

5.1.11 Establish a knowledge dissemination programme to encourage research uptake

This will involve establishing a programme to promote the dissemination of new climate change adaptation research knowledge and information on new technologies that have been developed to stakeholders to promote uptake of the research and information.

Budget Line	EUR	Total Costs
Human Resources		
	€ 152.875*3	458,625 EUR
5% of a full time DEA staff member	Annual Salary R500,000 *5%*3 years	R75,000
Capacity Development		
	138,663 EUR* 3 years	415,989 EUR
Total Costs (USD)		977 150,48
Total Costs (ZAR)		13 680 106,67

Methodology and assumptions

The above cost estimate is based on analogic and top-down costing based on cost information from the "Reaping the Potential of Entrepreneurship for a Climate-Smart Inclusive Green Economy in South Africa" project supported by the Government of

Flanders (three years, €1.062.999), which comprised a component on Inspiring and Incubating Climate-Smart Enterprises, one on "ecosystem-building", and one on "Showcasing and Accelerating Outstanding Climate-Smart Enterprises". Costs from the second

year of implementation for capacity development (€138,663), and human resources (€152,875), were used as an analogic to the costs associated for this action. Although the NCCAS provides no timeframe for this activity, it was assumed that the timeframe was three years. Annual costs were then multiplied by the timeframe of this activity (three years) to calculate total costs. Operational costs are considered as part of costs associated with human resources as it assumed this will be carried out through a consultancy assignment. Costs associated with DEA oversight are associated with 5% of a full time DEA staff member based on salary-scale information.

Intervention 6: Build the necessary capacity and awareness for climate change response

6.1.1 Develop and implement an effective communication and outreach programme

This will involve developing a communication strategy that should consider approaches such as knowledge-sharing events, repositories of information on climate change impacts, climate change forums, resources, and translation of climate science into actionable policies and plans. The communication strategy should be launched and a continuous communications campaign implemented.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
	150,000*3 years	450,000
Capacity Development		
	750,000*3 years	2,250,000
Operational Costs		
	100,000* 3 years	300,000
Total Costs (USD)		214 285,71
Total Costs (ZAR)		3 000 000,00

Methodology and assumptions

The above cost estimate is based on top-down costing based on budget information from the 2019/20 DEA budget. According to the DEA budget document for SAWS, "to increase its provision of risk management information, the service intends to increase the number of targeted campaigns from 65 in 2018/19 to 72 in 2021/22 at an estimated cost of R15 million over the medium term". This data was used to calculate the cost of seven campaigns (\$15 million) over two years (or \$7.5 million over one

year), so each campaign is approx. R1m per year. This cost estimate assumes that this action is based on the implementation of one campaign over the timeframe of this action (three years). Total costs were then allocated by percentage across budget categories as follows:

- **Human resources:** 15%
- **Capacity development:** 75%
- **Operational costs:** 10%

6.1.2 Develop and implement a training programme for government officials

This will involve developing and implementing a training programme. Since a number of training initiatives already exist to promote the development of adaptive capacity by government officials, such as the Let's Respond Toolkit for local government, the programme will ensure that there is a unified approach to climate change adaptation training and that the impacts of the programme are monitored.

Budget Line	Cost calculation	Total Costs (ZAR)
Human Resources		25,042,500
Consultancy fees/TA (national), includes needs assessment, curriculum development and provision of two-day trainings for national level training programme	R750,000 to include R500,000 fees (50*10,000) + 250,000 travel (inception, consultations, feedback =R750,000 * 3 years	2,250,000
Consultancy fees/TA (provincial) includes needs assessment, curriculum development and provision of two-day trainings for provincial level training programme	R650,000 (comprising fees of 500,000 (50*10,000) and 150,000 travel) = R650,000 * 3 years	1,950,000
Consultancy fees/TA (municipal) for updated municipal training programmes based on needs assessment, additional curriculum development	350,000 to include 200,000 (20*10,000) fees and 150,000 travel (inception, consultation, feedback) =R350,000* 3 years	1,050,000

Budget Line	Cost calculation	Total Costs (ZAR)
Consultancy fees for the provision of trainings for local level training programme	72,500 per municipality (comprising fees of 10,000 (3*7,500), and travel 50,000* 91 municipalities =6,597,500* 3 years	19,792,500
Capacity Development		25,650,000
11 national level training for 11 sectors	200,000 * 11 sectors =R2,200,000 * 3 years	6,600,000
9 provincial trainings	200,000 - to cover provincial level sector staff attending) * 9= R1,800,000* 3 years	5,400,000
Municipal trainings	91 municipal trainings (50,000 to cover staff attending) 1 per municipality R4,550,000)* 3 years	13,650,000
Operational Costs		
	10% of total costs= 1,689,750* 3 years	5,069,250
Total Costs (USD)		3 982 982,14
Total Costs (ZAR)		55 761 750,00

Methodology and assumptions

The cost estimate for this action is based on bottom-up costing using estimated costs for consultancy fees and expenses required for the provision of

trainings to national (11 sectors), provincial (9), and municipal (91) in climate change adaptation.

6.1.3 Establish formally accredited training courses

This will involve establishing one or more formally accredited climate change adaptation training courses for government officials to ensure consistency in training and to support the professional development of participating officials

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
	20% of total annual cost = 1,329,540*7 years	9,306,780
Capacity Development		
	70% of total annual cost 4,653,390*7 years	32,573,730
Operational Costs		
	10% of total annual cost 664,770*7 years	4,653,390
Total Costs (USD)		3 323 850,00
Total Costs (ZAR)		46 533 900,00

Methodology and assumptions

The above cost estimate is based on top-down costing based on budget information from the Centre for Excellent for Energy Security.⁹ The cost of the CoE for energy security is 88,636,000 from 2017-20 so /4 = 22,159,000/year. Although this is a research programme, it is assumed that 30% of this cost would be allocated to training. The cost was then calculated

as follows (22,159,000*0. 30)*7 (4-10 years). Costs were then allocated according to estimated resource requirements across cost categories:

- **Human resources:** 20%= 1,329,540*7
- **Capacity development:** 70%= 4,653,390*7
- **Operational costs:** 10% = 664,770*7

9

<https://www.nrf.ac.za/sites/default/files/documents/NRF%20Strategy%20Implementation.pdf>

6.1.4 Incorporate climate change adaptation into relevant secondary and tertiary curricula

This will involve incorporating climate change adaptation into relevant secondary and tertiary curricula to mainstream climate change knowledge into education and training. It should form part of the broader framework of education on sustainable development, be interdisciplinary and aim to equip South African citizens to orient society and the economic system towards climate resilience and sustainability.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees for tertiary curricula development	20% of total costs = 1,329,540 (*7 years)	9,306,780
Consultancy fees for secondary curricula development	20% of total costs = 1,329,540 (*7 years)	9,306,780
Capacity Development		
National level multi-day secondary institutions (post-secondary)	70% of total annual cost = 4,653,390 (*7 years)	32,573,730
Capacity development for tertiary institutions	70% of total annual cost = 4,653,390 (*7 years)	32,573,730
Operational Costs		
Ops: 10% =	10% on total costs	
Total Costs (USD)		6 581 223,00
Total Costs (ZAR)		92 137 122,00

Methodology and assumptions

The above cost estimate is based on top-down costing based on budget information from the Centre for Excellent for Energy Security.¹⁰ The cost of the CoE for energy security is 88,636,000 from 2017-20 so /4 = 22,159,000/year. Although this is a research programme, it is assumed that 30% of this cost would be allocated to training. The cost was then calculated as follows (22,159,000*0.30)= 6,647,700*7 (4-10 years). Costs were then allocated according to estimated resource requirements across cost categories:

- **Human resources:** 20%= 1,329,540*7
- **Capacity development:** 70%= 4,653,390*7
- **Operational costs:** 10% of total costs

Intervention 7: Establish effective governance and legislative processes to integrate climate change in development planning

Outcome 7.1: Adaptation governance defined and legislated through the Climate Change Act once approved by parliament

7.1.1 Create formal climate change legislation for adaptation

This will involve developing climate change legislation and taking it through the parliamentary process for enactment. This is required as South Africa's rich body of climate resilience and adaptation knowledge, as reflected in policies, strategies and white papers, needs to be translated into a Climate Change Act. This will enable government's commitments to be backed up by legislation.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
	80% of total estimated budget	800,000
Capacity Development		
Consultation, workshops	10% of total estimated budget	100,000
Operational Costs		
	10% of total estimated budget	100,000
Total Costs (USD)		71 428,57
Total Costs (ZAR)		1 000 000,00

Methodology and assumptions

The above cost estimate is based on top-down costing based on the estimated resource requirements and associated costs for drafting formal climate change legislation for adaptation. The estimated budget for drafting legislation is estimated at R1,000,000 to account for costs associated with human resources, consultations and drafting. This cost was then allocated by percentage to the following cost categories as follows:

- **Human resources:** 80%
- **Capacity development:** 10%
- **Operating costs:** 10%

Outcome 7.2: Institutional support structures for climate change adaptation strengthened

7.2.1 Continue to facilitate the meeting of the Inter-Ministerial Committee on Climate Change

This will involve ensuring that the Inter-Ministerial Committee on Climate Change continues to meet on a regular basis. The Inter-Ministerial Committee on Climate Change aims to coordinate climate change efforts across sector departments and spheres of government.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
	10% of total costs: 1,785.502* 3 years	5356.506
Capacity Development		
Annual meetings, including venue and catering costs, and transport for key members	80% of total costs: 14,284.016* 3 years	42,852.048
Operational Costs		
Administrative, printing, and communications	10% of total costs: 1,785.502* 3 years	5356.506
Total Costs (USD)		3 826 075,71
Total Costs (ZAR)		53 565 060,00

Methodology and assumptions

The above cost estimate is based on bottom-up and analogic costing based on data derived from the DEA-ACF project document funded by the Government of Flanders. According to this data, the costs for hosting bi-annual meetings is budgeted at R35,710.04. This figure was divided to calculate the cost for hosting one meeting, equivalent to R17,855.02. Based on the understanding that IMCCC meetings are hosted on an annual basis

over a timeframe of three years, this figure was multiplied by three (years) to calculate total costs, equivalent to R53,565.06. This figure was then allocated by percentage based on estimated resource requirements to cost categories as follows:

- **Human resources:** 10%
- **Capacity development:** 80%
- **Operating costs:** 10%

7.2.2 Continue to facilitate the meeting of the Intergovernmental Committee on Climate Change (IGCCC)

This will involve ensuring that the IGCCC continues to meet on a regular basis. The IGCCC fosters information exchange, consultation, agreement and support among the spheres of government regarding climate change and government's response to climate change. As a high-level platform, it brings together representatives from National Treasury and the national departments of environmental affairs; agriculture, forestry and fisheries; energy; health; human settlements; international relations and cooperation; trade and industry; transport; rural development and land reform; science and technology; social development; water affairs; and provincial environment departments; and from the South African Local Government Association (SALGA).

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
	10% of total budget = 1,785.502* 3 years	5356.506
Capacity Development		
	80% of total budget = 14,284.016* 3 years	42,852.048
Operational Costs		
	10% of total costs: 1,785.502* 3 years	5356.506
Total Costs (USD)		3 826 075,71
Total Costs (ZAR)		53 565 060,00

Methodology and Assumptions

The above cost estimate is based on bottom-up and analogic costing based on data derived from the DEA-ACF project document funded by the Government of Flanders. According to this data, the costs for hosting bi-annual meetings is budgeted at R35,710.04. This figure was divided to calculate the cost for hosting one meeting, equivalent to R17,855.02. Based on the understanding that IGCCC meetings are hosted on an annual basis over a timeframe of three years, this figure was multiplied by 3 (years) to calculate total costs, equivalent to 53,565.06. This figure was then allocated by percentage based on estimated resource requirements to cost categories as follows:

- **Human resources:** 10%
- **Capacity development:** 80%
- **Operating costs:** 10%

7.2.3 Establish a functioning Provincial Committee on Climate Change for each province

This will involve each province establishing a Provincial Committee on Climate Change, managed by the provincial environmental departments. The role of these committees is to coordinate climate change response actions in the relevant provinces (some provinces have already established such committees).

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
	10% of total annual costs: 270,000 (per year) * 3 years	810,000
Capacity Development		
	80% of total annual costs: 2,160,000 per year * 3 years	6,480,000
Operational Costs		
	10% of total annual costs: 270,000 (per year) * 3 years	810,000
Total Costs (USD)		578 571,43
Total Costs (ZAR)		8 100 000,00

Methodology and assumptions

The above cost estimate is based on bottom-up and analogic costing based on data derived from the DEA-ACF project document funded by the Government of Flanders. Based on background research from a SANAS report, the cost estimate is based on the assumption that provincial committees are already established, whereby costs have been estimated for meeting facilitation. Based on budget information from the Flanders document, the cost of a provincial meeting is budgeted at R150,000. According to the NCCAS, provincial meetings are scheduled to take place bi-annually over a

timeframe of three years. The cost calculation was therefore as follows: R150,000*2 (bi-annual) = R300,000 *9 (provinces)= R2,700,000 *3 (1-3 years) = R8,100,000. The total cost was then allocated by percentage across cost categories according to estimated resources requirements:

- **Human resources:** 10% 270,000 (per year) * 3 = 810,000
- **Capacity development:** 80% 2,160,000 per year * 3 = 6,480,000
- **Operating costs:** 10% = 270,000 (per year) * 3 = 810,000

7.2.4 Establish a functioning Municipal Committee on Climate Change for each municipality

This will involve each municipality establishing a Municipal Committee on Climate Change. The role of these committees is to coordinate climate change response actions in the relevant municipalities (some municipalities have already established committees).

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
	10% of total annual costs: 2,780,000 * 3 years	16,680,000
Capacity Development		
Municipal workshops/meetings	80% of total annual costs: = 22,240,000 * 3 years	66,720,000
Operational Costs		
	10% of total annual costs: 2,780,000 * 3 years	16,680,000
Total Costs (USD)		7 148 571,43
Total Costs (ZAR)		100 080 000,00

Methodology and assumptions

The above cost estimate is based on bottom-up costing based on the estimate resource requirements and associated costs for hosting a bi-annual meeting in municipalities. The estimated cost of hosting a municipal meeting was estimated at R50,000 per meeting. This cost was then multiplied by two to account for hosting two meetings per year (bi-annual), and multiplied by 278 municipalities. Based on this calculation, the total annual cost for hosting bi-annual meetings is estimated to be

R27,800,000. The total annual cost was multiplied by three to account for the timeframe of this action (1-3 years). The costs were then allocated by percentage across cost categories as follows:

- **Human resources:** 10% = 2,780,000 * 3 years = 8,340,000
- **Capacity development:** 80% = 22,240,000 * 3 years = 66,720,000
- **Operational costs:** (10%) = 2,780,000 * 3 years = 8,340,000

Outcome 7.3: Enhanced public-private-civil society collaboration and stewardship

7.3.1 Continue to facilitate the meeting of the National Committee on Climate Change (NCCC), a multi-stakeholder climate change forum.

This will involve ensuring that the NCCC continues to meet on a regular basis. The NCCC is a multi-stakeholder climate change forum that consists of stakeholders from government departments, civil society, business and academia. The forum advises DEA on international climate change commitments and national climate change implementation.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Staff salaries for organizing and facilitating the event	10% of total costs	60,000
Capacity Development		
National workshop costs, inclusive of travel, catering etc.	R200,000* 3 years	600,000
Operational Costs		
Communications, administrative and operational costs	10% of total costs	60,000
Total Costs (USD)		51 428,57
Total Costs (ZAR)		720 000,00

Methodology and assumptions

The above cost estimate is based on bottom-up costing and analogic costing based on data derived from the DEA-ACF project document funded by the Government of Flanders. Based on budget information, the allocated costs of hosting a national workshop is R200,000 inclusive of travel. This figure was then multiplied by three, based on the assumption that the forum would meet on an annual basis over the timeframe of the activity

(1-3 years), equivalent to total R600,000. Costs for human resources and operational costs were then calculated as a percentage of total costs (10%).

- **Human resources:** 10% of workshop costs = 60,000
- **Capacity development:** = 600,000
- **Operational costs:** 10% of workshop costs = 60,000

7.3.2 Implement collaborative pilot resilience-building projects

This will involve government implementing resilience-building pilot projects jointly with business and industry to demonstrate the benefits of building climate change resilience to the private sector. These pilot projects can serve as the catalysts for future climate adaptation work in the private sector. Possible business groups to target include the National Business Initiative, Business Unity South Africa and Business Leadership South Africa.

Budget Line	Cost calculation	Total Costs (USD)
Human Resources		
Management fee	$191,362/5 = 38,272.4$ (annual) *7= 267,906.80 *9 provinces	USD2,411,161.20
Research and lessons learned	$189,000/5 = 264,600$ * 9 provinces	USD 2,381,400
Capacity Development		
Training and capacity building provided to 12 institutions	$325,000/5 * 7 = 455,000$ * 9 provinces	USD 4,095,000
Small grants provided to vulnerable communities to deliver tangible and sustainable benefits	$1,542,000/5 * 7 = 2,158,800$ * 9 provinces	USD 19,429,200
Operational Costs		
Project execution -	$195,320 /5 * 7 = 273,448$ * 9 provinces	USD 2,461,032
Total Costs (USD)		30 777 793,20
Total Costs (ZAR)		430 889 104,80

Methodology and assumptions

The above cost estimate is based on bottom-up costing and analogic costing based on budget data derived from the Taking Adaptation to the Ground: A Small Grants Facility for Enabling Local Level Responses to Climate Change implemented by SANBI and South South North Trust. The project used pilots through the GEF Small Grants Facility to increase climate resilience in production landscapes and socio-economic systems in communities in two pilot district municipalities in South Africa,

by working directly with local stakeholders and anticipated beneficiaries through a small granting mechanism.

The total costs for implementation were divided by the project duration (five years) to calculate annual costs, and multiplied by seven to align to the timeframe for this activity (4-10 years). Costs were then multiplied by nine to account for the implementation of projects in all nine provinces.

7.3.3 Continue to support knowledge-sharing platforms

This will involve providing continued support to community-based organisations and civil society organisations which provide platforms where lessons, ideas, and knowledge can be shared to build climate resilience. This will promote learning from the experiences of stakeholders in different sectors, including NGOs, academia, business and communities to support adaptation to climate change.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Technical and communications staff	10% of total cost	R140,000
Capacity Development		
National knowledge-sharing workshops (annual)	80% of total cost	R1,120,000
Other knowledge-sharing platforms, training, workshops etc.	60,000 EUR per year* 7 years	420,000 EUR
Operational Costs		
Administrative, operational, and communications costs	10% of total cost	R 779 333,33
Total Costs (USD)		612 333,33
Total Costs (ZAR)		8 572 666,67

Methodology and assumptions

The above cost estimate is based on bottom-up costing and analogic costing based on budget data from the Adaptation Network supported by the Government of Flanders (2016-2019). The cost calculation is based on estimated costs for hosting a national meeting per year at R200,000* 7 years (4-10 years) = R1,400,000. Total costs were then allocated according to estimated resource requirements across cost categories as follows:

- **Human resources:** 10%
- **Capacity development:** 80%
- **Operational costs:** 10%

Intervention 8: Enable substantial flows of climate change adaptation finance from various sources

8.1.1 Carry out a cost-benefit analysis of the NCCAS

This will involve developing a cost-benefit analysis of the NCCAS, initially to determine the full cost of implementing the NCCAS. Thereafter the benefits of the NCCAS will be identified and quantified.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees, including travel (inception, consultations, and feedback)	500,000 fees (50*10000) + 125,000 travel	625,000
Capacity Development		
Validation workshop, to include travel	200,000	200,000
Operational Costs		
	10% of total costs	82,500
Total Costs (USD)		64 821,43
Total Costs (ZAR)		907 500,00

Methodology and assumptions

The above cost estimate is based on bottom-up costing based on estimated resource requirements and costs associated with commissioning a

consultancy assignment to carry out a cost-benefit analysis of the NCCAS. The cost calculation is based in once-off costs.

8.1.2 Develop resource mobilisation strategy

This will involve developing a resource mobilisation strategy that will highlight all activities involved in securing new and additional resources for implementing the strategy. The resource mobilisation strategy will also recommend ways to maximise the use of existing resources.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees, including travel (inception, consultations, and feedback)	500,000 fees (50*10000) + 125,000	625,000
Capacity Development		
Validation workshop, including travel	200,000	200,000
Operational Costs		
	10% of total costs	82,500
Total Costs (USD)		64 821,43
Total Costs (ZAR)		907 500,00

Methodology and assumptions

The above cost estimate is based on bottom-up costing based on estimated resource requirements and costs associated with commissioning a consultancy assignment to develop a resource mobilisation strategy for the NCCAS. The cost calculation is based in once-off costs.

8.1.3 Develop a national climate investment plan

This will involve developing a national climate investment plan which will provide an overview of a set of robust and financeable adaptation projects and programmes for consideration by domestic and international funders.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees, including travel (inception, consultations, and feedback)	500,000 fees (50*10000) + 125,000 travel	625,000
Capacity Development		
Validation workshop	200,000 to include travel	200,000
Operational Costs		
	10% of total costs	82,500
Total Costs (USD)		64 821,43
Total Costs (ZAR)		907 500,00

Methodology and assumptions

The above cost estimate is based on bottom-up costing based on estimated resource requirements and costs associated with commissioning a

consultancy assignment to develop a national climate investment plan. The cost calculation is based in once-off costs.

8.1.4 Expand the list of government entities accredited for climate financing

This will involve identifying additional government entities that would be appropriate to accredit for climate financing and supporting them through the accreditation process. The throughput of adaptation projects to dedicated multilateral climate funds would be maximised by expanding the list of accredited government entities to include well-capacitated municipalities and provinces.

Budget Line	Cost Calculation	Total Costs (USD)
Human Resources		
	50% of total costs: 500,000 per year * 3 years	USD 1,500,000
Capacity Development		
	40% of total costs: 400,000 per year * 3 years	USD 1,200,000
Operational Costs		
	10% of total costs: 100,000 * 3 years	USD 300,000
Total Costs (USD)		3 000 000,00
Total Costs (ZAR)		42 000 000,00

Methodology and assumptions

The above cost estimate is based on top-down and analogic costing based on project information from the Green Climate Fund (GCF). The GCF provided up to USD 1,000,000 per year for readiness activities. Based on this figure, the timeframe of the activity (1-3 years), the cost calculation for total costs

is USD 3,000,000. This figure has been allocated by percentage according to the estimate resource requirements for this action.

- **Human resources:** 50%
- **Capacity development:** 40%
- **Operational costs:** 10%

8.1.5 Build capacity of local accredited implementing entities to access adaptation finance

This will involve building the capacity of accredited implementing entities to improve their ability to secure finance. This will assist South Africa to maximise the allocation of adaptation finance from dedicated multilateral climate funds.

Budget Line	Cost Calculation	Total Costs (GBP)
Human Resources		
20%	30,000= 10,000* 3 years	GBP 30,000
Infrastructure, Equipment and Technology		
Capacity Development		
	105,000= 35,000* 3 years	GBP 105,000
Operational Costs		
	15,000= 5,000*3	GBP 15,000
Total Costs (USD)		194 805,19
Total Costs (ZAR)		2 727 272,73

Methodology and assumptions

The above cost estimate is based on top-down and analogic costing based on project information from the Southern Africa Climate Finance Partnership. The total budget for the Southern Africa Climate Finance Partnership is approximately £500,000 budget for two years to cover six countries (including South Africa). The annual cost of 250,000 was divided by six to calculate the estimated annual allocation of funding to each country, equivalent to £41,666. This figure was rounded up to £50,000

to account for capacity building, workshops, and technical assistance activities. This figure was then multiplied by the timeframe of this action (three years), equivalent to £150,000. This figure has been allocated by percentage according to the estimate resource requirements for this action.

- **Human resources:** 20%
- **Capacity development:** 70%
- **Operational costs:** 10%

8.1.6 Develop a project preparation assistance fund

This will involve establishing a project preparation fund to support entities with the potential to prepare

applications but insufficient internal funding for the process.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
	10% of total costs: R80,000* 7 years	560,000
Capacity Development		
	90% of total costs: 720,000* 7 years	5,040,000
Total Costs (USD)		400 000,00
Total Costs (ZAR)		5 600 000,00

Methodology and assumptions

The above cost estimate is based on top-down costing based on estimated resource requirements and costs associated with project preparation grants aligned to GCF and Adaptation Fund type project preparation assistance. The cost estimate is based on submitting four proposals per year to various international finance sources, with each proposal costed at R200,000, equivalent to R800,000. The figure was then multiplied by the timeframe of

the activity (seven years) to calculate total costs over a seven-year timeframe. This figure was then allocated by percentage to cost categories based on estimated resources requirements for this action:

- **Human resources:** 10%
- **Capacity development:** 90%
- **Operational costs:** 0% (0 because this will be grant administered by the human resource costs)

8.1.7 Mainstream NCCAS priorities into the Medium Term Strategic Framework and assign implementation responsibilities

This will involve mainstreaming NCCAS priorities into the Medium Term Strategic Framework and assigning implementation responsibilities to ensure that the NCCAS is implemented by sectors and spheres of government.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees, including travel (inception, consultations, feedback)	500,000 fees (50*10,000) + 250,000 travel	750,000
DEA management costs	10% of that total costs to account for DEA staff to manage	75,000
Total Costs (USD)		58 928,57
Total Costs (ZAR)		825 000,00

Methodology and assumptions

The above cost estimate is based on bottom-up costing based on estimated resource requirements and costs associated with commissioning a

consultancy assignment to mainstream NCCAS priorities into the MTEF.

8.1.8 Investigate options to include climate change adaptation parameters in the equitable share allocations of state revenue calculations

This will involve investigating options to include climate change adaptation parameters in the

equitable share allocations of state revenue calculations.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees, including travel (inception, consultations, feedback)	500,000 fees (50*10,000) + 250,000 travel	750,000
DEA management costs	10% of that total for DEA staff to manage	75,000
Total Costs (USD)		58 928,57
Total Costs (ZAR)		825 000,00

Methodology and assumptions

The above cost estimate is based on bottom-up costing based on estimated resource requirements

and costs associated with commissioning a consultancy assignment.

8.1.9 Promote knowledge exchange on the economic benefits of private sector adaptation action

This will involve documenting private sector adaptation actions and the economic benefits of these actions, and ensuring that this information is shared widely. This will assist in promoting the uptake of adaptation action by other private sector entities.

Budget Line	Cost Calculation	Total Costs (EUR)
Human Resources		
Consultancy fees	= € 152.875*3	458,625 EUR
5% of a full-time DEA staff member	=R500,000 Annual Salary * 5%	25,000.00 ZAR
Capacity Development		
	138,663 EUR* 3 years	415,989 EUR
Total Costs (USD)		973 579,05
Total Costs (ZAR)		13 630 106,67

Methodology and assumptions

The above cost estimate is based on bottom-up and analogic costing based on budget information from the "Reaping the Potential of Entrepreneurship for a Climate-Smart Inclusive Green Economy in South Africa". The three-year project is funded by the Government of Flanders in partnership with the Climate Innovation Centre (€1.062.999), which has a component on "inspiring and incubating climate-

smart enterprises," one on "ecosystem-building", and one on "showcasing and accelerating outstanding climate-smart enterprises". Cost information for human resources and capacity building (during the second year of implementation) was taken to calculate annual project costs. This figure was then multiplied by the timeframe of this action (three years).

Intervention 9: Develop and implement an M&E system that tracks implementation of adaptation actions and their effectiveness

Outcome 9.1: A national M&E system developed and implemented by 2025.

9.1.1 Establish a M&E system to track progress in achieving the strategic outcomes of the NCCAS

This will involve setting up an effective M&E system to track and assess success in achieving the strategic outcomes of the NCCAS.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
	60% of total annual cost: 26,299,800* 3 years	78,899,400
Infrastructure, Equipment and Technology		
	15% of total annual cost: (once-off cost) 6,574,950	6,574,950
Capacity Development		
	15% of total annual cost: 6,574,950* 3 years	19,724,850
Operational Costs		
	10% of total annual cost: = 4,383,300* 3 years	13,149,900
Total Costs (USD)		8 453 507.14
Total Costs (ZAR)		118 349 100,00

Methodology and assumptions

The above cost estimate is based on top-down and analogic costing based on budget information from the DEA 2019/20 budget. According to this data source, the average allocation for "climate change monitoring and evaluation" from 2019/20-21/22¹¹, equivalent to R14,611,000 was used to estimate total annual costs. This figure was tripled to R43,833,000, taking into account the need to expand the system by embedding across the sectors then multiplied by the timeframe of the activity (1-3 years), and allocated by percentage according to cost categories as follows:

- **Human resources:** 60% = 26,299,800* 3 years
- **Capacity development:** 15% = 6,574,950* 3 years
- **Infrastructure, equipment, and technology:** 15% once off cost- 6,574,950
- **Operational costs:** 10%= 13,149,900

11 In 2019-20 MT expenditure estimate the budget for CC M&E is 13,634,000, rising to 14,631,000 in 2020-21 and 15,568,000 in 2021-22

9.1.2 Report on success in achieving the strategic outcomes of the NCCAS

This will involve using the information collected in the M&E system to report annually on progress in achieving the strategic outcomes. The report should also highlight key lessons learnt, as well as any shifts that may be required to achieve the strategic outcomes of the NCCAS.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees, including travel (inception, consultations, feedback)	500,000 fees (50*10000) + 250,000 travel	625,000
Capacity Development		
Validation workshop	200,000 to include travel* 3 years	600,000
Operational Costs		
	10% of total cost	R122,500
Total Costs (USD)		51 621,14
Total Costs (ZAR)		1 347 500,00

Methodology and assumptions

The above cost estimate is based on bottom-up costing based on estimated resource requirements and costs associated with commissioning a consultancy to develop annual reports based on information collected from the monitoring and

evaluation system. Costs for the organization of validation workshops have been included in the cost estimated, budgeted annually over the timeframe of the activity (1-3 years). Operational costs have been calculated at 10% of total costs.

9.1.3 Update the NCCAS based on the M&E learnings

This will involve updating the NCCAS every five years based on the learnings that have been developed as a result of the establishment of an M&E system and development of annual reports.

Budget Line	Cost Calculation	Total Costs (ZAR)
Human Resources		
Consultancy fees, including travel (inception, consultations, feedback)	500,000 fees (50*10000) + 250,000 travel (625,000
Capacity Development		
Option for validation workshop	200,000 to include travel	200,000
Operational Costs		
	10% of total costs	82,500
Total Costs (USD)		20 192,57
Total Costs (ZAR)		907 500,00

Methodology and assumptions

The above cost estimate is based on bottom-up costing based on estimated resource requirements and costs associated with commissioning a consultancy to update the NCCAS based on carrying out a mid-term review based on M&E learnings. Costs for the organization of a validation workshop have been included in the cost estimate, costed at R200,000. Operational costs have been calculated at 10% of total costs.

ANNEXURE 2: COSTING METHODOLOGY

1 Introduction

The purpose of this report is to present the methodology for the development of a detailed cost estimate for the implementation of strategic interventions identified in South Africa's National Climate Change Adaptation Strategy (NCCAS). The strategy, which elaborates the national adaptation planning for the country, will also form the National Adaptation Plan (NAP). The NAP is mandated under the United Nations Framework Convention on Climate Change, and acts as a common reference point for adaptation efforts in the short to medium term, providing guidance across all levels of government and informing national, provincial and local planning. It is overseen by the Department of Environmental Affairs (DEA).

To support the DEA in identifying the steps to be taken to facilitate a smooth transition to implementation when the NAP is approved and adopted, CowaterSogema International has been contracted to develop a detailed cost estimate. This

report outlines the proposed methodology for the development of a detailed cost estimate of the NAP, outlining the scope and limitations of the analysis as agreed with the National Adaptation Planning team in the DEA, as well as the basis for developing the cost estimates. This report was developed in consultation with the National Adaptation Planning team in the DEA.

This assignment is commissioned by the South African Government through DEA, with support from the US In-Country NAP Support Programme. This program is designed to provide targeted technical support in order to facilitate NAP implementation, responding to capacity gaps identified by the DEA. The in-country support programme is coordinated and administered by the International Institute for Sustainable Development (IISD), the Secretariat of the NAP Global Network, in collaboration with USAID colleagues, both in South Africa and at headquarters.

2 Context

South Africa's process to develop the National Climate Change Adaptation Strategy (NCCAS) began in 2014 and will be presented to the Minister for approval within the next few months. The vision of the NCCAS is to "transition to a climate resilient South Africa, which will follow a sustainable development path, guided by anticipation, adaptation and recovery from a changing climate and environment to achieve our development aspirations". The NCCAS meets international obligations under the United Nations Framework Convention on Climate Change (UNFCCC), as well as implementing national policy commitments under the National Climate Change Response Policy (NCCRP). Related to the UNFCCC, as well as forming South Africa's NAP, the NCCAS also considers the six adaptation goals outlined in the Nationally Determined Contribution (NDC), and thus acts as an implementation strategy against which progress can be monitored. At the national level, the NCCAS

has been developed to implement the NCCRP but also advances that by including additional sectors, such as energy, that were previously only considered relevant to mitigation activities.

South Africa's NAP outlines the nine strategic interventions where the government will make investments in order to create an enabling environment and facilitate implementation of interventions for climate change adaptation and resilience building. The NCCAS is based around four strategic objectives and nine strategic interventions with corresponding actions and outcomes, directed towards achieving the vision of the transition to a climate-resilient South African. Each strategic intervention has a dedicated Chapter to outline the envisaged actions associated with the intervention.

The strategic interventions of the NCCAS are presented below:

Table 1: NCCAS Strategic Interventions

I.1	Reduce human and economic vulnerability, ensure resilience of physical capital and ecological infrastructure and build adaptive capacity.
I.2	Develop a risk, early warning, vulnerability and adaptation monitoring system for key climate vulnerable sectors and geographic areas.
I.3	Develop a vulnerability and resilience methodology framework that integrates biophysical and socio-economic aspects of vulnerability and resilience.
I.4	Facilitate mainstreaming of adaptation responses into sectoral planning and implementation.

1.5	Promote research application, technology development, transfer and adoption to support planning and implementation.
1.6	Build the necessary capacity and awareness for climate change response.
1.7	Establish effective governance and legislative processes to integrate climate change in development planning.
1.8	Enable substantial flows of climate change adaptation finance from various sources.
1.9	Develop and implement an M&E system that tracks implementation of adaptation actions and their effectiveness

These strategic interventions will put in place the knowledge, resources and systems to enable sectors, sub-national governments and relevant key stakeholders to implement adaptation strategies within the overarching framework of the NAP. The

development of a cost estimate for implementing the NAP has been identified as a priority to facilitate a smooth transition to implementation when the document is approved and adopted.

3 Approach and Key Principles

3.1 Approach

The motivation behind costing the NCCAS is to build a business case for adaptation and outline the cost implications. Recognising that some sectors are more advanced than others and already have their own plans in place, whilst others are still in need of guidance, the purpose of the NCCAS is to provide overall costing, taking into account that there are already some existing commitments in place to achieve the objectives. The approach will be realistic but ambitious, taking into account the South African context.

The cost estimate will consider the full range of costs associated with implementation of the strategic interventions identified in the NCCAS. This will include human resources; infrastructure, equipment and technology; capacity development; and operational costs – based on the principle of

minimum capacity required to meet objectives. It will be organized around the nine strategic interventions, noting synergies that may create efficiencies in the required investments. The NCCAS already divides the lifespan of interventions over the short (1-3 years), medium (4-10 years) and long term (10+ years). The cost estimate will be a full cost estimate over appropriate timeframes, with annual breakdowns, thereby allowing realistic annual contributions towards long-term goals that will not be completely met within the 10-year lifespan of the NCCAS. The cost estimate will be based on high quality cost information, and the detailed and comprehensive consideration of the actual resource requirements and financial costs required for the implementation of the strategic interventions of the NCCAS.

3.2 Key Principles

The guiding principles for the development of the cost estimate of the NCCAS are outlined below:

Table 2: Key Principles for the Development of the Cost Estimate

Title	Description
Clear identification of purpose	Before starting the costing exercise, the parties involved need to define why the costing is being conducted, and what decisions will be made based on the results of costing. Different purposes require different information on cost and resources, and application of different costing methods.
Realism	A starting point for costing strategies is a clear definition and understanding of programmes and activities that need to be implemented and their outputs. Before starting the costing process, the costing team with responsible parties will ensure that programmes and activities are realistic and feasible in the South African context.

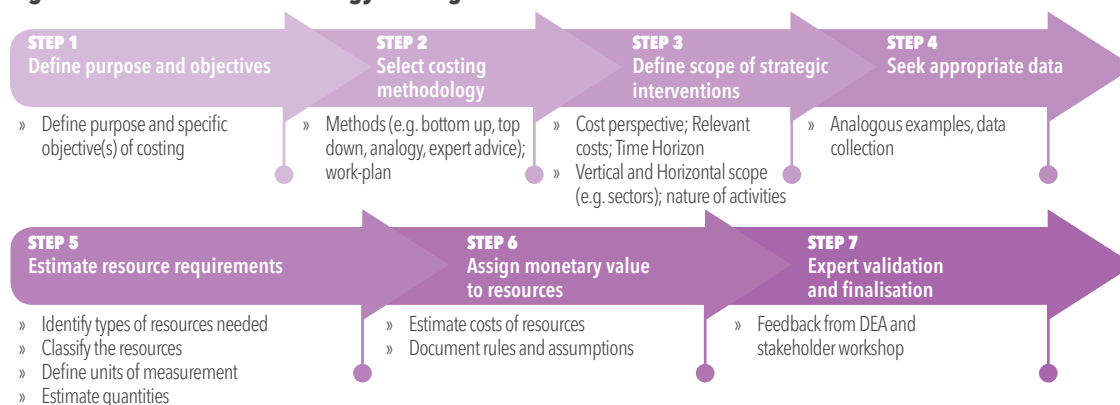
Title	Description
Efficiency	Efficiency relates to the use of all inputs in producing a given output and can be measured by determining the ratio of useful output to total input. Efficiency is important because of scarcity of government resources. Activities should be implemented with available resources whenever possible, whereas additional resources should be planned only when this is absolutely necessary and should be used in the most productive way. The cost estimate will account for full costs, and where possible, where existing funding is already contributing to interventions and actions, identifying deficits and funding gaps.
Conservatism	Conservatism is closely linked to efficiency and involves making well-justified and prudent, rather than over-estimated cost estimates. Conservatism will be applied in the assessment of respective costs required for implementation. When the level of uncertainty is relatively high, contingencies will be planned to mitigate risks associated with conservative estimates.
Consistency	Costing, including the basic assumptions, approaches and costing methods will be done consistently for all programmes and activities. This will ensure comparability of results.
Participation and consultations	The NCCAS is a cross-cutting national strategy and requires support for implementation across several institutions and levels of government. Costing cannot be done in isolation. Participation and consultations of all institutions responsible for financing and implementation are needed. This process is iterative and will involve multiple rounds of consultations.
Availability of valid data	The quality of input data used in the costing exercise directly affects the quality of output information used for decision making. Input data relates to types and quantities of resources and their costs. Data needs to be accurate, consistent, realistic and practical. MoF should advise on data sources to be used, based on purpose of costing and availability of data.
Documenting details and assumptions	Cost calculations are usually done under certain assumptions, such as those on availability of specific resources, inflation trends, implementation and financing options etc. These need to be realistic and explicitly stated. All calculation details, such as those on unit costs and quantities of resources, need to be properly documented. This will enable better understanding of cost information by decision makers and facilitate future revisions of cost calculations.

4 Strategy Costing Methodology

In order to identify and estimate costs associated with the implementation of the NCCAS, the costing exercise needs to follow a clear plan. The process for the development of the cost estimate will involve a

number of steps, each requiring specific information and resulting in specific outputs. The steps involved in the costing process is illustrated in Figure 1.

Figure 1: Overview of the Strategy Costing Process



The following section outlines the proposed methodology for the development of a detailed cost estimate for the implementation of strategic interventions identified in the NAP. Although the steps are presented sequentially, in practice the

process is dynamic and involves many iterations, including regular interaction between the drafting team and the DEA, as agreed during the inception meeting on 28th February 2019.

4.1 Define Purpose and Objectives

The first step in conducting the costing exercise is the definition of the decision problem and the specific objectives for how the cost information will be used to inform the implementation of the NAP. Based on consultations with the National Adaptation Planning team in the DEA, the purpose of the cost estimate is to build a business case for climate change adaptation and outline the full cost implications associated with the implementation of the nine strategic interventions and related actions identified in the NCCAS.

The objective of the cost estimate is to outline the full cost implications of the minimum required

capacity to implement the strategic interventions and associated actions of the NCCAS, including human resources; infrastructure, equipment and technology; capacity development; and operational costs. The cost estimate will provide a realistic annual costing breakdown of the total amount of funds that need to be secured from the government budget and donors to support the implementation of the NCCAS over the short (1-3 years), medium (4-10 years) and long term (10+ years), whilst accounting for what is already taking place in terms of existing funding contributing to the full costs associated with each strategic intervention.

4.2 Select Costing Methodology

The costing methodology has been identified as one element of the strategy financial management cycle to be used to calculate the financial requirements for the implementation of the NCCAS. The costing approach proposed will contribute to the overall objectives of NCCAS and ensure near-accurate and complete information on the real cost requirements for implementation is obtained. At the strategy planning stage, costs are assigned to activities identified from the strategic interventions. The costing methodology is based on the assumption that a high-quality action plan indicating programmes, activities, timelines and

implementation responsibilities is developed to support strategy implementation.

The process of developing this costing methodology involved several stages, including desk research, consultations with the DEA, and drafting and finalising the document based on feedback from stakeholders. Desk research focused on analysing relevant costing methodology guides for government strategies. Several guides on costing specific government services or types of projects were analysed from the perspective of the general approach to the costing process.

4.2.1 Full Costing Vs Incremental Costing

Based on the approach to measuring the scope of resources employed to implement a project, programme or strategy, costs can be classified as full or incremental (or additional). The South African National Treasury recommends that government uses the full cost recovery method. Full costs of a project, programme or strategy are the existing costs plus the incremental (additional) costs. Full cost strategy therefore accounts for the costs of all resources employed for the purpose of its implementation. Although it is necessary to always provide full costs, there will nevertheless be situations where it may be necessary to only provide incremental costs. Incremental (additional) costs are costs of additional inputs or resources that need to be added on top of existing infrastructure to implement a project, programme or strategy. These are, for example, costs of new staff that need to be employed, costs of additional materials and services

4.2.2 Costing Methods

Based on the level of detail and accuracy, the NCCAS cost estimate will be based on mixed methods or approaches used for costing government programmes and strategies, each involving a different level of accuracy and detail. The most commonly used costing methods are bottom-up, top-down (or parametric) costing, analogy costing, and costing based on expert opinion.

Bottom-up costing

Bottom-up costing, also referred to as the 'engineering approach', is based on detailed analysis of resource requirements and their costs to determine the estimated cost of a project or programme. The application of this technique requires breaking down a project or programme into its smallest components (typically called activities or actions). Resource requirements (labour, materials, capital items) and their costs are estimated at the lowest level. Cost is then calculated by multiplying quantities of resources with their unit cost. The total estimate is completed by summing up detailed estimates done at lower levels. When using this method, the cost expert from CowaterSogema will work with the team from the DEA to obtain details on resource requirements and costs for each strategic intervention and associated actions. This technique is considered as the "golden standard" of costing, because it provides the most detailed estimate customized to a specific cost object. Bottom-up costing will allow analytical insight into different components of costs and helps in understanding cost drivers and the effects of change. However, this technique has several drawbacks. First, it is expensive and time consuming. A lot of time is required for defining details at the lowest (activity) level. Secondly, the costing team needs

that need to be consumed (trainings, publications, travel), or costs of additional capital items that need to be procured (equipment, software).

A combination of desk research and meetings held with the NAP team within the DEA indicated that the full cost accounting method would be most preferred for the requirements of NCCAS. However, in cases where projects are already being funded, full costs will still be indicated with a clear distinction between what existing funding is available and contributing to the full costs of each strategic intervention, and funding gaps. This means that our approach will use a combination of both methodologies - the hybrid method - establishing financial requirements using full costing and then follow with a provision of more detail to the initial calculations to give visibility of what is already being funded.

to understand each specific activity and trade-offs in the activity and programme design. Next, since there is very little space for unknown factors, it is difficult to use this technique for costing activities or projects where the level of uncertainty is high. Finally, this technique requires the availability or development of an extensive and detailed cost database for different types of programmes.

Parametric costing

With parametric costing, also referred to as top-down costing, the cost of a new programme is estimated based on a validated relationship between historical cost and technical characteristics of similar programmes. This relationship is determined based on the analysis of historical data for several similar programmes. The assumption is that the same factors that affected cost in the past will continue to affect future costs. This relationship is then used to estimate the cost of the new programme by entering its specific characteristics into the parametric model or formula. Parametric costing is normally used when activities or resource requirements cannot be defined in details to use the bottom-up approach. It is also used for estimating costs of standardized activities or outputs, and for allocation of indirect costs. Its major advantage is that it is reasonably quick and easy to apply and clearly shows main cost driver(s). The main disadvantage is that it lacks details. Also, establishing a credible cost estimate relationship requires access to relevant historical data for several activities or programmes, which may be difficult to obtain. Confidence in results therefore depends on how valid the relationships are between costs and the technical attributes of the programmes used for comparison.

Analogy costing

Analogy costing, or estimate by analogy, is based on the assumption that new programmes or projects are evolved from those already implemented, but have different features or components. The costs of new programmes or their components are therefore estimated based on actual costs of a similar programme, with adjustments to account for differences between the requirements. However, adjustments should be based on quantitative rather than qualitative inputs as much as possible. This method is similar to parametric (top-down) costing. The main difference is that parametric costing is based on historical data of several previously implemented projects, whereas the analogy costing is looking at only one highly similar project. This method is often used as a cross-check for the bottom-up method. Its main advantage over the bottom-up costing is that it looks only at differences between projects, which saves time. It can also be used before detailed project requirements are known. The main disadvantages are that it relies on a single data source and can be used only when a similar programme was implemented.

4.2.3 Selected Method – Mixed

The selected methods should enable the DEA to meet the costing objectives. Different methods are not mutually exclusive and can all be used together in one costing exercise. Costing the NCCAS in fact requires a combination of methods. For example, bottom-up costing will be used for distinct activities with clear outputs; parametric costing for

Expert opinion

Costing based on expert opinion or expert judgement is not really a calculation technique. Typically, the costing team interviews several experts independently, reviews results and combines them into a single best estimate. Since it is not backed up with supporting data, this approach is considered to be too subjective. Objectivity can be improved if the cost analyst checks and documents data obtained from experts. This approach is used in absence of other valid data to develop the cost estimate – for example in costing completely new types of projects. Its main advantage is that it accounts for differences and special circumstances, as well as the impact of different variables. The key downsides are the lack of objectivity and difficulties in documenting factors. Because of these downsides, this approach should be used occasionally, ideally to complement other methods or to cross-check their results.

programmes or activities for which less details are available; and analogy costing for the replication of similar programmes. Expert judgement will be used for programmes that are the first of their kind or to complement other methods for the validation of cost estimates.

4.3 Define Scope of Strategic interventions

The definition of the scope of the cost estimate involves the establishment of several key parameters, including the basis for costing, cost perspective, relevant costs, time horizon, and vertical scope. The following section describes the scope and limitations of the analysis as agreed with the National Adaptation Planning team in the DEA.

The **basis for costing** will be organized around the nine strategic interventions identified in the NCCAS. For each strategic intervention, the details of the estimated costs for each action will be calculated, including costs associated with human resources, infrastructure, equipment and technology, capacity development, and operational costs. The cost estimate will identify synergies across strategic interventions (e.g. places where investing in human resources for one intervention will also cover another).

The **cost perspective** will consider costs incurred by the government/public sector for the purpose of estimating total costs for government resource planning.

The **relevant costs** to be included in the cost estimate will consider the full financial costs i.e. financial outlays for resources that will be consumed for the purpose of the implementation of strategic interventions identified in the NAP. The relevant costs will not deduct where existing activities are already being (partly) implemented, but instead will note where this is the case.

The **time horizon** for the cost estimate will consider relevant financial costs required for the implementation of strategic interventions outlined in the NCCAS over the short (1-3 years), medium (4-10 years) and long term (10+ years), with annual breakdowns, thereby allowing realistic annual contributions towards long-term goals that will not be completely met within the 10-year lifespan of the NCCAS. The cost estimate should be reviewed and revisited every five years in line with the review of the NAP to reassess priority areas for resource allocation for adaptation planning.

As the NAP acts as a common reference point for adaptation efforts across all levels of government in

South Africa, the **vertical scope** will consider costs of resource allocation for activities implemented by institutions at national, provincial and local levels (district municipality and municipality).

Given the NCCAS's cross-sectoral and economy wide approach to climate change adaptation, the **horizontal scope** of the cost estimate will include the estimated costs for actions associated with strategic interventions across all sectors. The horizontal scope will consider the costs of resource allocation across government departments and be

4.4 Seek Appropriate Data

Data collection and analysis are time-consuming and require a lot of effort, therefore the minimum data set needed to produce valid estimates for the NCCAS is to use readily available data sources. The data is to be collected, analyzed and adjusted so that it can be used for costing. The sources from which the data will be collected include government departments such as DEA and DPSA and donor agencies championing climate change projects such as GIZ, as well as other climate change institutions and civil society.

Focus will be on essential data that is feasible to collect to minimize the burden on all stakeholders. The attention will be on capturing large expenditure items, instead of focusing on data that is likely to

4.4.1 Data Sources and Data Collection Instruments

Data will be sought from primary (original) sources whenever possible, because they are considered the best in quality and ultimately the most useful. Secondary data is derived from primary data and changed, and therefore their overall quality is lower. Extracting data from existing reports and databases is in principle very time consuming. The costing team will therefore develop adequate instruments to facilitate data collection, such as data collection sheets, hold interviews and consultations. Analogies from other contexts will be used to estimate costs associated with the implementation of similar projects in other neighbouring country contexts

4.5 Estimate Resource Requirements

Whichever costing method is used, one of the two key elements of the costing process is estimating

4.5.1 Identifying Types of Resources

Resource requirements will be estimated at cost object (activity) level. Resource requirements will be estimated for each activity separately. Before estimating quantities, all resource items will be accurately classified, and their relation to cost object established. Primary classification will be by resource item. Resource items will correspond to main budget line items (for example labour, materials

based in the implementation arrangements of the NCCAS.

The cost estimate will include all relevant costs of interventions across key adaptation sectors, including energy, mining, water, health, human settlements, agriculture, forestry, biodiversity and ecosystems, fisheries, disaster risk reduction, transportation and infrastructure and climate adaptation plans in local and provincial government, as well as administration.

have negligible impact on the results. If the data is not readily available, proxies or assumptions will be considered, assuming that validity will not be compromised.

Types of data needed can be classified to resource utilization data and cost data. Data on **types and quantities of resources** will be provided by technical experts from DEA based on activities being costed and information on previous similar activities. Data on **costs of resources** will be provided by DEA staff, and donor budget documents, government staff salary data, expenditure records, inventory lists, invoices, suppliers' offers, contracts, market prices and various analyses and studies.

through the use of other project documentation (e.g TORs/CFPs for similar studies; draft budgets; cost estimates) in which costs will be adjusted to account for costs in the context of South Africa.

These instruments will ideally integrate both primary and secondary data requirements in one form. The selection of instruments depends on the type and availability of data. A simple sheet may be sufficient to obtain data on budget expenditures for several line items, but an interview will probably be needed to define the way in which indirect costs should be allocated.

types and quantities of resources required, in physical units.

and services, capital assets) to enable the linking of the cost estimate with budget planning. Costs for infrastructure, equipment, and technology will be estimated based on best available information (e.g. using analogies from other project documentation).

Capital items will be distinguished from recurrent items. Capital items have a useful life of one year

or longer and a purchase price above a certain threshold. They are annualized over the number of years that the items are expected to last. Based on their frequency of utilisation, resource items will be classified as one-off or recurrent. One-off items are consumed only once during the strategy implementation. Recurrent items are consumed periodically over a period of time as a result of strategy implementation. Distinction between one-off and recurrent items will be done for identification of one-off and recurrent costs. Based on their relation to cost object (activity), resource items will

4.5.2 Estimating Quantities of Resources

The quantities of each resource item will be estimated in physical units of measurement. These units will be selected based on type and characteristics of resources. Estimating quantities of physical resources will be comprehensive,

4.6 Assign Monetary Value to Resources

4.6.1 Estimate Costs of Resources

Once the types and quantities of resources have been estimated, monetary values will be assigned to resources. Assigning monetary values means calculating unit costs and total costs of resources. The sum of the costs of all resources required for activity implementation will be the cost of activity. Costs of resources will be estimated using mixed approaches mentioned in 4.1.5 above. Depending on the type of activity, market prices may also be considered if future prices of resources significantly differ from the current prices and if using historical data would not provide accurate estimates.

Indirect costs/overheads will be assigned on a cause-and-effect basis and in a reasonable and consistent way. The selection of allocation base will therefore be guided by the existence of a strong cause-and-effect relationship and is a matter of judgement and common sense.

In order to better link the strategy cost estimate with government mid-term and annual budget planning, but also with the donors' financing plans, NCCAS cost estimates will be produced by fiscal year. If a single activity is implemented over several years, its costs will be apportioned to years in which it is implemented. For greater accuracy, resource requirements and their costs will be planned on a year-by-year basis, and these annual estimates will then be summarized to calculate total activity

4.6.2 Document Rules and Assumptions

All assumptions made to allow the estimate to proceed will be documented. Documenting all calculation details, methodologies, data sources, rules and assumption will result in more professional, credible and convincing estimates, facilitate future

be classified as direct or indirect. Direct items are used solely by the activity and can be assigned to it entirely and in an economically feasible way. Indirect items cannot be easily assigned to the activity, but must be consumed in order for the activity to happen. Since this strategy cost estimate is for a period of 10 years (2020-2030), resource requirements will also be planned by year of implementation. This will facilitate linking with multi-annual and annual budgets and work plans. The assumption is that resources will be paid (i.e. the cost generated) in the fiscal year they are consumed.

reliable, valid and representative. The quantities of all relevant resource elements will be estimated depending on resources and availability of data from multiple sources.

cost. Budgeting for multi-annual period requires adjustment of cost information for inflation. Inflation will be accounted for. The base-year amounts will be converted to future year amounts using the adequate inflation indexes. Inflation indexes will be sourced from the South African National Treasury.

Once the costs of activities have been calculated, they will all be added up to calculate cost of respective higher level elements (i.e. strategic interventions) and ultimately cost of the NCCAS strategy as a whole. Appropriate calculation tool proposed is a simple excel spreadsheet that will enable analysis of input data and unit costs. The excel spreadsheet will be able presentation of cost information by:

- Action plan element (objective, program, result, activity, output), to enable linking costs with areas of work and results
- Line item (including at least salaries, materials and services, and capital expenses)
- Year of implementation, to enable linking cost estimate with multi-annual and annual budgets
- Frequency of cost occurrence, to enable distinction between one-off and recurrent cost of strategy, for the purpose of better costing
- Relevant cost category, such as incremental and existing costs, to enable decision making for specified purposes

revisions, and enable better insight into potential risk areas. This will also represent a valuable point of reference for future costing exercises.

4.7 Expert Validation and Finalization

The cost estimate will be validated by stakeholders prior to being formally adopted. Validating includes verifying the calculations, making sure that the assumptions, methodologies, and documentation are complete, accurate and reasonable, and confirming that the results of costing meet the specified purpose and objectives. Estimates will first be double-checked by the costing team. The DEA NAP team will take the primary responsibility for verifying the programmatic aspects of costing, including the anticipated outputs and requirements for physical resources. The DEA NAP team will also be responsible for validating the data sources, assumptions, methodology and cost calculations and confirming the quality, completeness and reasonableness of the cost information that will be prepared by CowaterSogema.

CowaterSogema will organize a validation workshop with attendance from a wide range of stakeholders representative of the horizontal and vertical scope of the NAS so that the full range of costing can be validated. The validation workshop will include the participation of stakeholders directly engaged in the implementation of the NAS. This will include stakeholder representatives from national ministries and sectoral departments, levels of government (national, provincial, district municipality and municipality), as well as research and tertiary

institutions, donor organizations, and NGOs and civil society organisations.

The DEA will be responsible for confirming that the costing information satisfied its purpose and objectives.

When validating the cost estimate, DEA and other stakeholders will ensure that the estimate is:

- **Well-documented**, with indication of source data, rules and assumptions and calculation details. Explanations of why particular methods or references were chosen will also be included, as well as explanations of any potential deviations from these methods or references.
- **Comprehensive**, meaning that it has sufficient details to ensure that cost elements are neither overlooked nor double-counted.
- **Accurate**, meaning that it is unbiased and that the work effort is not overly conservative or overly optimistic and is based on the estimated most likely cost. Mathematical errors will be minimal and insignificant.
- **Credible**, meaning that any limitations related to uncertainty contained in data or assumptions are discussed. Major assumptions can be varied to determine how sensitive the results are to changes in the assumptions.

5 Cost Estimate Workplan

ID	Activity Name	Feb	March	April	May	
1	Review relevant documentation	■				
2	Consult with NAP team in DEA		■			
3	Define purpose and objectives		■			
4	Select costing methodology		■			
5	Define scope of strategic interventions			■		
6	Seek appropriate data			■		
7	Estimate resource requirements			■		
8	Assign monetary value to resources			■		
9	Expert validation and finalisation			■	■	
Deliverables						
D1	SA costing methodology	■				
D2	SA costing 1 st draft			■		
D3	SA costing 2 nd draft				■	
D4	SA costing feedback				■	
D5	SA costing 3 rd draft					■
D6	SA costing final report					■

APPENDIX 1: COSTING TEAM

Position	Name		Roles and Responsibilities
Team Leader	David Burton	CS	Oversight and coordination
Costings Expert	Olivia Mushamba	CS	Designing the costing methodology to strategic interventions, report drafting
Senior Climate Change Expert	Katharine Vincent	CS	Defining the scope of strategic interventions, report drafting
Climate Change Expert	Taylor Martin	CS	Research into costing the nature of strategic interventions, report drafting
Environment control officer: Adaptation	Alinah Mthembu	DEA	Primary liaison between drafting team and DEA, link to other relevant government departments and sources of information
Director: Climate Change Adaptation	Sibonelo Mbanjwa	DEA	DEA oversight

APPENDIX 2: MEETING MINUTES - INITIAL MEETING

Inception meeting-costing of the NCCAS

Department of Environmental Affairs (DEA)

February 28, 2019, 10am-12pm

Attendees: Sibonelo Mbanjwa, Alinah Mthembu, David Burton, Olivia Mushamba, Katharine Vincent

1. Opening and welcome by Sibonelo
2. Introductions
3. Presentation of the NCCAS by Alinah (see also powerpoint presentation that Alinah will send)
 - NCCAS considers all six adaptation goals as outlined in the NDC and thus will also enable South Africa to achieve that commitment.
 - The process of developing the NCCAS began in 2014. The vision explicitly mentions the role of adaptation in contributing to a sustainable development path because it became clear during consultations that climate change was only seen as an environment issue.
 - Some sectors have adaptation plans already so in that sense the strategy is a bit behind - but the goal is to provide guidance where necessary and enhance sector efforts where they have started. It also provides an overarching framework strategy that enables consideration of cross-sector issues, e.g. trade offs .
 - There are more sectors mentioned in the strategy than the National Climate Change Response Policy. Reason for this is that energy was initially excluded from adaptation in the latter but more recently has been brought on board as they are adapting their operations to climate change.

Specific elaborations on Strategic Interventions

- SI2 - Has complementarities with the National Framework for Climate Services (which is at an advanced stage but not yet implemented) - aim with SI2 is to integrate that into the strategy
- SI3 - Originated from a recommendation made in the 3rd National Communication to the UNFCCC that a standard methodology that should be used.
- SI5 - Originated from the recognition in the annual climate change M&E report that the challenge was the application of the extensive research and what are the key agendas (this is research that ACIDI-UCT and Wits have been doing and in which Katharine has fed inputs).
- SI7 - Aim is to determine what needs to be developed in addition to horizontal and vertical integration. Also the National Climate Change Bill is under development so they need to know what legislation is needed.
- SI8 - Currently most climate change work that is done is unfunded/funded from international donors rather than the national fiscus - so the aim is to build a case to National Treasury ("so this is what we need and this is what it will cost").
- SI9 - DEA has developed an M&E system which is already online but NCCAS is looking just at the adaptation component (system also does mitigation).

Specific elaborations on Strategic Objectives

- SO7 - There is likely a need for a capacity development plan.

Activities in the NCCAS have been divided into three timeframes:

- Short 1-3 years
- Medium 4-10 years
- Long 10+ years

Next steps in the finalisation of the NCCAS

- Have done a socio-economic impact assessment
- Aiming for submission to Minister three months from now (for gazetting there has to be 60 day consultation prior to that)
- Costing of "strategic interventions" - the assignment to be undertaken by Cowater Sogema

4. Defining the scope of the assignment

Sibonelo and Alinah reiterated that the aim is to build a business case for climate change adaptation, and outline the cost implications.

Principles to follow:

- Realistic costing requirements taking into account the South African context
- Full transparency in costing calculations and assumptions
- Full costing approach
- Based on cost implications of the minimum required capacity to achieve the aim (for interventions where the costs come from staffing there is government staff costing information available – e.g. how many staff would be required to achieve x? Can then be used as a benchmark for provinces, knowing that they are starting from different points)
- Take into account what is already taking place – so provide full cost estimates but not, where possible, where existing funding is already contributing to that full cost (e.g. research funding need may be x, but the NRF is already contributing y, so the deficit that needs to be raised is z)
- Cost over different timeframes: some activities are once off, others are short, medium or long timeframe
- Provide annual costing breakdown of total, including inflation forecasts
- Current government costing is done differently so there are a variety of approaches (activity-based, results-based etc) BUT aim of the strategy is strategy level cost, not project-level specificity, so we should be guided by available information (e.g. staff costs, GEF Ecosystem-Based Adaptation project costing) but within best reasonable estimate

5. Next meetings

- David and Olivia with the DEA economists
- David and Olivia with Alinah (and Sibonelo) regularly to discuss progress

Action points

Alinah

1. Send SANAS report
2. Send NCCAS presentation
3. Follow up with sectors for costing information on strategies and plans
4. Follow up with GIZ regarding their funding for different projects
5. Follow up with Mokotazi to request adaptation costing that was used in the NDC

David, Olivia and Katharine

1. Submit draft methodology by Tuesday 5th March
2. Communicate any timeline changes by Friday 8th March

APPENDIX 3: LIST OF STAKEHOLDERS CONSULTED

IISD	Angie Daze
DEA	Alinah Mthembu, Sibonelo Mbanjwa
GIZ	Alexa Brown, Annelie Janz-Huber
Urban Earth	Margaret McKenzie
CSIR	Willemien Van Niekerk, Alize Le Roux
Government of Flanders	Katrien Vandepladutse



**environment, forestry
& fisheries**

Department:
Environment, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA