WESTERN CAPE CLIMATE CHANGE RESPONSE FRAMEWORK AND IMPLEMENTATION PLAN FOR THE AGRICULTURAL SECTOR - 2016
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INTRODUCTION

Smart Agriculture for Climate Resilience (SmartAgri), a two-year project by the Western Cape Department of Agriculture and the Western Cape Department of Environmental Affairs & Development Planning, was launched in August 2014. SmartAgri responds to the need for a practical and relevant climate change response plan specifically for the agricultural sector of the Western Cape Province. The University of Cape Town’s African Climate and Development Initiative (ACDI) and a consortium hereby deliver a Framework and Implementation Plan which will guide and support the creation of greater resilience to climate change for farmers, agri-businesses and other stakeholders across the province. The project provided real and practical information and support, and should inspire the sector in a manner which optimises decision-making and ensures sustainability at a local level.

Dr Ilse Trautmann & Goosain Isaacs
FOREWORD BY THE MECs

Extreme weather events are threatening food security and economic growth.

The National Government estimates that the countrywide drought has cost our economy in the region of R16 billion. Analysts report that consumers will pay nearly 30% more for a basket of staple foods this year.

Climate change modelling shows that annual temperatures are rising and the number of colder days will decrease. Droughts, floods and heat waves will become more regular.

These trends highlight the need for a co-ordinated response from government and the private sector to mitigate the impact of climate change.

This is why the Western Cape Government has partnered with the University of Cape Town’s African Climate and Development Initiative to develop a climate change response plan, SmartAgri.

Through this implementation plan, we are putting practical and innovative plans in place to respond to climate change.

The Western Cape is well-positioned to lead the way in this regard.

We’ve already introduced conservation agriculture, in partnership with the Agricultural Research Council. This approach involves minimum soil disturbance, maximum soil cover and crop rotation. As a result of this intervention, the province’s wheat farmers have seen increased production and profit, reduced soil erosion and improved water quality and soil health.

Through the Fruitlook system, we are using satellite technology to analyse crop growth and water use. The technology has helped farmers to improve their production, reduce costs and has raised awareness around water use.

We look forward to working together to build a sustainable agricultural sector that drives responsible and smart practices which respond to climate change.


Alan Winde: Western Cape Minister of Economic Opportunities, responsible for Agriculture, Economic Development and Tourism
EXECUTIVE SUMMARY

The Western Cape Government (WCG) recognises the important role of the agricultural sector in the provincial economy and for food security. The sector has considerable potential to drive economic growth, job creation and social development in rural areas. As South Africa becomes progressively more urban, the agricultural sector remains critical in supporting important rural-urban linkages. This is underscored in the National Development Plan (NDP) and the Provincial vision for economic and social development (OneCape-2040), as well as in other strategies and planning initiatives.

At the same time, the WCG has identified the agricultural sector as being particularly vulnerable to a changing climate. Climate projections for the region indicate continued warming of 1.5 °C to 3 °C across the whole province by 2050, with some moderation of increases along coastal areas. Very high temperatures and heat waves are expected to become more common. Winter rainfall is projected to decrease over most of the province by mid-century, although some models show a likelihood of increasing rainfall, particularly over the eastern regions. Longer dry spells and more frequent droughts are likely, as well as more frequent heavy rainfall and flooding, particularly in late spring and early summer. Other possible high-impact climate risks include changing frequencies and locations of frost and hail, unseasonal cold snaps, and strong wind.

This reality calls for urgent action in guiding and supporting the sector to adapt to the unavoidable impacts of climate change, and reduce its greenhouse gas emissions. A strategic and inclusive approach is required to build long-term resilience to climate change through “climate smart agriculture”\(^1\), and for placing the sector on a clear path towards the Green Economy\(^2\). This is why the Western Cape Government (the Department of Agriculture and the Department of Environmental Affairs and Development Planning) has partnered with the University of Cape Town’s African Climate and Development Initiative to develop the Western Cape Climate Change Response Framework and Implementation Plan for the Agricultural Sector, widely known as the SmartAgri Plan.

The SmartAgri Plan builds on the Western Cape Climate Change Response Strategy (WCCCRS 2014) and its Implementation Framework, specifically the focus area of “Food Security”. It also aligns closely with the current five-year Provincial Strategic Plan and the WCG: Agriculture Strategic Goals. One of the seven Goals is “Optimise the sustainable utilisation of water and land resources to increase climate smart agricultural production”. Owing to its position as a highly vulnerable sector, the agricultural sector is the first sector in the province to benefit from a sectoral climate change response framework and plan.

\(^1\) An approach to developing the technical, policy and investment conditions to achieve sustainable agricultural development for food security under climate change.

\(^2\) A sustainable development path based on addressing the interdependence between economic growth, social protection and natural ecosystems. It aims to achieve the double dividend of optimising green economic opportunities and enhancing our environmental performance.
The SmartAgri Plan suggests that the WCG: Agriculture and other sectoral institutions and stakeholders pursue to following vision: “Leading the Way to a Climate-Resilient Agricultural Future for the Western Cape”.

In pursuit of this vision, the SmartAgri Plan proposes the following four Strategic Focus Areas (SFAs):

1. Promote a climate-resilient low-carbon production system that is productive, competitive, equitable and ecologically sustainable across the value chain.
2. Strengthen effective climate disaster risk reduction and management for agriculture.
3. Strengthen monitoring, data and knowledge management and sharing, and lead strategic research for climate change and agriculture.
4. Ensure good co-operative governance and institutional planning for effective climate change response implementation for agriculture.

The SmartAgri Plan is strongly premised on collaborative and co-ordinated planning and action within and between the public and private sector, including National, Provincial and Local Government; organised agriculture and commodity organisations; individual farmers and local farmer organisations; agri-processors and agri-businesses in the value chain; labour and civil society; and research and academic institutions. The WCG is implementing a number of initiatives that contribute to building climate resilience in the agricultural sector – but these will need to be increased in scale, and integrated into a wider joined-up sectoral effort. Only when climate change considerations are integrated and institutionalised into the different arenas of decision-making that affect the sector, can the long term resilience of the sector to climate change be realised.

The SmartAgri Plan presents the “road map” for the agricultural sector to travel towards a more productive and sustainable future, despite the uncertainties around specific climate projections. The Plan is a joint effort that seeks to ensure the continued growth and competitiveness of the whole agricultural value chain. Through its focus on innovation, the Plan allows the climate change challenge to serve as the catalyst for realising a new socially and ecologically just and productive agricultural sector. Equipped with the SmartAgri Plan, the agricultural sector will develop the necessary resolution to find new operational models under growing resource constraints and rapidly-evolving global markets. This vision must also speak to the necessity of creating a resilient and diversified food system capable of tackling the issue of food and nutritional insecurity.

The transition of the agricultural sector may well, in some areas at least, need to take a “leapfrog” approach as opposed to incremental steps, particularly in aspects of social change and optimised resource use approaches. If embraced, such an approach could open agriculture to new technologies, investment opportunities and jobs in the green economy, that are all requirements for the building of climate-resilience. The SmartAgri Plan, as a whole, tries to balance such transformative change against more measured and incremental changes, so as to ensure continued stability and retention of livelihoods.
Some difficult policy trade-off decisions may be required in this process, for example around the allocation of scarce resources between human settlements, industry, agriculture and ecosystems. Climate change will influence these decision-making processes profoundly. As such, an integrated systems view that brings to the fore the interdependencies between food, energy, water, land and biodiversity is essential in this situation to optimise trade-offs and to avoid unnecessary policy clashes.

Farmers are known for their ability to manage climatic and other risks. There is some existing capacity in the agricultural sector of the Western Cape to adapt to the added stresses of climate change. Key assets within the sector include high levels of diversification of commodities and markets, a well-organised commercial sector that provides research, technical and marketing support, a very strong value chain, and excellent local research and training capacity. Local companies are already providing energy-saving low-carbon solutions to farms and agri-businesses. These assets and solutions must be harnessed to stimulate innovation and technology transfer for adaptation and mitigation. The SmartAgri Plan builds upon this capacity and will ensure that the existing response capacity is further developed to its greatest potential. Some of the proposed actions are already resourced and supported, whereas others challenge the public and private sectors and civil society to take leadership in raising the finances and capacity required for implementation.

Estimates of climate change impacts and associated costs elicit a ‘cascade of uncertainty’. Against this backdrop, decision support tools, such as the SmartAgri Plan, can benefit from the use of scenarios (conjectures of what might happen in the future). Climate scenarios suggest that changes in temperature and rainfall regime could be either gradual (defined as the “Trend” scenario in the SmartAgri Plan) or rapid (defined as the “Shock” scenario). In either case, they are likely to be combined with periodic extreme events of different spatial scale and impact, from short-term local flooding and hail events to longer duration regional droughts. The direction, rate and magnitude of some climatic changes remain more uncertain in some instances (e.g. shifting rainfall patterns) than in others (e.g. gradual annual warming). Thus, decisions and responses need to be robust in the face of different possible trajectories. The SmartAgri Plan thus focuses on the “no regrets” approach, where decisions made and actions taken now have benefits beyond building climate change resilience, and do not constrain potential future options to respond to climate change.

We are left with a choice between developing adaptive responses in a co-ordinated and anticipatory way that takes into account both climate and socio-economic threats (the “High Road”), and that builds the necessary resilience of the sector, and continuing to adapt in an unco-ordinated and unbalanced way (the “Low Road”). To achieve the “High Road” under considerable climate uncertainty will require the integration of climate change considerations into longer term resource and economic planning, with discussions around possible radical transformation.

An effective response to climate change demands an iterative, flexible and inclusive approach, with multiple feedbacks and adjustments where people, knowledge and joint learning shape the process and its outcomes. The SmartAgri Plan should, therefore, be re-assessed and revised from time to time, to ensure that it remains up-to-date, relevant, and implementable, and that the sector remains steadily on the “High Road”.
The SmartAgri Plan will be executed through the accompanying Implementation Plan, with progress towards climate resilience in the agricultural sector tracked using the M&E Plan.

In its current form, the SmartAgri Plan places considerable emphasis on action from government (National, Provincial and Local), commodity organisations and other organised agriculture and stakeholders, and on targeted research to fill major knowledge gaps that hinder more proactive action. Nevertheless, travelling on the “High Road” would require that farmers (of all incomes and experience levels), agribusinesses, non-governmental organisations and community-based organisations get involved at an early stage. The SmartAgri Plan provides ample opportunities to do so. Many activities focus on the farm level, whereas others take a catchment, landscape or value chain approach. Thus, the SmartAgri Plan speaks to the diversity of the sector and the opportunities that exist at all levels to make a real difference. It may be expected that future revisions will reflect an increasing uptake (and level) of responsibility from all stakeholders, with government creating a supporting environment.

The Implementation Plan is reinforced by six priority projects. These “Priority Projects” have been developed both to deliver climate resilience to agriculture over the short- to medium-term, and to begin the transformative process required for long-term resilience and sustainability at a time when the climate will have changed significantly. They are:

1. Conservation Agriculture for all commodities and farming systems
2. Restored ecological infrastructure for increased landscape productivity, socio-ecological resilience and soil carbon sequestration
3. Collaborative integrated catchment management for improved water security (quality and quantity) and job creation
4. Energy efficiency and renewable energy case studies to inspire the transition to low-carbon agriculture
5. Climate-proofing the growth of agri-processing in the Western Cape
6. Integrated knowledge system for climate smart agricultural extension.

The “Priority Projects” have been prioritised by a range of stakeholders and are supported by the current scientific understanding of urgent actions needed. A number of the projects will link with key provincial strategic projects over the next five years and can thus benefit from existing high levels of support and resourcing. Jointly these projects will accelerate the implementation of the SmartAgri Plan.

We warmly invite all interested parties to become active participants and to join forces in implementing SmartAgri, to help secure the future of the agricultural sector even as the climate changes.

“As never before in history, common destiny beckons us to seek a new beginning… Every individual, family, organisation, and community has a vital role to play…. Let ours be a time remembered for the awakening of a new reverence for life, the firm resolve to achieve sustainability, the quickening of the struggle for justice and peace, and the joyful celebration of life.”

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UITVOERENDE OPSOMMING

Die Regering van die Wes-Kaap (WKR) herken die belangrike rol van die landbousektor in die ekonomie van die provinsie en vir voedselsekerheid. Die sektor het beduidende potensiaal om ekonomiese groei, werkskepping en maatskaplike ontwikkeling in die landelike gebiede te verseker. Aangesien Suid-Afrika al hoe meer verstedelik, bly die landbousektor uiters belangrik om belangrike landelik/stedelike skakels te ondersteun. Dit word in die nasionale Ontwikkelingsplan (NOP) en die provinsie se visie vir ekonomiese en maatskaplike ontwikkeling (EenKaap-2040), en ander strategieë onderskryf.

Terselfdertyd het die WKR die landbousektor as uiters kwesbaar in 'n veranderende klimaat geïdentificeer. Klimaatsprojeksies vir die gebied dui 'n stygende verhitting van 1.5 °C tot 3 °C oor die hele provinsie teen 2050, met matiger stygings in kusgebiede. Daar word verwag dat baie hoë temperature en hittegolwe meer algemeen sal voorkom. Voorts word voorspel dat winterreënval oor die grootste deel van die provinsie teen die middel van die eeu sal afneem, hoewel sekere modelle stygende reënval oor verval die oostelike gebiede voorspel. Langer tye van droogtes en meer gereelde droogtes, asook meer gereelle swaar reënneerslae en vloede, veral in die laat lente en vroeë somer word voorspel. Ander moontlike hoë-impak-klimaatriisiko’s sluit 'n veranderlike verspreiding en voorkoms van ryp, buite-seisoenale koue tydperke, hael en sterk wind in.

Daar moet dringend opgetree word om die sektor te lei en te ondersteun om by die onvermydelike impak van klimaatsverandering aan te pas en sy kweekhuisgassykstelsel te verander. 'n Strategiese en inklusiewe benadering moet gevolg word om deur “klimaatslim landbou” veerkragte teen klimaatsverandering te bou en die sektor op 'n stuwende pad na Groen Ekonomie te plaas. 4 Dis waarom die Wes-Kaapse regering (Departement van Landbou en Departement van Omgewingsake en Ontwikkelingsbeplanning) met die Universiteit van Kaapstad se Afrika-Klimaat-en Ontwikkelingsinisiatief saamgespan het om die Wes-Kaapse Reaksieraamwerk vir Klimaatsverandering en Implementeringsplan vir die Landbousektor, beter bekend as SmartAgri-plan, te ontwikkel.

Die SmartAgri-plan is op die Reaksiestrategie vir Wes-Kaapse Klimaatsveranderings (WKKVRS 2014) en die Implementeringsraamwerk daarvan, en meer spesifiek die fokusarea ‘Voedselsekerheid’ gebaseer. Dit bring ook die huidige Provinsiale Strategiese Plan en die WKR se Landbou-strategiese doelstellings in lyn met mekaar. Een van die sewe doelstellings is “Maksimaliseer die volhoubare gebruik van water en grondbonne om klimaatslim landbouproduksie te vermeerder”. Die landbousektor is die eerste sektor wat op grond van sy posisie as ’n hoogs kwesbare sektor voordeel uit ’n sektorale reaksieraamwerk en -plan gaan trek.

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4 'n Benadering om die tegniese, beleids- en beleggingstoestande te ontwikkel om volhoubare landbou-ontwikkeling vir voedselsekerheid onder klimaatsverandering te bereik.
5 'n Volhoubare ontwikkelingspad gegrond op die aanspreek van interafhanklikheid tussen ekonomiese groei, maatskaplike beskerming en natuurlike ekosistems. Dis daarop gemik om die dubbele dividend van die maksimalisering van groen ekonomiese geleenthede en die verbetering van ons omgewingsprestaties te bereik.
Die SmartAgri-plan stel voor dat die WKR: Landbou en ander sektorale instellings en belanghebbendes die visie: “Lei die weg na ’n klimaatsveerkragtige landboutoekoms vir die Wes-Kaap” nastreef.

In navolging van hierdie visie beoog die SmartAgri-plan die volgende vier Strategiese Fokusareas:

1. Bevorder ’n klimaatveerkragtige, laekoolstof-produksiestelsel wat produktief, mededingend, billik en ekologies volhoubaar oor die waardeketting is.
2. Verstewig doeltreffende klimaatramp-risikovermindering en -bestuur vir die landbou.
3. Verstewig monitering, die bestuur en deel van data en kennis, en lei strategiese navorsing vir klimaatsverandering en die landbou.
4. Verseker goeie samewerkende regering en institutionele beplanning vir die doeltreffende implementering van klimaatsveranderingsreaksie vir die landbou.

Die SmartAgri-plan is stewig gegrond in samewerkende en gekoördineerde beplanning en optrede in en tussen die openbare en privaat-sektor, insluitend die nasionale, provinsiale en plaaslike regering; georganiseerde landbou en kommoditeitsorganisasies; individuele boere en plaaslike boereverenigings; agri-prosesseerders en -besighede in die waardeketting; arbeids- en die openbare gemeenskap; en navorsings- en akademiese instellings. Die WKR is besig om ’n aantal inisiatiewe te implementeer wat tot die bou van klimaatveerkragtigheid in die landbousektor sal bydra – maar hierdie inisiatiewe sal in skaal moet toeneem en in ’n groter gedeelde sektorpoging inpas. Slegs wanneer klimaatsveranderingsoorwegings geïntegreer en geïnstitusionaliseer is in die verskillende arenas van besluitneming wat die sektor beïnvloed kan die langtermyn-veerkragtigheid tot klimaatsverandering gerealiseer word.

Die SmartAgri-plan bied die “padkaart” vir die einddoel waarheen die landbou moet streef na ’n meer produktiewe en volhoubare toekoms, ondanks die onsekerhede rakende spesifieke klimaatvooruitskouings. Dis ’n gesamentlike poging wat voortgesette groei en mededingendheid van die hele landbouwaardeketting nastreef. Deur die fokus op vernuwing, word uitdaging van die klimaatsverandering deur die katalisator vir die realisering van ’n nuwe sosiale en ekologiese billike en produktiewe landbousektor. Met die SmartAgri-plan as toerusting sal die landbousektor die nodige oplossings ontwikkel om nuwe operasionele modelle te midde van toenemend beperkte hulpmiddels en snel-groeiende globale marke te vind. Hierdie visie moet ook die noodsaaklikheid van die skep van ’n veerkragtige en gediversifiseerde voedselstelsel takel wat die kwessie van voedsel- en voedingsekuriteit kan aanpak.

Die oorgang van die landbousektor sal dalk, ten minste op sekere terreine, ’n benadering van spronge eerder as aanwas-stappe moet volg, veral ten opsigte van sosiale verandering en die maksimalisering van die benadering tot hulpmongebrauk. Met so ’n benadering kan nuwe tegnologieë, beleggingsgeleenthede en werk in die groen ekonomie, wat almal nodig is om klimaat-veerkragtigheid te bou, vir die landbou oogmaak word. Die SmartAgri-plan in die geheel probeer sulke radikale veranderinge met meer afgemete en aanwasveranderinge balanseer om sodoende
voortgesette stabiliteit en die behoud van lewensonderhoud te verseker. Enkele moeilike beleidskompromisbesluite kan in hierdie proses vereis word, byvoorbeeld ten opsigte van die toewysing van skaars hulpbronne tussen menslike nedersettings, nywerhede, die landbou en ekostelsels. Klimaatsverandering sal hierdie besluitnemings prosesse fundamenteel beïnvloed. As sodanig is ‘n siening van geïntegreerde stelsels wat die interafhanklikheid tussen die biodiversiteit van voedsel, energie, water en grond in hierdie situasie op die voorgenoemde plaas, wesenlik belangrik, om kompromieë te maksimaliseer en onnodige botsende beleide te voorkom.

Boere is daarvoor bekend dat hulle die vermoë het om klimaatsverandering en ander risiko’s te bestuur. Daar is bestaande kapasiteit in die landbousektor van die Wes-Kaapse stelsel om by die ekstra spanning van klimaatsverandering aan te pas. Sleutelbates in die sektor sluit in: hoë vlakke van diversifisering van kommoditeite en markte; ’n goed georganiseerde handelsektor wat navorsing verskaf; tegnieke en marksteun; ’n baie sterk waardeketting en uitstekende plaaslike navorsings-en opleidingskapasiteit. Plaaslike maatskappye voorsien reeds energiebesparende laeoolstofoplossings aan plase en landbou-onderneemings. Hierdie bates en oplossings moet bestuur word om vernuwing en die oordra van tegnologie vir klimaatsaanpassing en -versagting te stimuleer. Die SmartAgri-plan bou op hierdie kapasiteit en sal verseker dat die bestaande reaksievermoë verder tot sy beste potensiaal ontwikkel word. Sommige van die voorgestelde optredes word alreeds gebruik en ondersteun, terwyl ander die publiek, die privaat-sektor en burgerlike samelewing uitdaag om leiding te neem om die nodige finansies en vermoë in te samel wat vir die implementering van hierdie optredes vereis word.

Skattings van die impak van klimaatsverandering en gepaardgaande koste bring ’n ‘kaskade van onsekerheid’ mee. Teen hierdie agtergrond kan hulpmiddels om besluite te steun, soos die SmartAgri-plan, baat by die gebruik van scenario’s (vermoedens van wat in die toekoms kan gebeur). Klimaatscenario’s toon aan dat verandering in temperatuur- en reënvalomvang geleidelik kan wees (in die SmartAgri-plan word dit die ‘Neiging’-scenario genoem) of vinnig kan wees (die ‘Skok’-scenario in die plan). In beide gevalle gaan hulle waarskynlik saamval met periodieke uiterste voorvalle van verschillende ruimtelike skaal en impak, van korttermyn- plaaslike vloede en hael tot langduriger streekdroogtes. Die rigting, voorkoms en omvang van sekere klimaatsveranderinge is in sekere gevallen meer onseker (bv. verskuiwende reënvalpatrone) as in ander (bv. geleidelike jaarlikse verhitting). Besluite en reaksies moet dus kragdagig wees in die lig van die verschillende moonlike bane. Die SmartAgri-plan fokus dus op die “nie spyt”-benadering, waar besluite en optredes wat nou geneem word voordele verder as die bou van veerkragtigheid teenoor klimaatsverandering het, en nie die potensiële opsies om in die toekoms op klimaatsverandering te reageer, belemmer nie.

Ons word dus gelaat met die keuse om aanpassingsresponse op ’n gekoördineerde en voorsienbare manier te neem wat die klimaats- en sosio-ekonomiese bedreigings (“Hoofpad”) in ag neem, en wat die nodige veerkragtigheid van dié sektor bou, of ons kan voortgaan om ongekoördineer en ongebalanseer aan te pas (“Stofpad”). Om die “Hoofpad” onder enige klimaatsonsekerheid te bereik sal die integrasie van klimaatsveranderingsoorwegings in langer-termyn- hulpmiddel en ekonomies
beplanning verg, met gesprekke oor moontlike radikale transformasie.

'n Doeltreffende respons tot klimaatsverandering vereis 'n herhalende, buigsame en inklusiewe benadering, met veelvuldige terugvoer en aanpassings, waar mense, kennis en gesamentlike leer die proses en die uitkomste daarvan bepaal. Die SmartAgri-plan moet daarom van tyd tot tyd herevalueer en hersien word om te verseker dat dit op datum, relevant en toepasbaar is en dat die sektor op koers bly om die "Hoofpad"-scenario te bereik.

Die SmartAgri-plan sal deur die gepaardgaande Implementeringsplan uitgevoer word, en die M&E-plan sal gebruik word om vordering ten opsigte van klimaatveerkragtigheid in die landbousektor te monitor.

In sy huidige vorm plaas die SmartAgri-plan sterk klem op aksie vanuit (nasionale, provinsiale en plaaslike) regeringsgeledere, kommoditeitsorganisasies en ander georganiseerde landbou en ander belanghebbendes, en op geteikende navorsing om daardeur groot kennisgappinge te vul wat meer proaktiewe optrede verhinder. Nietemin vereis hierdie reis op die "hoofpad" dat boere (van alle inkomste- en ervaringsgroepe), agri-besighede, nie-regeringsorganisasies en gemeenskapsgebaseerde organisasies reeds in 'n vroeë stadium betrokke raak. Die SmartAgri-plan verskaf genoeg geleenthede om so te maak. Baie aktiwiteite fokus op die plaasvlak, terwyl ander 'n opvang-, landskap- of waardeketting-benadering volg. Die SmartAgri-plan spreek dus die diversiteit van die sektor aan, asook die geleenthede wat op verskillende skale bestaan, om 'n werklike verskil te maak. Daar kan verwag word dat toekomstige hersienings op 'n toenemende betrokkenheid en vlak van verantwoordelikheid van alle belanghebbendes sal weerspieël, met die regering wat 'n ondersteunende omgewing skep.

Die Implementeringsplan word deur ses prioriteitsprojekte versterk. Hierdie 'Prioriteitsprojekte' is ontwikkel om op die kort en medium termyn klimaatveerkragtigheid vir die landbou te lever en om die transformatiewe proses te begin wat vir langtermyn-veerkragtigheid en volhoubaarheid benodig word in 'n tyd dat die klimaat beduidend verander het. Dit is die volgende:

1. Bewaringslandbou vir alle kommodeite en boerderystelsels
2. Herstelde en gerehabiliteerde ekologiese infrastruktuur vir beter landskapproduktiwiteit, sosio-ekologiese veerkragtigheid en koolstofsekwestrisie
3. Samewerkende geïntegreerde opvanggebiedsbestuur vir verbeterde watersekerheid (gehalte en hoeveelheid) en werkskepping
4. Energiedoeltreffende en hernubare energienavorsing om die oorgang na lae koolstof-landbou aan te moedig
5. Klimaatsbestande groei van landbouprossersing in die Wes-Kaap

Die 'Prioriteitsprojekte' is deur 'n wye groep belanghebbendes geëxploiteer en word ondersteun deur huidige wetenskaplike begrip van watter dringende optrede nodig is. 'n Aantal van die projekte skakel met sleutel-provinsiale strategieprojekte oor die volgende vyf jaar en kan dus voordeel trek uit die huidige hoë vlakke van steun en
hulpmiddels. Hierdie projekte sal gesamentlik die implementering van die SmartAgri-plan versnel.

Ons nooi alle belangstellende partye hartlik om aktiewe deelnemers te word en kragte saam te snoer om SmartAgri te implementeer, om so die toekoms van die landbousektor selfs te midde van klimaatsverandering te verseker.

“Soos nooit voorheen in die geskiedenis nie, roep ons gemeenskaplike eindbestemming ons om 'n nuwe begin te soek ... Elke individu, gesin, organisasie en gemeenskap het 'n lewensbelangrike rol te speel ... Kom ons maak dat ons onthou sal word vir die ontwaking van 'n nuwe eerbied vir die lewe, 'n vaste voorneme om volhoubaarheid te bereik, die versnelling van die stryd om geregtigheid en vrede, en die vreugdevolle viering van die lewe.”

---

URhulumente weNtshona Koloni (iWCG) uyithathela ingqalelo indima ebalulekileyo yecandelo lezolimo kuqoqosho lwephondo nakubonelelo ngokufya. Eli candelo linawo amandla okukhulisa uqoqosho, ukudala imisebenzi nophuhlilo lwezentlalao kwimimidlaesa esemaphandleni. Nzangakubeka umzantsi Afrika uya uba yimimidla ezidiophutha neelokishi, icandelo lezolimo libaluleke kakhulu ekuxhaseni uthungenwano lwamaphandle needolopho. Oku kugxininisiwe kwNational Development Plan (NDP) nombono wePhondo wophuhlilo loqoqosho nolwentlalalo (OneCape-2040), kunye nezinye izicwanga kunye nampambo ocwangciso.


7 Inkqubo yokuvulelisa imeko zobugcisa, ezomgazaqonqubo nezotyalomali ukuphumeza uqoqosho lwesozi lwezolimo oluzinileyo lobonelelo ngokufya kwimando yokuphumeza ukuphiza kwimozulu.

8 Inkqubo lophuhlilo elizinileyo lokujangana noxhomekeko oluphakathi lokuthula koqoqosho, ukhuseleko lwesenqalo nezinto ezisebenzisanyo kwinkulala. Injongo yayo intlangothi-mbini, kokusebenzisa onke amathuba oqoqosho lolondolo lwendalo ngelimi lixa kukhulisa ukusebenza kokuswangongileyo.
I-SmartAgri Plan iza nomkhomba-ndlela wokuba amaziko ezolozi nomanye achaphazelekayo eWCG alandelele umbono: “oKukukhokela iNdlela kwiKamva leZolimo eliNgachatshazelwa yiMozulu eNTshona Koloni”.

Ukulandela lo mbono, i-SmartAgri Plan iphakamisela ukuba kujolise kule Mimandla yoGxiniso yeZicwangciso Mine (SFA):

1. Ukuphakamisa inkqubo yoveliso exhathisayo yimozulu nenekhabhoni ephantsi eneziqhambonisa ezibonakalayo, enokukwazi ukukhuphisana, enobulungisa nezinzileyo kuyo yonke indalo
2. Kuqiniswe ukucuthwa kwemingcipheko yentshabalalo yemozulu neyolawulo lwenzolimo
3. Kuqiniswe ukubekwa kweliso, ulawulo lwedatha nololwazi notlawelwano, nokukhokela uphando oluwcwangcisiweyo lokutshintsha kwemozulu nolimo
4. Ukuqinisekisa ulawulo lwentsebenziswano olulungileyo neziczangciso zeziko zokujongana nokutshintsha kwemozulu ngendlela eneziphumo ezibonakalayo ukulungiselela ezolozi

I-SmartAgri Plan isekelwe ngamandla kuqangciso lwentsebenziswano namanyathelo acwangcisiweyo phakathi korhulumelapho namashishini, kubandakanywa uRhulumente weSizwe, owePhone noweMimandla; abezolimo abayimibutho nemibutho yeekhomo dithi; amafama azimelelo nemibutho yamafama yeengingqi; iiikampani ezipseswa iimvelo ezimozulu namashishini ezilozi asibonakalayo; abasebenzi nabahlali; kuye namaziko ophando kuye neeyunisethi. I-WCG imiselele amaphakathi olimiswe ezinobulungisa, ezintsha, ivumela ukuba umngeni wotshintsha lwemozulu ube sisixhobo sokuzisa icandelo elithi lezolimo elikhathalele imiba yezintsha, eyezokusingqongqo eyenobulungisa kanywa kusafuneka kodwa kusafuneka zongeziwe, yaye zihlanganiswe namanye amaphakathi olimiswe ephando kuyikwillisa kwizikhokelo dhulukileyo.


oku kwenza ukuba icandelo likwazi ukumelana nezi meko, okanye singaqhubeka simana sitshintsha ngkwemeko esijongene nayo ngendlela engacwangcisiswanga nengalunqelelelaniyo ("Isisombululo seXeshana"). Ukuphumeza ukuza "neSisombululo soKwenene" kwilimuko ezingaqinisekanga zemozulu kuza kufuna ukuhlanganiswa kweengqwalasela zotshintsho lwemozulu ukuze zibe zizibonelelo zexesha elide nezicwangciso zozaqosho apho kuya kuthi kubanjwe iingxoxo ngeenguqu ezimandla.

Indlela eza kusebenza ngempumelelo yokujongana nezidingo zokutshintsha kwemozulu kufuneka icace, ilungele imeko yaye ibandakanye abachaphazelekayo, kumane kunikwa ingxelo yaye kumane kuhlenga-hlengiswa apho abantu, ulwazi nokufuna kuya kunceda ukuba inxaqubo ibe nomkhombandlela neziphumo zayo. I-SmartAgri Plan ngoko ke, kufuneka imane ivavanywa, iphononongwa amaxesha ngamaxesha ukuchinisekisa ukuba ihlala ihambelana namaxesha yaye iyamiseleka yaye icandelo eli iihlala ilungele ukuphumeza "ISisombululo soKwenene".

I-SmartAgri Plan iya kuphunyezwa ngeSicwangciso soMiselo nenkqubela yokumelana nemozulu etshintshayo kwicandelo lezolimo eya kulandlelelwa kusetyenziswa iSicwangciso seM&E.

Kwimo ikuyo ngoku, i-SmartAgri Plan igxininisa ngokumandla kwintshukumo kahrulumente (weSizwe, wePhondo noweMimandla), imibutho yehekhumodithi; nemibutho yamafama kunye nabo bachaphazelekayo, nakuphando olungqalileyo ukuzu nolwazi olushotayo olungqanda ukuba kube akuthathwa manyathelo abambekayo. Nokxu kunjalo, ukundalenda "ISisombululo soKwenene" kufunisa ukuba amafama (afumana imivuzo eyahlukileyo kunye nanamava ahlukileyo), amashishini ezolimo, imibutho engenzi nzuzo nemibutho yasekuhlaleni abandakanye ye kwasekuqalaleni. I-SmartAgri Plan ibonelela ngamathuba amaninzi okwenza oko. Imisebenzi emininzi igxininisa kwizinga leefama, ngeli lixa ezinye izicwangciso zilandela inxaqubo yokujonga oovimba, imihlaba okanye abo babandakanyeke kwicandelo lilonke. I-SmartAgri Plan ngoko ke isebenza ngecandelo ngokwahlula kwalo kunye namathuba akhoyo kumanqwanqwa onke enza umahluko wokwenene. Inokulindeleka into yokuba uphononongwa lwexesha elizayo luya kubonisa ukubandakanye nokunyuka kwezinga lokwokweli kwalo bonke abachaphazelekayo, apho uhulumemente aya kudala imeko-bume yenxaso.

I-Sicwangciso soMiselo sibethelelwbenzi ziiprojekthi zeenkaqubo eziphambili ezithandathu. Ezi “Projekthi ziPhambili” ziphuhliselwe ukuba zenze icandelo lolimo ukuba likwazi ukumelana notshintsho lwemozulu kwixesha elifutshane ukuya kwixesha elide nokuqala inxaqubo yotshintsho yexesha elide yokumelana nemozulu nozinzo xa imozulu itshintshe kakhulu. Ezi projekthi zezi:

1. Ulimo oluLondoloza iNdalo lwazo zonke ikhomodiithi neenqaqubo zokufama
2. Izibonelelo zendalo ezibuyiselweyo nezivuseleleweyo ukulungiselela imveliso yomhlaba eyongezelelekileyo, ukuxhathisa kwendalo nokupheliswa kwekhabhonomi emhlabeni
3. Ulawulo iWeendawo ezingoovimba bamanzi ezilawulwe ngentsebenziSwano ukuphucula ubukho bamanzi (umgangatho nobungakanani) nokudalwa kwemisebenzi
4. Ukusebenza kwe-eneji nophando lwe-eneji enokuhlaziywa ukukhuthaza ukutshintshela kulimo olunekhabhoni encinci
5. Ukukhusela utyalomali kwifuthe lemozulu ukulungiselela ukukhula kweemveliso zolimo eNtshona Koloni
6. Inkqubo yoLwazi eHlanganisiweyo yokunabisa ulimo ngendlela engachatshazelwa yimozulu.

“LiProjekthi eziPhambili” zibekwe phambili ngabantu abachaphazelekayo abahlukileyo yaye zixhasa yingaqo yobunzululwazi ekhoyo ngoku yamanyathelo angxamisekileyo adingekayo. LiProjekthi eziliqela zinoqhagamshelwano neeprojekthi eziphambili eziwangcisiweyo zephondo zeminayaka emihlanu elandelayo, ngoko ke, zingazuza kumazinga aphezulu enkxaso nawezibonelelo. Ngokudibeneyo, ezi projekthi ziya kukhawulezisa umiselo lweSmartAgri Plan.

Simema ngobubele obukhulu, onke amaqela anomdla ukuba athathe inxaxheba yaye asebenzisane nathi ekumiseleni lSmartAgri, ukukhusela ikamva lecandelo lezolimo eliya lililhe nokuba sele kutshintsha imozulu.

“Ngendlela ekungazange kwenzeka ngayo ngaphambili kwimbali, indawo esiya kuyo efanayo isikhweba ukuba sikhangele iqalo elitsha… Wonke umntu, usapho, umbutho noluntu lonke, sonke sinendima ebalulekileyo emasiydiale…. Elethu ixesha malikhunjulwe njengelo lavusa ithemba elitsha lobomi, apho sathatha isiqibo esuluqilima sokuphumeza uzinzolo, saze sakhawulezisa idabi lobulungisa noxolo, nokubhiyozela ubomi.” ⁹

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<tr>
<td>ACDI</td>
<td>African Climate &amp; Development Initiative, UCT</td>
</tr>
<tr>
<td>ACZ</td>
<td>Agro-Climatic Zone</td>
</tr>
<tr>
<td>AFASA</td>
<td>African Farmers' Association of South Africa</td>
</tr>
<tr>
<td>AgriSETA</td>
<td>Agricultural Sector Education and Training Authority</td>
</tr>
<tr>
<td>ARC</td>
<td>Agricultural Research Council</td>
</tr>
<tr>
<td>BFAP</td>
<td>Bureau for Agricultural Policy</td>
</tr>
<tr>
<td>BGCMCA</td>
<td>Breede-Gouritz Catchment Management Agency</td>
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<tr>
<td>BRIP</td>
<td>Berg River Improvement Plan</td>
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<tr>
<td>CA</td>
<td>Conservation Agriculture</td>
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<td>CARA</td>
<td>Conservation of Agricultural Resources Act</td>
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<td>CAWC</td>
<td>Conservation Agriculture Western Cape</td>
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<tr>
<td>CBO</td>
<td>Community-based Organisation</td>
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<td>CCC</td>
<td>Confronting Climate Change project</td>
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<td>CDC</td>
<td>Centre for Disease Control</td>
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<tr>
<td>CMA</td>
<td>Catchment Management Agency</td>
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<td>CO2</td>
<td>Carbon dioxide</td>
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<td>City of Cape Town</td>
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<tr>
<td>CPAC</td>
<td>Commodity Project Allocation Committee</td>
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<td>CPUT</td>
<td>Cape Peninsula University of Technology</td>
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<tr>
<td>CRDP</td>
<td>Comprehensive Rural Development Programme</td>
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<td>CSA</td>
<td>Climate Smart Agriculture</td>
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<td>CSAG</td>
<td>Climate Systems Analysis Group, UCT</td>
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<td>CSIR</td>
<td>Council for Scientific and Industrial Research</td>
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<td>DAFF</td>
<td>National Department of Agriculture Forestry and Fisheries</td>
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<td>DEA EPWP</td>
<td>DEA Extended Public Works Programme</td>
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<td>National Department of International Relations and Cooperation</td>
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<td>DRM</td>
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<td>DRR&amp;M</td>
<td>Disaster Risk Reduction &amp; Management</td>
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<td>DSG</td>
<td>Departmental Strategic Goal</td>
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<td>DST</td>
<td>National Department of Science and Technology</td>
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<td>EATI</td>
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<td>EMF</td>
<td>Environmental Management Framework</td>
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<td>EWS</td>
<td>Early Warning System</td>
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<td>Further Education and Training</td>
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<td>IPCC</td>
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<td>Description</td>
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<td>IPW</td>
<td>Integrated Production of Wine</td>
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<td>RTDS</td>
<td>Research and Technology Development Services</td>
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<td>SAEON</td>
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<td>Strategic Outcomes-Orientated Goal (of WCG: EADP)</td>
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<td>SU</td>
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<td>WCG: Health</td>
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<td>WCH: Local Government</td>
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<td>WCG: Office of Premier</td>
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<tr>
<td>WCG: Social Development</td>
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<td>WWF-SA</td>
<td>World Wide Fund for Nature South Africa</td>
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GLOSSARY

**Adaptation:** The process of adjustment to the actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities. In natural systems, human intervention may facilitate adjustment to the expected climate and its effects.

**Agri-Outlook:** An online tool that provides monthly reports about climate and weather conditions in the Western Cape. The tool also provides the reader with future monthly weather predictions, from the National Weather Service.

**AgriPark:** A networked innovation system of agro-production, processing, logistics, marketing and training and extension services, located in district municipalities. As a network it enables a market-driven combination and integration of various agricultural activities and rural transformation services.

**Agro-climatic zones:** Spatial zones identified for the Western Cape through the aggregation of the more than 80 Relatively Homogeneous Farming Areas (RHFAs) based on climatic, vegetative and productive attributes. They define the agricultural landscape of the province.

**Agro-ecological principles:** The application of ecological science to agro-ecosystems when seeking to improve agricultural systems by mimicking natural processes, thus enhancing beneficial biological interactions and synergies.

**Biofuel:** A fuel, generally in liquid form, developed from organic matter or combustible oils produced by living or recently living plants. Examples of biofuel include alcohol (bioethanol) and soybean oil.

**Carbon footprint:** Measure of the exclusive total amount of emissions of carbon dioxide (CO\(_2\)) emissions that is directly and indirectly caused by an activity or is accumulated over the life stages of a product.

**Carbon tax:** A levy on the carbon content of fossil fuels. Because virtually all of the carbon in fossil fuels is ultimately emitted as carbon dioxide (CO\(_2\)), a carbon tax is equivalent to an emissions tax on CO\(_2\) emissions.

**Climate scenario:** A plausible and often simplified representation of the future climate, based on an internally consistent set of climatological relationships that has been constructed for explicit use in investigating the potential consequences of anthropogenic climate change, often serving as input to impact models. Climate projections often serve as the raw material for constructing climate scenarios, but climate scenarios usually require additional information, such as the observed current climate.

**Climate Smart Agriculture:** An approach to developing the technical, policy, and investment conditions needed to achieve sustainable agricultural development for food security under climate change. The magnitude, immediacy and broad scope of the effects of climate change on agricultural systems create a compelling need to ensure comprehensive integration of these effects into national agricultural planning, investments and programs. The CSA approach is designed to identify and operationalise sustainable agricultural development within the explicit parameters of climate change.

**Commercial farm:** A farm which is large enough (generally >5ha) to provide a main activity for the farmer and a level of income sufficient to support his or her family. Commercial farms are classified as small, medium or large. In practical terms, in order to be classified as commercial, farm income must exceed a minimum economic threshold. Commercial farmers produce crops and livestock intended for widespread distribution to wholesale or retail outlets (e.g. supermarkets), and any non-food crops. Commercial agriculture rarely includes crops grown for household consumption.

**Commodity organisation:** Commodity organisations bring together a wide spectrum of interest groups
related to a particular commodity or sector (such as horticulture) in a particular country, whether the commodity is for export, for the domestic market or for both. E.g. HORTGRO, Vinpro, GrainSA, etc.

**Conservation agriculture:** An approach to managing agro-ecosystems for improved and sustained productivity, increased profits and food security while preserving and enhancing the ecological and agricultural resource base. CA is characterised by three linked principles, namely: (i) continuous minimum mechanical soil disturbance, (ii) permanent organic soil cover, and (iii) diversification of crop species grown in sequences and/or associations, including legumes.

**Disaster:** Severe alterations in the normal functioning of a community or society caused by hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects; marked by the need for an immediate emergency response to satisfy critical human needs and the possible need for external support for recovery.

**Disaster risk management:** Processes for designing, implementing, and evaluating strategies, policies, and measures to (i) improve the understanding of disaster risk, (ii) foster disaster risk reduction and transfer, and (iii) promote continuous improvement in disaster preparedness, response, and recovery practices, with the explicit purpose of increasing human security, well-being, quality of life, and sustainable development.

**Disaster risk reduction:** Denotes both a policy goal or objective, and the strategic and instrumental measures employed for anticipating future disaster risk; reducing existing exposure, hazard, or vulnerability; and improving resilience.

**Early warning system:** The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities, and organisations threatened by a hazard to prepare to act promptly and appropriately to reduce the possibility of harm or loss.

**Ecological infrastructure:** Naturally functioning ecosystems that deliver valuable services to people, such as healthy mountain catchments, rivers, wetlands, coastal dunes, and nodes and corridors of natural habitat, which together form a network of interconnected structural elements in the landscape. Ecological infrastructure is therefore the asset, or stock, from which a range of valuable services flow.

**Ecosystem services:** Ecological processes or functions having monetary or non-monetary value to individuals or society at large. These are frequently classified as (i) supporting services such as productivity or biodiversity maintenance, (ii) provisioning services such as food, fibre, or fish, (iii) regulating services such as climate regulation or carbon sequestration, and (iv) cultural services such as tourism or spiritual and aesthetic appreciation.

**Environmental Management Framework:** A study of the biophysical and socio-cultural systems of a geographically defined area to reveal where specific land uses may best be practiced and to offer performance standards for maintaining appropriate use of such land.

**Equitable:** Dealing fairly and equally with all concerned.

**Farmer organisations:** Self-organised local groups of farmers who meet regularly or on occasion e.g. study groups.

**Food security:** A state that prevails when people have secure access to sufficient amounts of safe and nutritious food for normal growth, development, and an active and healthy life.

**Food system:** A food system includes the suite of activities and actors in the food chain (i.e., producing, processing and packaging, storing and transporting, trading and retailing, and preparing and consuming food); and the outcome of these activities relating to the three components underpinning food security (i.e., access to food, utilisation of food, and food availability), all of which need to be stable over time. Food security is therefore underpinned by food systems, and is an
emergent property of the behaviour of the whole food system. Food insecurity arises when any aspect of the food system is stressed.

**Green Economy:** A sustainable development path based on addressing the interdependence between economic growth, social protection and the natural ecosystem. It aims to achieve the double dividend of optimising green economic opportunities and enhancing our environmental performance.

**Greenhouse Gases:** Those gaseous constituents of the atmosphere that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth’s surface, the atmosphere, and clouds.

**Information (web-based) portal:** A specially designed web site that brings information and knowledge together from diverse sources in a uniform way, and makes them available to a variety of users.

**Input suppliers:** Suppliers of manufactured inputs used by production agriculture, e.g. fertiliser and agro-chemical companies, farm equipment suppliers, seed companies, nurseries, suppliers of animal drugs and animal feed.

**Invasive alien species:** A species introduced outside its natural past or present distribution (i.e., an alien species) that becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity.

**Knowledge management:** The process of capturing, developing, sharing, and effectively using the collective knowledge of a group of actors to achieve defined goals. It is about ensuring that people have the knowledge they need, where they need it, when they need it – the right knowledge, in the right place, at the right time.

**Land use and Land use change:** Land use refers to the total of arrangements, activities, and inputs (a set of human actions) undertaken in a certain land cover type. The term land use is also used in the sense of the social and economic purposes for which land is managed (e.g., grazing, timber extraction, and conservation). Land use change refers to a change in the use or management of land by humans, which may lead to a change in land cover.

**Local knowledge:** The knowledge people in a given community have developed over time, and continue to develop. It is based on experience, often tested over centuries of use, and adapted to the local culture and environment.

**Low-carbon economy/development:** Economy/development with minimal output of greenhouse gas emissions.

**Maladaptive actions (or maladaptation):** Actions that may lead to increased risk of adverse climate-related outcomes, increased vulnerability to climate change, or diminished welfare, now or in the future.

**Mitigation (of climate change):** A human intervention to reduce the sources or enhance the sinks of greenhouse gases.

**Monitoring and Evaluation (M&E):** A process that helps improve performance and achieve results. Its goal is to improve current and future management of outputs, outcomes and impact. It is mainly used to assess the performance of projects, institutions and programmes set up by governments, international organisations and NGOs. It establishes links between past, present and future actions.

**Monitoring:** To be aware of and continuously measure and assess the state of a system and any changes that may occur over time.
The Mont Fleur Scenario Exercise: An experiment in “future-forging” that brought together 25 South Africans over four intense, informal weekends at the Mont Fleur Conference Centre near Stellenbosch. This group discussed what was happening in South Africa, what might happen, and what, in the light of these possible futures, could be done.

Organisational learning: The process of creating, retaining, and transferring knowledge within an organisation. An organisation improves over time as it gains experience. From this experience, it is able to create knowledge.

Organised agriculture: Agricultural organisations or federations of agricultural organisations, which can include commodity organisations, and which aim to support the development of the agricultural sector and their members, e.g. Agri Western Cape, AFASA, etc.

(Peri-)urban agriculture: Commercial and smallholder agricultural production within town/city boundaries or in close proximity thereof. Home and community (subsistence) food gardens which are often associated with urban agriculture, are not considered here as they differ from commercial and smallholder agricultural production.

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

Research institutions: Universities and Universities of Technology, parastatal research institutions e.g. ARC, CSIR, SANBI

Resilience: The capacity of a social-ecological system to cope with a hazardous event or disturbance, responding or reorganising in ways that maintain its essential function, identity, and structure, while also maintaining its capacity for adaptation, learning, and transformation.

Risk: The potential for consequences where something of human value (including humans themselves) is at stake and where the outcome is uncertain. Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the consequences should these events occur.

Smallholder farmers: Farmers who produce more product than their own requirements and sell excess, either directly to consumers or to collection centers or co-operatives, which generally process and market the products. The yields achieved in smallholder agricultural production are low and erratic. Due to the inconsistency of production, fair and stable market access is a huge limitation to the individuals engaging in this activity. Farm size is 0.5 – 5.0ha.

Stewardship: The responsible use (including conservation) of natural resources in a way that takes full and balanced account of the interests of society, future generations, and other species, as well as of private needs, and accepts significant answerability to society.

Subsistence farmers: Farmers who, faced with resource and technology constraints, practice agriculture to supplement the food needs of their families from resources that are available within the immediate vicinity of the household residence. This type of farming takes place in rural or urban / peri-urban areas. Farm size is <0.5ha.

Sustainable development: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Training institutions: Schools, Elsenburg Agricultural Training Institute, Boland College (FET), Universities, and Universities of Technology

Transformation: A change in the fundamental attributes of natural and human systems. Transformational change is profound, fundamental, and irreversible. It is a metamorphosis, a radical change from one form to another.
**Transformational adaptation:** A response to the effects of climate change that ‘changes the fundamental attributes of a system’. Transformational change implies shifts in locations for production of specific crops and livestock, or shifting to farming systems new to a region or resource system.

**Uncertainty:** A state of incomplete knowledge that can result from a lack of information or from disagreement about what is known or even knowable. It may have many types of sources, from imprecision in the data to ambiguously defined concepts or terminology, or uncertain projections of human behaviour. Uncertainty can therefore be represented by quantitative measures (e.g., a probability density function) or by qualitative statements (e.g., reflecting the judgment of a team of experts).

**Value chain:** The set of actors (private, public, and including service providers) and the sequence of value-adding activities involved in bringing a product from production to the final consumer. In agriculture these can be thought of as a ‘farm to fork’ set of processes and flows.
1.1 Background

Climate change is one of the most serious issues facing the world, and will have significant implications for the agricultural sector of the Western Cape Province. It is also a highly complex problem, interacting with other changes such as global market instability, rising input costs, population growth and poverty, increasing scarcity of land, water and energy, and uncertainties around land reform processes. Focused and practical solutions are required to deal with the additional challenge of climate change. Such solutions require joint planning for the agricultural sector within the province. They should acknowledge the many uncertainties inherent in projecting a future climate, and frame the response within the probable range of potential risk, but simultaneously leave ample room for adjustments to alternative futures as they evolve. An integrated systems view which incorporates social, economic, political and ecological contexts is essential. This would ensure that solutions do not have unintended consequences, benefit those in greatest need, and are sustainable in the long term.

Farmers and agriculture-dependent societies have throughout history evolved a deep understanding of climate-related risk and risk management, and have adjusted to, and coped with these factors as best they could. However, farming societies are now moving into uncharted territory where known patterns of climate risk and impact are shifting due to climate change. Yields and prices have become more variable and show greater extremes, often driven by local to global climate events. Hazards with a low historical probability but significant consequences are becoming more frequent and/or intense, for example heavy rainfall leading to flash flooding, heat stress events and intense wildfires.

Climate change is a particularly problematic additional stress in regions already experiencing high resource pressure, or which are regarded as agriculturally marginal. Food production is critically dependent on water, land, energy and ecosystem services, but also exerts impacts on its environment and resources required by other sectors and a growing population. As resource constraints and shortages begin to emerge, economic development decisions are coming face to face with trade-offs and the need to seek greater efficiencies of resource-use and optimisation of overall benefits, whilst maintaining food, energy and water security. Climate change increases the urgency of confronting these challenges so that the agricultural sector can become part of the solution.

Scenario planning is a powerful approach to mapping possible futures, both desirable and undesirable. The exact effects on a sector and over time cannot be accurately predicted at present. The challenge for planners in the Western Cape, therefore, is to consider the range of scenarios of climate change in the province, and their resultant sectoral effects. A combination of no-regrets, low-cost and high-cost policies and measures must then be pursued, at the appropriate time, with the
goal of promoting climate-resilient farming societies. It is widely acknowledged that climate change adaptation and mitigation in agriculture must include, but also go beyond crop- and livestock-specific interventions. Many effective responses seek synergies between adaptation and mitigation, and have disaster risk reduction co-benefits. An example which has gained considerable traction globally and in the Western Cape is Conservation Agriculture. These approaches aim to manage agro-ecosystems for improved and sustained productivity, increase profits and food security, while preserving and enhancing the resource base and the environment. They focus not just on the farm level, but also on the landscapes that provide the climatic, agro-ecological and social context.

1.2 Purpose

The Western Cape Climate Change Response Framework and Implementation Plan for the Agricultural Sector sets out to:

- Provide a time-specific strategic roadmap to a climate-resilient agricultural sector
- Provide spatially explicit, commodity-specific and scale-sensitive implementation pathways that are practical and effective for specific climate risks
- Promote opportunities for the sector through climate change adaptation and mitigation
- Inspire farmers and agri-business to optimise decision-making for a resilient and sustainable future in the face of complex and uncertain changes
- Strengthen the enabling environment for autonomous (farmer-led) and planned (government-led) responses
- Facilitate a more integrated, co-ordinated and co-operative response through strong multi-stakeholder partnerships, networks, and knowledge sharing
- Mobilise and direct new investments in agriculture in support of adaptation and mitigation

1.3 The spatial dimension

For the purposes of the SmartAgri project, spatial units or Agro-Climatic Zones (ACZs) have been identified for the Western Cape. These were identified through the aggregation of the more than 80 Relatively Homogeneous Farming Areas (RHFAs) which are based on climatic, vegetative, and productive attributes (Figure 1). These zones define the agricultural landscape of the province and have been used throughout this project. RHFAs are described as follows: “Homogeneous Farming Areas demarcate areas where the main agricultural activities practiced, or which realistically could be practiced, are common to most farm enterprises and within which the pertinent climate factors do not vary sufficiently to influence production practices and potential. These agro-ecological zones provide an excellent spatial unit for representing the specific agricultural character, current enterprises, and climatic potential of a locality.”
1.4 Overview of the process

The development of the SmartAgri Plan took place in three phases:

- **Phase 1:** Status Quo Review of Climate Change and the Agricultural Sector of the Western Cape. This was based on a desktop assessment of the best available science and understanding, and complemented by interviews with key stakeholders and two stakeholder workshops.

- **Phase 2:** Development of the Climate Change Response Framework for the Agricultural Sector. Intensive stakeholder engagement across all the District Municipalities was undertaken. The process was also driven by the formulation of an overall Vision, a scenario planning study and a gap analysis, as well as the development of six case studies. A process of prioritisation was followed, which included stakeholder inputs and a Multi-Criteria Analysis.

- **Phase 3:** Development of the Climate Change Response Implementation Plan for the Agricultural Sector, and the formulation of the Monitoring & Evaluation Plan. The details of the Implementation Plan were discussed through an intensive series of meetings with agricultural fora and focus groups, for specific aspects of the Plan. Workshops were also held for senior Municipal staff from District and Local Municipalities.

A more detailed account of the stakeholder engagement process is provided in a separate document.
PROCESS TO DEVELOP SMARTAGRI PLAN

- Status Quo review of Climate Change and Agriculture in the Western Cape
  12 December 2014
  - Desktop research
  - Interviews
  - Stakeholder workshops - scoping
  - August - November 2014

- Climate Change Response Framework for the Agricultural Sector of the Western Cape
  14 September 2015
  - Stakeholder workshops in districts
  - Focus group meetings
  - Government & agri-business workshops
  - Interviews
  - Scenario & Gap Analysis & Case Studies
  - Align with National & Provincial Policies and Programmes
  - February - August 2015

- Climate Change Response Implementation Plan for the Agricultural Sector of the Western Cape
  6 March 2016
  - Workshops for Local Government in districts
  - Agricultural Fora meetings
  - Focus group meetings
  - Interviews
  - Communications campaign
  - October 2015 - February 2016

- Final SmartAgri Plan
  31 March 2016

- Monitoring & Implementation Plan
  31 March 2016
2 SCENARIO ANALYSIS

Scenario analysis or planning is a way of exploring the future in an imaginative way and interrogating the options before deciding on a strategic course of action. It is most commonly conducted by identifying, through a structured process, two axes: the horizontal one portrays certainty and uncertainty and the vertical one control (decision-making to deal with complexity) and the absence of control or decision-making. This approach can be adapted when a future incorporating climate change is under consideration, since the uncertainties inherent in projecting possible climate futures add to the complexity and must be incorporated.

The scenarios developed here (for the agricultural sector of the Western Cape facing climate change) are intended to provide decision makers at various levels and scales with a strengthened understanding of what the future could hold, and what is required to lead the sector into the most desirable future.

2.1 Background

The Western Cape has the oldest intensive commercial agricultural system in South Africa, and is thus largely held by experienced, mostly white farmers who are generally either financially well-endowed, or at least have access to some level of financial and technical support. The region is characterised by well-established high-value agri-industries with fairly high labour intensity and good added-value potential, with a strong export component.

The region competes for international export markets against other regions with Mediterranean-type climates in the southern hemisphere, and to a lesser extent against northern hemisphere Mediterranean-type regions, owing to the inverted seasonality. Since the 1996 deregulation of previously highly regulated production practices, a spate of innovation, product diversification and some level of farm unit consolidation have been introduced. This region must now be amongst the most agriculturally diversified in the world, with crops ranging from rain-fed extensive commercial cereals to high value indigenous crops such as Rooibos tea, irrigated horticultural and viticultural production, and with several intensive and extensive animal production systems in place.

A trend towards profit- and land-sharing with previously disadvantaged groups has begun but remains a challenge. Tensions amongst labour have boiled over in some areas, leading to violence, and there is contention over the setting of the minimum wage, tenure security and land access issues. In terms of local supply chains, a great deal of purchasing power is concentrated in supermarkets that have used farmers’ innate price-taking vulnerability to squeeze margins for farmers. Some industries, such as dairy, have been severely affected.

Important socio-economic trends include the rapid growth of informal settlements...
associated with urban centres since the 1980’s, a trend which may now be slowing. However, the expansion of formal housing to rectify this situation has important consequences for water and land use planning, and for markets for local agricultural production. There is an increasing awareness amongst all role players and stakeholders of the tension between urban and agricultural water needs, with the environmental reserve lacking in prioritisation.

A period of warming during the 1990s appears to have partly stimulated some shifts in crop production practices, including adaptive responses in the form of selective planting of higher-temperature tolerant varietals in the horticulture industry, more sustainable land tilling practices, and an increased efficiency in irrigation. Increasing focus on the impacts of extreme events has raised awareness of climate change risks amongst commercial producers and insurers, with higher premiums and even the non-availability of insurance due to high risks resulting in farmers self-insuring through the implementation of technologies that may be seen as more cost-effective than insurance products. Active NGO groups have also raised awareness and conducted numerous programmes to build resilience against adverse climate conditions for new commercial producers in industries such as Rooibos tea production. The threat of wildfire to commercial forestry and even to some woody perennial crops is becoming more obvious.

Intensive production and processing methods are subject to the threat of increasing energy costs, including through carbon taxation in the event of strong mitigation undertakings by national government. This risk would be worsened under a climate scenario of rapid warming and drying, which would require rapid increases in energy use and additional water management responses such as on-farm recycling. Vulnerable industries in the sector include dairy farming, intensive animal production (chicken, pigs), and the area of product storage. A further well-recognised mitigation related cost is that of carbon taxes on exports that would require lower on-farm carbon footprints and/or increase the cost of transport.

Overall, the status quo in the Western Cape reveals an agricultural economy that is showing signs of growth and diversification after a period of consolidation in some sub-sectors, with greater momentum towards greater representivity amongst producers. Against this positive backdrop, serious challenges exist relating to labour, which challenges seem exacerbated by profit taking along the value chain with little benefit to the producer, and increasing pressure on water resources for intensive production, which is also responsible for most employment and foreign export earnings. The situation is thus relatively stable, but significant risk faces the sector in the event of adverse effects on production, which would be worsened by climate change impacts, and the potential future pressures of energy and carbon footprint considerations.

2.2 Climate vulnerability

The Western Cape is perceived to be highly vulnerable to climate change, but as the initial phase of anthropogenic climate change has unfolded since the 1980s, it appears that other Mediterranean regions globally may be much more vulnerable
than this region, experiencing shifts such as loss of snow pack underpinning irrigation (Chile, California) and shocks such as extreme drought and heat events, associated with large wildfires in California, Western Australia, and Europe. The Western Cape has experienced gradual warming of ca. 1°C over the last five decades, but changes in rainfall have been less distinct. There have been numerous locally important climate disasters, but nothing at the scale experienced by the aforementioned regions. This recent relatively lower exposure to adverse climatic conditions in the Western Cape may partly be due to the influence of climatic buffering of both temperature and rainfall change owing to geographic location, but may also be due to chance alone. For this reason, a future climate scenario of more gradual and moderate change relative to other Mediterranean-type agricultural regions seems relevant, but without discounting the possibility of rapid and substantial change at some point in the next few decades that could be triggered in the event, for example, of southerly shifts in westerly rainfall-bearing frontal systems.

2.3 Climate scenario development

Climate change has moved from being a major uncertainty to becoming more certain and a central feature of future planning in agriculture. In other words, climate change is a phenomenon with a high probability of influencing agriculture in the future, and over which local and regional actors have little to no control. However, what remains uncertain is the continued rate and intensity of the climatic changes that are already underway. Long term climate change also interacts strongly with other uncontrollable realities for agriculture, most notably climate variability, which has long been taken into account by agricultural producers and their products’ value chains, and provides an important basis for the planning of appropriate responses.

Scenario development is useful in situations where actors have control over responses and where there is some uncertainty regarding the outcome of trends. Scenario planning for agriculture in the Western Cape can therefore usefully proceed from a status quo socio-economic baseline in two main directions, namely with and without climate change response planning and project implementation. This main axis is under the control of actors in the sector and beyond (further explained in section 2.4). This axis can be combined with a second axis representing the two types of climate scenarios (see section 2.5) that remain plausible given the current uncertainty in climate change projections.

2.4 Response planning and implementation scenario development

In order to simplify the scenario landscape, we explored two fundamental response scenarios in the SmartAgri project, namely a “business as usual” or “Low Road” scenario in which response planning and implementation is left in the hands of individual actors and no technical or policy support is provided by authorities. In the second “High Road” scenario, a range of risks and opportunities is identified,
recognised, and planning and implementation processes are put in place. In each case, a series of proximate or direct risks and opportunities is identified, and a further set of remote risks and opportunities is explored.

2.4.1 Low Road Scenario

**DIRECT IMPACT RISKS**

**Water resources:** Conflicting demands for water from agricultural and urban users lead to greater allocation of water to urban use, and to the reduction of irrigation quotas. This leads to the shrinking water-dependent agricultural production and greater exposure of irrigated production to drought shocks. Water-dependent agricultural processing is also curtailed. The result is a loss of jobs in agriculture and the value chain, a reduction in local food security, increasing food prices to retailers and consumers, the consolidation of production to a few producers, and a decline in export earnings, together with a greater dependency on food produce imported from other regions of South Africa and from other countries.

**Drought:** Strong conflict between agriculture and urban use leads to temporary reallocation of water to urban use, and sudden shocks to production in water-dependent agri-industry. There is a temporary increase in unemployment. Fodder becomes expensive and livestock numbers are reduced leading to long run food security issues and low resilience once drought conditions are relieved. Production of rainfed crops drops and this affects staple food prices, particularly where bread is concerned. Insurance premiums rise and become unaffordable. Social disruption in urban and rural areas increases because of increasing food prices and greater unemployment.

**Hail:** Greater incidence or intensity of hail events leads to unpredictable loss of production and produce quality of high value crops as well as seasonal job losses. The supply value chain and consumers are hard-hit as buyers look to import more expensive substitutes from elsewhere in the world. Seasonal carry-over effects on production resulting from loss of, or damage to perennial fruit trees/vines reduce yield and quality during subsequent seasons. Since insurance has pulled out, growers put up hail nets, thereby increasing costs.

**Wildfire:** Higher air temperatures and drier conditions lead to increased availability of dry fuels, especially during summer and autumn months. This leads to an increased risk of runaway, large fires, and resultant increased risk to people, animals and assets due to uncontrollable fires. Forestry is threatened by the virtual impossibility of managing large fires under hot and dry conditions. Production systems in proximity to natural vegetation, forests and land densely populated with invasive alien plants, come under threat. Loss of livestock takes years to recover from. Very hot fires lead to soil crusting which results in an increased chance of floods after fires, and loss of topsoil.

**Flooding:** An increase in the frequency of high intensity rainfall events leads to crop, soil and infrastructure loss. Degradation of soils increases. Siltation of dams increases. Interruptions to production increase, especially in low-lying and flat fields.
that support cereal production, leading to lower reliability of staple crop production. Food prices increase and there is a greater dependency on food imports.

**Pests and diseases:** Animal, crop, and soil diseases become more common and new pests and diseases appear. More pesticides and interventions increase input costs. Exports become curtailed because of international concerns about food safety and quarantine issues. Higher costs are incurred by producers. Loss of productivity occurs leading to job losses and declining export earnings.

**Heat stress and heat waves:** Increasing heat stress reduces the productivity and profitability (produce quality) of legacy perennial crops leading to shrinking production, and legacy crops that retain productivity require greater irrigation inputs which places strain on water resources. Additional energy costs are associated with greater cooling needs in intensive animal production, storage facilities and irrigation pumping. Eutrophication of water occurs more frequently. Increasing heat stress impacts agri-workers working outdoors and reduces their well-being and productivity.

**Cold spells:** Unseasonal cold stress, sometimes linked to frost and snowfalls in higher-lying interior regions, causes stock deaths. These events have especially high impacts when they occur erratically outside the expected winter cold period.

**INDIRECT IMPACT RISKS**

**Energy:** Costs of energy rise leading to increasing costs of cultivation, agri-processing and beneficiation. Costs of intensive agricultural practices increase.

**Markets:** Loss of market share due to increasing intermittency of production and reduction in quality, leading to loss of earnings and revenue. Impacts on competitors in the global market interact with local impacts in determining market shifts.

**Climate and trade policy:** Loss of market share due to use of unacceptable chemical treatments for pests and disease or due to carbon footprint issues. Adaptation and mitigation resources cannot be accessed to counter these adverse outcomes.

**Carbon tax:** Farmers are exposed to increasing tax rates in South Africa after the first five years of implementation. Carbon tax leads to higher energy prices. Impacts depend on how competitors are affected relative to South African producers.

2.4.2 High Road Scenario

**DIRECT IMPACT RISKS AND OPPORTUNITIES**

**Water resources:** Water scarcity is a catalyst for social and technical innovation (sectoral, cultivar, irrigation, soil, invasive alien plants, desalination shifts, improved quality) and improved management, leading to a more efficient water sector that satisfies all users and the environment.

**Drought:** Drought planning and early warning reduces risks. The adoption of
Conservation Agriculture reduces crop losses. Breeding advances have provided drought-resilient cultivars and breeds. Pest and disease research allows effective application of new techniques and rapid responses to containment and management.

**Flooding:** Restoration of wetlands and riparian zones reduces flooding risk. The adoption of Conservation Agriculture practices improves soil water infiltration and water-holding capacity. New technologies are developed and applied, such as transferring flood water to belowground aquifers.

**Hail:** Roll-out of hail/shade netting prevents or reduces hail damage. Innovative insurance solutions allow compensation. Externally blemished produce are processed through new facilities and product lines.

**Wildfire:** Fire Protection Associations (FPAs) adapt to new fire regimes. Invasive alien plant clearing is accelerated, resulting in an increase in rural employment and social capital. Insurance industry finds partnering solutions for joint risk management.

**Pests and diseases:** Innovative response increases sector resilience leading to greater cohesion and giving rise to new industries. Monitoring and rapid response systems are well-resourced. Established markets are resilient to biosecurity threats and new markets are easily accessed. Public health is safeguarded.

**Heat stress and heat waves:** There is pro-active planning for heat stress events, aided by early warning systems, to ensure intensive technological solutions are applied cost-effectively. Crop varieties are changed and higher-temperature-tolerant varietals are introduced, which leads to the stimulation of new industries and value chains and is supported by strong research. Enhanced use of solar energy provides energy for cooling and pumping.

**Cold spells:** Effective early warning systems ensure sufficient time to respond before the event.

**INDIRECT IMPACT RISKS AND OPPORTUNITIES**

**Energy:** Energy efficiencies are increased and costs reduced. Renewable energy is used in areas of unmet demand to increase production efficiencies. The introduction of Smart Grid technology provides some farmers with a potential additional source of income from renewable energy where current infrastructure will not be expanded. Organic waste is returned to the soil or converted into energy.

**Markets:** The Western Cape capitalises on strategic advantages to gain market share as global markets shift in response to climate change impacts and the demand for lower carbon footprints. New markets are entered.

**Climate and Trade Policy:** Western Cape minimally affected by embedded carbon costs or border adjustment tariffs due to emerging economy status. Various agricultural sector role players proactively access adaptation and mitigation financial (and other) resources.
Carbon tax: Investments in soil carbon, renewable energy and cleaner fuel allow farmers to offset carbon taxes. Farmers adopt low carbon footprint strategies that render them more competitive in export markets.

2.5 Climate change scenario development

The climate change projections as presented by the IPCC and regionally downscaled climate models for the Western Cape have been distilled into two scenarios: These are rapid and substantial (Shock) vs gradual and moderate (Trend) change in climate. The fundamental difference in implication between these two climate scenarios is the time available for planning and implementation to take place, and the potential resilience of the agricultural economy as it currently stands. In other words, under the “Shock” climate scenario there is much less time to plan and implement, and resilience will be tested repeatedly sooner rather than later with less time available between adverse episodes for the system to recover.

The degree and rapidity of change could be seen to be represented by the modelled higher end of expected increases in temperature for the Western Cape, evolving more quickly than end-century, accompanied by increasing variability and occurrence of extremes. This is within the realm of possibilities given the current global greenhouse gas emissions trajectory and if the global policy process remains stalled. The continuing uncertainty around the direction of rainfall change in the Western Cape (increase or decrease) is avoided by taking the approach that rapid changes with greater extremes are detrimental regardless of direction (e.g. rapid development of increasing frequency of heavy rainfall is as damaging to agriculture as rapid reductions in rainfall). This “Shock” climate scenario is juxtaposed against the “Trend” scenario. Given more time, climatic changes can be managed through planning, projects and adaptation at all levels, within a broader vision and move towards systemic transformation.

2.6 Climate x Response scenario combinations

The combination of the two climate and the two planning response axes results in four plausible scenarios in each of the quadrants (Figure 2).

It is important to point out that these quadrants do not represent projections or even modelled descriptions of discrete future states in the manner of the IPCC. Instead, the axes map a decision-making space that, once understood, enables decision makers to incorporate uncertainty and subjectivity with regard to the future in a systematic and traceable manner. All positions on the axes are considered possible and the quadrants do not constitute a normative judgement on the future of agriculture in the Western Cape.
“Hard times” represents the least desirable outcome, and would involve a significant adverse result for Western Cape agriculture. Mean temperatures have risen quickly and heat waves have become a regular occurrence. Floods, droughts, hail, fire and pest/disease epidemics wreak havoc. Under drought conditions water is not sufficiently available for farming. Pressure on people and the economy means that the environment suffers, further perpetuating negative feedback cycles impacting on people. Actors compete with one another and the focus is on short-term survival. The net result of this outcome would include significant job losses, a drop in the number of successful farmers, reduced local food security, loss of international export market share, and conflict between agricultural and urban water use. Government is frequently called on to help, but does not have the resources to do so.

“Grace under pressure” represents a more desirable outcome than “Hard times”. In this scenario, significant and rapid climate change is a reality, but with pro-active decision making, planning and implementation (as envisaged by SmartAgri) the agricultural sector is able to retain jobs effectively, and to retain its export market share, although food security and food prices would likely be temporarily adversely affected.
following climate events. The environment suffers, but is resilient and continues to support agriculture with ecological infrastructure and services. Actors in the public and private sector work together towards a longer-term goal of sectoral strength and support for the vulnerable during difficult times. The response options could allow some level of transformation of the sector to occur, both in terms of diversification and the spectrum of activities, and in terms of participation by more representative actors.

“Muddle through” would essentially see slow transformation of the industry and a tendency for individual responses that would slow the adoption of truly sustainable adaptive responses, and slow transformation of the participants in the sector. Individual responses not strategically planned and collectively decided on will result in unintended consequences and maladaptation. The need to adapt to climate change is not as urgent given the gradual and even warming and changing rainfall regime (with few shocks), since those with access to resources can manage. The actors fail to see the shortcomings of continued “business as usual” and there is a slow continued decline in social and ecological capital, and thus economic growth. Government does not invest in capacity for climate change responses leading to disproportionate impacts after minor events.

“New era” would see a truly deep transformation of the industry within a time frame that would allow a considered and sustainable transformation path to be determined and followed (as envisaged by SmartAgri). Climate changes are moderate but taken seriously. The outcome would include a more equitable and sustainable sector that would facilitate a greater level of local food security, more affordable product prices, and an expanding share of the international export market, together with many new local and international collaborations that would stimulate innovation and new support industries. Partnerships achieve the rehabilitation and preservation of the ecological and agricultural resource base. Communities become participants in realising a future for themselves in agriculture, with targeted support from government.
The following figure (Figure 3) presents the project’s Vision and overarching Goal, and the four Strategic Focus Areas (SFAs) identified as key to achieving these.

### THE FRAMEWORK

The Vision is complementary to the existing Vision of the Western Cape Province: “Our vision for 2040: A highly-skilled, innovation-driven, resource-efficient, connected, high opportunity and collaborative society” and the existing Vision of the Western Cape Department of Agriculture: “A united, responsive and prosperous agricultural sector in balance with nature”

The SmartAgri Plan does not explicitly separate adaptation and mitigation, but rather seeks to identify synergies and co-benefits between adaptation and mitigation. Most land-based responses satisfy the criteria for both adaptation and mitigation, for example the benefits of Conservation Agriculture for increasing soil moisture holding capacity and for reducing diesel usage. Similarly, the achievement of greater water use efficiencies in irrigation systems through the use of variable drive pumps - an adaptation - simultaneously reduces electricity usage, and thus has mitigation benefits.
3.1 Rationale for Strategic Focus Areas

The four SFAs are distinct from one another mainly on the basis of spatial scope and the range and nature of the actors involved and their relationships.

SFA1 encompasses the production system - viewed holistically and including the means of production (land/soil, water, energy, labour) - and the whole value chain. It is strongly production-orientated and speaks to agriculture as an economic sector providing revenue and livelihoods while looking after natural resources. The spatial focus is primarily the farm and, to some extent, the landscape within which the farm operates (especially in terms of water provision), followed by the journey taken by what the farm produces. Climate change impacts are experienced directly and indirectly. SFA1 is commodity- and farm type-specific and can be prioritised per Agro-Climatic Zone (ACZ). The actors are farmers themselves and their supply chain and buyers, with government being responsible for overall land use and water planning. The responses are a mixture of adaptive and mitigative, and a number of responses are both.

SFA2 has a similar scope to SFA1, but deals with the specific challenges experienced when climate-related disasters occur. The landscape becomes more important, with farm experiences closely linked to catchment conditions and to fire risk posed by surrounding vegetation, and the area of impact and response becomes wider, sometimes encompassing a whole district. Climate change impacts are harsh. SFA2 is only commodity- and scale-specific in a few instances, but generally applies equally to the entire sector. Some actions can be started in priority ACZs. Responses are no longer solely in the hands of individual farmers, and government takes on a greater responsibility. All responses are adaptive, although pro-active soil management for flood and erosion prevention has mitigation co-benefits.

SFA3 reaches beyond the farm to the sources of information and knowledge that support the growth and success of farming (the agricultural knowledge economy). There are clearly far greater research and information gaps and needs amongst subsistence and smallholder farmers when these groups are compared to large commercial operators. This cuts across commodities and ACZs. Nevertheless, some sector-wide responses are essential for the building of greater climate resilience in the whole system. This SFA demands collaboration between a very wide range of actors, including farmers themselves, research institutions and academia, training institutions, NGOs, and government at all levels, most of which actors are based in the larger cities and towns. Information and knowledge products cover both adaptation and mitigation.

SFA4 specifically addresses government’s roles and responsibilities, since the Response Framework is government-led. There is no spatial dimension except the provincial boundaries, but the deeper rural areas and areas further away from the seat of government are at a relative disadvantage. The responses are not commodity-specific or aimed at certain farming systems; rather, government creates an enabling set of rules, regulations, planning instruments and incentives so that farmers and agri-businesses can get on with the job of adaptation and mitigation with the fewest possible hurdles and the best chance of innovating towards
sustainability under new conditions. Since individual areas of government cannot deal with the challenge on their own, partnerships within government and with the private sector are essential.

**BOX 1: PEOPLE ON FARMS**

The livelihoods and well-being of people who work on farms are of paramount importance. Rural smallholder farmers, peri-urban smallholder farmers, newly established commercial farmers, and agri-workers on commercial farms, who have limited resources and little power in the system, are likely to be hit the hardest by any changes or stressors that affect the Western Cape agricultural sector. Climate change is likely to amplify the stressors and risks these communities are exposed to. Any efforts to strengthen their resilience to climate change impacts necessitates that the underlying barriers and vulnerabilities be addressed.

Climate change will affect these vulnerable groups both directly and indirectly. Direct impacts include health risks associated with heat stress, cold stress, deteriorating air quality, water-borne diseases associated with flooding and poor water quality (e.g. diarrhoea, cholera), vector-borne diseases associated with mosquitoes and ticks, and the dangers of working out of doors and containing damages when storms, lightning, floods, and fires hit. Agri-workers will also need to be able to respond to the risk of damaged or destroyed housing and the reality of being cut off from urban centres and essential services. The indirect impacts of climate change could include certain deleterious effects on mental health (e.g. when livelihood opportunities are lost or diminished), and climate change’s adverse impacts would be worsened by food insecurity, hunger, and malnutrition.

From this perspective, the entire SmartAgri Plan must speak to the vulnerabilities of these groups. The Plan takes this approach implicitly. Nevertheless, explicit attention is given to the direct risks faced by agri-workers in Strategic Focus Area 1, under Objective 1.5: “Protect agri-worker wellbeing”. It is problematic that agri-workers have a low level of awareness of climate change and the risks it brings to them and their livelihoods and well-being. At a minimum, properly investigated and formulated guidelines and, ideally, regulations, should be developed for the management of heat stress in people working outdoors on farms. These must be accompanied by education and awareness-raising regarding heat management, soil and water management, food security, and the acquisition of new skills that may be needed on farms in order to adapt. In the longer term, a specific assessment of climate change impacts on agri-workers and their response needs is required, in strong collaboration with other sectors, such as Health and Social Development.
BOX 2: THE ROLE OF THE FINANCE SECTOR

The removal of State-subsidised credit and insurance to South Africa’s agricultural sector opened the door for new forms of commercial finance (banks, investors, insurers). The ‘financialisation’ of South Africa’s agricultural sector has not been uniform; new commercial farmers in particular have not always been extended the credit that they require. However, the finance sector has been crucial in supporting the transition from statutory single-channel marketing and state subsidies to today’s competitive production of food and fibre, and integration in global markets.

Undeniably, however, the finance-driven expansion of South Africa’s agriculture sector has also had undesirable impacts, and finance has, at times, failed to provide the appropriate signals to investors and savers with regard to risks and opportunities. It is these “blind-spots” that implicate the sector in certain environmental and social problems. It is access to credit that enables the farming of a larger footprint, sometimes into virgin lands and with irrigation water, through the provision of earth-moving machinery. It is crop insurance that has insulated farmers from the reality of changing climates and encouraged production in marginal climatic zones. It is economies of scale generated by capital-intensive agriculture that have created market barriers for new entrants and smaller farmers, particularly those without freehold title over land that can serve as collateral. Finally, it is the need to honour debt obligations that has seen farmers adopt increasingly intensive production techniques and short-term perspectives, including irrigation-intensive crop production, sterilisation and nitrate loading of soils and intensive livestock husbandry.

Certainly, the finance sector has become more than simple financier; the sector now influences the location of farming, the technologies used, and the nature of the farming system. Part of the challenge for the finance sector involves the question of what to do with this influence. Financial institutions go to great lengths to ensure that their clients comply with environmental and social legislation; neither the blind-spots nor the perverse farming practices that accompany them are illegal. The fact remains, however, that aspects of finance-enabled agriculture undermine the natural resource base and social capital on which the sector depends. In the process, these aspects generate heightened exposure to existing risks and to new longer-term risks that affect both farmers and financiers adversely.

Given the increasingly prominent role of the finance sector and the difficulties inherent in enforcing environmental legislation, it was inevitable that efforts to instil environmental governance would focus on financiers. Many South African bank managers and insurers have more contact with, and better information on, farmers and the local environment than the responsible government
Departments. In most instances, financiers are more able to exert positive influence over and provide incentives with regard to farming practice than organisations that only have recourse to environmental legislation.

To respond to this role and associated scrutiny, financiers have adopted commitments (such as the Basel Three accord), standards, and reporting measures (such as Environment, Social and Governance – ESG). The onerous reporting requirements are something that most banks lament as necessary but insufficient when it comes to managing environmental risk. ESG reporting is particularly poor at addressing the types of systemic environmental risks that cause either environmental or financial collapse.

If the finance sector is to play its part in a climate smart Western Cape agricultural sector, and secure its own client base in the process, there are three broad fronts on which it can act:

1. Inclusion of changing biophysical risks in insurance and credit assessments: Banks could be doing more than “product development” by asking different questions of their clients, i.e., making sure that their assessment of the all-important debt “repay-ability” includes factors that will see farmers cope better with climate change. By asking firms about their “resource efficiency” lenders and investors can make better decisions about how well these firms operate, and whom they (as backers) will lend to and invest in.

2. Stress-testing loans: Stress-testing is a requirement under Basel Three, but South African banks do not currently stress test their loan books against systemic environmental pressures such as prolonged drought, deteriorating water quality or increased fire risk. This is in spite of some of these pressures being influenced by climate change.

3. Providing bespoke finance for activities that enable a transition to a more resilient sector: The transaction cost of adapting to climate change acts as a barrier to change. Financial products that encourage the preservation of soil carbon and riparian buffers; the use of livestock feeds that reduce greenhouse gas production in enteric fermentation; the installation of rooftop solar photovoltaic systems; energy cogeneration from slurry ponds; the use of wind power, and overall energy efficiency represent potential new business for banks and simultaneously reduce the incidence of systemic risk to the sector.

As a broad rule where banks can support income diversification on farms, they will improve agricultural resilience. Similarly, financial incentives that encourage worker equity and participation in the agricultural sector will encourage the types of social contract that will be required to farm under perturbed climates. What is the Provincial Department of Agriculture’s role in this? Some impacts cannot be achieved at the farm scale and need a system or catchment intervention. The Department can convene the conversations and meetings,
assist in defining what SmartAgri involves, and be an independent monitor and communicator of systemic progress.

There is also an urgent need for the Department to take the risk of a pilot (e.g. Priority Project #2), to demonstrate what needs to be done and what the respective benefits to farms, banks, and insurers are. (These include cost savings, higher yields, better water retention, drought resilience, etc.). At the moment, banks and insurers remain unconvinced that what is on offer through greater attention to the environment is worth the effort and risk of changing their business model. It would require a public demonstration to highlight the merits of an alternative.

The aim should be a “resilience dividend” – that is, interventions that reduce climate risk and yield a suite of other benefits. These include resource efficiency and cost savings, greater on-farm value addition so that bulk products are not transported, soil fertility and water retention, labour inclusivity (through a progressive carbon market, for example), new investments through the carbon tax and off-set programme, and on-farm electricity and biofuel production that stimulate greater investment in rural areas. In this way, climate change could, with the support of the finance sector, serve as a catalyst for a more stable and inclusive socio-ecological system that removes some of the distortions introduced by apartheid-era subsidies for Organised Agriculture.

The financial sector, of course, has its own legislation and fiduciary responsibilities, some of which are inadequately understood by environmental activists, but there are three broad reasons why financiers may want to incentivise climate smart practices amongst their clients: the reduction of risks and financial losses, the creation of new business, and the protection of existing investments and corporate reputation.
3.2 Strategic Objectives

Figure 4. The individual Objectives (outer circles) under each Strategic Focus Area
The SmartAgri Plan includes six Priority Projects that have been chosen to catalyse the early adoption of important climate change response interventions with high impact. The set of six projects include both adaptation and mitigation activities that are critical components of creating a resilient agricultural sector in the short- to medium-term, and of beginning the transformative process which is required to ensure long-term resilience and sustainability in the face of continued climate change.

The six Priority Projects were identified through extensive engagement with stakeholders, and lengthy consideration by the project team, who evaluated each Project according to its scientific, agricultural and socio-economic merits. Good alignment exists between a number of these suggested Priority Projects and a few key provincial strategic projects that are being conducted (including a number of Provincial “Gamechangers”), and the Priority Projects may, therefore, benefit from existing high levels of support and resourcing and a sense of urgency already present within Provincial structures. The remaining Priority Projects are innovative and integrative pilot projects or new approaches to thinking or planning. To reach their envisioned impact, the Priority Projects will require commitment and financial support from the public and private sectors, and from civil society. Jointly these projects will accelerate the implementation of the SmartAgri Plan.

An important element of the Priority Projects will be the comprehensive monitoring and reporting of all agricultural, ecological, social, economic, and operational metrics. This will inform how future activities need to be structured to ensure that envisioned goals are met in a cost-effective and socially appropriate manner.

The recommended Priority Projects include:

1. Conservation Agriculture for all commodities and farming systems
2. Restored ecological infrastructure for increased landscape productivity, socio-ecological resilience and soil carbon sequestration
3. Collaborative integrated catchment management for improved water security (quality and quantity) and job creation
4. Energy efficiency and renewable energy case studies to inspire the transition to low-carbon agriculture
5. Climate-proofing the growth of agri-processing in the Western Cape
6. An integrated knowledge system for climate smart agricultural extension

4.1 Priority Project #1: Conservation Agriculture for all commodities and farming systems

Rationale
It is globally recognised that long-term resilient food production under conditions of climate change is dependent on the restoration of agricultural soils in terms of their structure, fertility, water retention, and biotic diversity.
The Conservation Agriculture (CA) Priority Project aims to build on existing programmes aimed at transitioning from conventional production systems to conservation agriculture in the Western Cape.

Conservation Agriculture refers to a farming system where three principles are adopted – (i) minimum disturbance of the soil, (ii) permanent year-round soil cover, and (iii) sound crop rotations and/or associations using diverse species (including legumes). These practices should be supported by Good Agricultural Practices (GAP) such as the integrated management of weeds, nutrients, pests, and livestock. The transition should include all three components and may take a phased approach towards the adoption of low external input (LEI) practices.

Numerous stakeholders, particularly those in the West Coast, Overberg, and Eden District Municipalities, prioritised the scaling up of existing CA activities as an important climate change response measure. In addition, CA practices are currently prioritised by the Provincial Government because of their (the CA practices’) impact on the provision of resilience to the significant drought experienced in the West Coast district in the period 2015-2016. Furthermore, reduced tillage, one of the principles of CA, has been identified by Provincial Government as an important climate change mitigation practice within the agricultural sector owing to a reduction in greenhouse gas (GHG) emissions linked to a reduction in diesel usage, combined with other environmental benefits such as reduced fertiliser and pesticide usage. The results of the Multicriteria Analysis (MCA) of response options conducted during the SmartAgri project showed that CA was one of only four options that appeared in the top 10 of four or more of the rankings performed by nine experts.

Economically, the adoption of CA principles generally leads to a substantial reduction in diesel costs as well as a reduction in the amount spent on fertiliser. However, significant upfront investment is needed in new machinery, which often inhibits immediate adoption. This financial hurdle needs to be addressed if CA is to be adopted at greater scale in the near-term.

CA has historically been researched and implemented on grain farms (e.g. where wheat and maize are grown), but the principles can be applied to other commodities and farming systems. There is opportunity to expand the CA approach to perennial crops (e.g. rooibos), underground crops (e.g. potatoes), and livestock. Mixed crop-livestock systems and managed pastures for dairy production show potential opportunities for the expansion of CA in the Western Cape.

This Priority Project therefore focuses on creating conditions that encourage the adoption of CA principles across the province.
### Implementation

<table>
<thead>
<tr>
<th>Climate change risks which are addressed</th>
<th>Prolonged dry spells and droughts, increasing temperatures and heat waves, heavy rainfall events and floods, changing rainfall seasonality</th>
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</table>
| Current barriers to scaling up and scaling out | · High upfront investment required for the shift from conventional tillage to CA. Farmers are often already heavily invested in conventional tillage equipment, which further inhibits investment in CA technologies.  
· While there is existing quality research into CA for grain crops, there has been little research into CA for other crops and crop-livestock systems. Additional research capacity is needed to optimise implementation and provide technologies for rooibos, potatoes, pasture systems and other commodities.  
· The benefits to soil health and profitability often take several years to be realised. Management can be hesitant to adopt new practices without clear illustration of success at scale. |
| Factors of strength | · Significant local expertise and long-term research trials on the adoption of CA in grain production systems.  
· Initial evidence of positive impacts is already observable and evident in data.  
· An active farmer-led association focusing on CA is already in existence (CAWC).  
· Conducive national policy development with the opportunity to contribute to the national discourse on CA. |
| Adaptation / mitigation rationale | · Adaptation: CA restores the health of soils and decreases exposure to wind and water erosion and soil water evaporation. As a climate change adaptation, it increases soil water-holding capacity, increases the diversity and abundance of beneficial soil micro-organisms, increases soil fertility, decreases the temperature of the upper soil layer, and reduces soil erosion and siltation, thus improving downstream water services to agriculture and urban economies.  
· Mitigation: CA increases the ability of soils to sequester (absorb and fix) carbon, and reduces GHG emissions through the noted reduction in the use of diesel and fertiliser. |
| Objectives | · Increase the uptake of CA through the provision of long-term evidence regarding the production, financial and environmental benefits of CA at scale (with grain and other field crops).  
· Increase the spatial extent of CA practices through awareness, education, training and extension activities.  
· Drive greater uptake of CA through active and collaborative support structures (e.g. CAWC, commodity organisations, WCG: Agriculture).  
· Address initial inhibitory financial hurdles and create long-term financial incentives to sustain the expansion of CA practices.  
· Expand research on the carbon sequestration and GHG emission aspects of CA in a broad range of Western Cape commodities and contexts. |
### Proposed Activities

- Conduct a survey (including spatial data) of the adoption of the three components of CA (minimum disturbance, organic soil cover, rotation of diverse crops).
- Ensure continuation and significant expansion of long-term CA trials on WCG: Agriculture Research Farms and commercial farms, incorporating a range of commodities, and climatic and soil conditions.
- Initiate collaborative full-scale long-term CA trials for potatoes, rooibos, pasture systems and field vegetables, while realising training opportunities where they exist.
- Initiate research to optimise mixed crop-livestock CA farming systems, with training opportunities.
- Initiate short- and long-term projects to develop less-costly CA technologies aimed at implementation by subsistence and smallholder vegetable farmers, with training opportunities.
- Conduct research on the climatic effect of adopting CA practices, where this includes research on the reduction in GHG emissions due to decreased fuel usage, changes in soil organic carbon, and potential changes in surface albedo.
- Develop partnerships between WCG: Agriculture and industry associations to leverage each entity’s existing capacity and networks towards the common goal of efficient implementation at scale.
- Promote membership and commodity diversity in Conservation Agriculture Western Cape (CAWC).
- Mainstream CA into the curricula of agricultural courses at secondary and tertiary level and to extension services courses.
- Engage with National Treasury and the Department of Environmental Affairs (DEA) on the inclusion of CA in the national Carbon Tax framework and potential carbon offset mechanisms.
- Promote the development of financial and crop insurance products linked to CA practices.
- Make contributions to the development of the National Conservation Agriculture Policy by the National Department of Agriculture, Forestry and Fisheries (DAFF).

### Potential impact

Owing to the significant spatial extent of field crops in the Western Cape, CA may be one of the principle climate change response measures that can be implemented at scale. If the initial financial burden of changing to CA, and gaps in knowledge of production practices can be addressed, the potential impact of CA could be very high, on both farmers and their workers, as well as on neighbouring communities.

### Scenarios

CA is able to provide resilience under both the “trend” and “shock” scenario. Although CA cannot provide protection against a serious drought, the impacts of drought are buffered, and year-to-year yield variability is reduced.

### Proposed Lead Institution

WCG: Agriculture (RTDS) should continue to take the lead and provide critical research expertise and capacity.

### Proposed Support Institutions

Commodity organisations (e.g. GrainSA, Potatoes SA, Rooibos Council, Milk Producers’ Organisation, etc.); farmer organisations and organised agriculture; Conservation Agriculture Western Cape (CAWC); research and training institutions; Western Cape extension services; NGOs; WWF-SA; DAFF; DEA; National Treasury; WCG; EADP; financial institutions; input suppliers.
**Beneficiaries**
- Farmers (smallholder and commercial) who have adopted the CA approach.
- Value chain actors who depend on a stable production environment.
- Agri-workers on farms and within the value chain whose livelihoods must be protected.
- Local communities and Municipalities who depend on healthy ecosystem services supported by CA practices (e.g. drought mitigation, flood attenuation, reduced siltation of dams, improved water infiltration and an increased groundwater recharge).

**Financing**
Currently funded by individual farmers themselves, and WCG: Agriculture. Future sources of funding that could be pursued include international climate change response funds (e.g. Green Fund). Supporting funding should be sought from commodity organisations and national agricultural research and climate change research funds, commodity organisations, and the National as well as Provincial Treasuries. Financial institutions also have a role to play in providing favourable terms for CA-related capital investments.

**Timeframes**
Start immediately; benefits can be seen after 3-5 years; project should be continued for at least 8 years (and long-term trials require at least 15 years).

### Spatial priorities

<table>
<thead>
<tr>
<th>Flagship #1: Conservation Agriculture</th>
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<tbody>
<tr>
<td>1 Bokkeveld</td>
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<tr>
<td>2 Bo-Langkloof - Outeniqua</td>
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<td>3 Breede</td>
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<td>4 Cape Town - Winelands</td>
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<td>17 Piketberg</td>
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<td>19 Rûens-East</td>
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<td>21 Sandveld-South</td>
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<td>23 Tankwa-van Wyksdorp</td>
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4.2 Priority Project #2: Restored ecological infrastructure for increased landscape productivity, socio-ecological resilience and soil carbon sequestration

Rationale
Well-functioning landscapes provide a wealth of ecological services to farmers, rural communities and downstream economic centres. These services include, among other things, the provision of water; the regulation of stream flow and soil erosion; the production of forage, crops and fuelwood, and the regulation of climate through the sequestration of carbon in biomass and soils. Furthermore, well-managed landscapes are more resilient to disturbance than degraded ones. The ecological systems that provide these important services are referred to as ‘ecological infrastructure’. The maintenance of ecological infrastructure should be included as an integral part of responding to climate change, with emphasis on both restoring and managing degraded landscapes over the long-term as well as halting further degradation.

The Restoration of Ecological Infrastructure Priority Project sets out to pilot a comprehensive set of restoration and long-term management measures required to reinstate ecosystem services in degraded landscapes. As an important response to climate change, this Project was highly prioritised by stakeholders consulted in the District Municipalities, particularly by those in the West Coast, Little Karoo and Central Karoo District Municipalities.

In the Western Cape, the overgrazing of rangelands, the spread of invasive alien plants on and adjacent to agricultural land, and inappropriate ploughing and land management, have led to extensive degradation in indigenous fynbos, succulent Karoo and grassland areas. Sheet, gully and wind erosion of soils are accelerated in bare degraded landscapes. These changes have reduced the productive capacity of such landscapes and made them more vulnerable to the adverse effects of climate change, e.g. through impacts of more intense floods, droughts and fires.

The restoration of degraded landscapes leads to an increase in biomass and soil carbon stocks. The South African National Terrestrial Carbon Sink Assessment identified reforestation, landscape restoration and reduced tillage as three of the country’s principle land-use-based climate change mitigation measures.

The scientific and economic aspects of restoring ecological infrastructure are well understood. Past global analyses, together with numerous sub-national studies in South Africa, have illustrated that investing in ecological infrastructure is generally more cost-efficient and sustainable than investing in built-infrastructure alternatives. This understanding led to the proposal of a 19th National Strategic Integrated Project (SIP19) for South Africa, which focuses on the restoration of ecological infrastructure and associated services. Landscape management programmes also offer substantial employment opportunities that are realised during the restoration and management phases. The Expanded Public Works Programme of the Department of Environmental Affairs - particularly Working for Water, Working for Woodlands and Working on Fire - have proved the significant job creation potential that exists through the implementation of such activities. In addition, programmes implemented by
Climate change risks which are addressed

- Prolonged dry spells and droughts, heavy rainfall and floods, increasing temperatures, increasing risk from intense wildfires

Current barriers to scaling up and scaling out

- Lack of systematic, bottom-up co-ordination and planning, community partnerships, and farm-scale business models for restoration and management activities at a landscape scale.
- Insufficient and unsustainable financial and human capacity to undertake long-term implementation in all land-use and land-tenure types.
- A lack of monitoring, reporting and verification capacity that would allow the benefits of such activities to be disclosed to funding agencies and investors, and would allow the realisation of potential carbon revenues.

Factors of strength

- Good knowledge of the relationship between ecological infrastructure and climate change resilience, including awareness of the economic efficiency of restoration measures.
- Substantial benefits to both smallholder and commercial farmers as well as downstream communities and urban economies.
- Potential to be implemented by a wide range of agencies, from individual farmers, to municipalities and the Expanded Public Works Programme.
- Good opportunity to generate substantial long-term employment possibilities in remote rural areas.

Adaptation / mitigation rationale

- Adaptation: Improvements in the regulation of water flow, erosion and sedimentation, decreases in the occurrence of intense fires, and improvements in the resilience of fodder and crop production improve the ability of people living in the landscape to respond to projected increases in significant flood, drought and intense fire events, and increasing variability in temperature and rainfall.
- Mitigation: The restoration of degraded landscapes leads to an increase in biomass and soil carbon stocks. The South African National Terrestrial Carbon Sink Assessment identified reforestation, landscape restoration and reduced tillage as three of the country’s principle land-use based climate change mitigation measures.

Objectives

- Restore the innate resilience of ecosystems to disturbance and the adverse effects of climate change.
- Restore the innate ability of ecosystems to provide a range of ecosystem services (e.g. water regulation, soil health regulation) in a manner that is resilient to climate change.
- Reduce the impact of climate change on humans and economies within the landscape in a manner that is proved to be cost-effective.
- Create long-term employment and skill development opportunities in remote rural areas through the development, implementation, monitoring and reporting of restoration and management measures.
- Explore and develop new emerging financing mechanisms e.g. potential carbon revenues opportunities through South Africa’s emerging carbon tax framework.

Implementation

LandCare, CapeNature, District Municipalities, Catchment Management Agencies and NGOs such as WWF-SA and Living Lands, may provide additional experience and capacity and opportunity for effective partnerships. A crucial element is the active participation from the start by farmers and other land owners, agri-workers and local communities.
Western Cape Climate Change Response Framework and Implementation Plan for the Agricultural Sector

Proposed Activities

- Identify three pilot catchments that cover the main axis of variation across the province e.g. rainfall, type of land-use and agriculture, and potential implementation models. The three pilots should adequately inform future provincial-scale implementation.
- Undertake a status quo assessment of the three pilot catchments to inform the nature and scope of implementation. This analysis should describe at least (i) the biophysical nature of the catchment, (ii) the type and extent of agricultural activities, (iii) the socio-economic context, (iv) local institutional structures, and (v) potential implementation frameworks and agents.
- Identify and develop appropriate implementation models considering (i) required logistics and implementation and management capacity, (ii) potential implementation agents, (iii) costs and how they would scale, (iv) long-term incentive plans, and (v) risk of non-delivery.
- Develop a comprehensive monitoring, reporting and verification plan. This should include full consideration of each stage of the MRV process.
- Understand and potentially create long-term business plans for each principle form of land-use within the catchment.
- Implement the Project within the three chosen pilot catchments.
- Assess the principle outcomes of the three pilot programs.
- Develop a comprehensive implementation plan for provincial scale roll-out of activities

Potential impact

The immediate impact on the agricultural sector would be an improvement in ecosystem services, an increase in the resilience of water supply to climate change, and the conservation of soil. However, the positive impacts on all residents and economies within target catchments are likely to be substantial. The restoration of ecological infrastructure has been shown to be a cost-effective means of adapting to climate change.

The restoration of ecological infrastructure has been shown to be a cost-effective means of adapting to climate change.

Full knowledge of the total spatial extent of the opportunity is lacking, owing to an absence of maps that adequately identify areas with degraded soil carbon. A conservative estimate of 25 000 ha of degraded grassland in the Western Cape is therefore assumed, based on the mapping of erosion gullies. Restoration could, for planning purposes, be estimated to represent a carbon sequestration potential of 1.0 tC/ha.yr.

Scenarios

Landscape restoration is able to provide resilience under both the “trend” and “shock” scenario. Although this kind of restoration cannot provide protection against serious droughts or wildfire, the impacts are reduced through the natural buffering capacity of functional ecosystems, and the year-to-year variability of landscape productivity is reduced.

Proposed Lead Institution

Provincial Departments, possibly a joint lead between WCG: Agriculture, WCG: EADP and WCG: EDAT, but could also include WCG: Local Government and WCG: DMC; with research institutions.

Proposed Support Institutions

DAFF, DEA EPWP, DWS, DRDRLR, CMAs, WUAs, Municipalities, CapeNature, SANBI, NGOs, SAEO, commodity organisations, farmer organisations, WWF-SA; Sustainable Resource Management Committees, CBOs and communities, service providers

Beneficiaries

- Farmers (smallholder and commercial)
- Agri-workers on farms and within the value chain whose livelihoods must be protected
- Local residents who may be employed to undertake implementation and monitoring tasks
- Value chain actors who depend on a stable production environment
- Downstream economies that are dependent on a reliable, clean supply of water
- Local communities and Municipalities who depend on healthy ecosystem services (e.g. drought mitigation, flood attenuation, reduced siltation of dams, better water infiltration and recharge of groundwater)
Financing

It is anticipated that funding would be obtained from a number of sources. An analysis of funding and financing options is required during the pilot phase, but it is assumed that payment would potentially be realised through public funds, private finance, carbon revenues and international climate change funds.

Timeframes

Start immediately; benefits can be seen after 3-5 years; project should be continued for at least 20 years.

Spatial priorities

4.3 Priority Project #3: Collaborative integrated catchment management for improved water security (quality and quantity) and job creation

Rationale

The infestation of catchments, river courses and water bodies by invasive alien plants (IAPs) can reduce streamflow, impair water purification, reduce biodiversity and change the frequency and intensity of fire. This in turn, negatively impacts ecosystems, agriculture and society. The removal of IAPs and the rehabilitation and management of affected riparian areas increases water flow, which is then available to agriculture and downstream users. Given that water resources are projected to diminish in the Western Cape, and that climate change will contribute to the increasing spread of IAPs in catchments if left unchecked, this activity will make a significant contribution to ensuring climate resilience for agriculture.
The Catchment Management for Water Priority Project focuses on establishing a collaborative and flexible implementation model based on current effective initiatives, which will allow for local customisation and locally determined partnerships and governance arrangements. Emphasis will be placed on ensuring that the model is financially robust (which will likely mean including a value-added component for the wood) and will be able to provide new jobs to local residents. A critical component of the project involves developing methodologies to determine a “business case” for this response measure that could ensure financial support both for the initial removal of IAPs, and for rehabilitation and on-going maintenance. The beneficial impacts on water flows and water quality need to be monitored. The model will then be implemented in two catchments with commercial and/or smallholder agricultural activity in areas already prioritised (but where no catchment and river management has yet taken place). Finally, evaluation of the model will lead to the creation of a sustainable long-term implementation programme that can be scaled across other catchments in the province.

Increasing integrated catchment management activities (as a climate change response measure) was highly prioritised by stakeholders in all the District Municipalities as well as by Provincial Government officials. The results of the Multicriteria Analysis (MCA) of response options conducted for the SmartAgri project showed that catchment management was one of only four options that appeared in the top 10 of four or more of the rankings performed by nine experts. It consistently scored ‘high’ on job creation potential.

There are already numerous efforts underway to remove IAPs and in support of integrated catchment management. These include both national and local government initiatives such as the Working for Water programme, the LandCare programme, efforts by CapeNature and NGOs such as WWF-SA, and in many cases the actions of individual farmers, land owners and affected communities. However, workable partnership and governance arrangements are still evolving. This response measure is vital for creating capacities and a sense of ownership in rural communities. Close collaboration between various role players is required for optimal utilisation of available resources and for joint learning processes which enhance the problem-solving capacities of the participating stakeholders.
### Implementation

<table>
<thead>
<tr>
<th>Climate change risks which are addressed</th>
<th>Prolonged dry spells and droughts, flood events, changing rainfall seasonality, increasing temperatures, increasing risk from intense wildfires.</th>
</tr>
</thead>
</table>
| Current barriers to scaling up and scaling out | - Lack of clear institutional mandates and partnership arrangements resulting in a lack of co-ordination and duplication.  
  - Cost of alien invasive plant clearing and follow-up management.  
  - Perceived lack of opportunities for local workers in current initiatives resulting in limited local support and possible resistance. |
| Factors of strength | - Existing well-functioning catchment management partnership models in some areas and general acceptance of the benefits thereof.  
  - Local expertise and champions at national and local levels.  
  - Long history of research into alien invasive plant species and eradication programmes and demonstrated benefits.  
  - Evidence of positive impact on improved water yield and quality, improved biodiversity, and potential to create jobs. |
| Adaptation rationale | Clearing of invasive alien plants increases base flow as well as the regulation of water flow, allowing agriculture and downstream economies to become more resilient to prolonged dry periods and floods. It restores ecosystem services that purify the water flowing downstream, where farmers and communities benefit from high quality water. In addition, it reduces the frequency and intensity of fire in a climate that is predicted to become warmer and drier and where the probability of wildfire is predicted to increase. |
| Objectives | - Learn from best practice integrated catchment management models already active in the province in terms of the bottom-up development of catchment management plans, partnership arrangements, financial models and job creation models  
  - Implement locally customised projects in two priority catchments specifically targeted at showing the potential benefits and role for the agricultural sector  
  - Agree on a flexible sustainable catchment management model that can be used to increase the scale of activities in all priority catchments in the Western Cape |
| Proposed Activities | - Document the well-functioning catchment management partnership projects in the Western Cape and their modus operandi, for use in guiding the facilitation and implementation of similar projects in priority areas, with inclusion of further components focused on creating additional livelihoods from the clearance and management process (that take local and seasonal labour dynamics into account).  
  - Establish collaborative catchment management partnership projects in two priority areas currently not serviced by similar projects, and are targeted specifically for demonstrating the benefits to and role of the agricultural sector. The projects should be based on the results and recommendations of the study described above. At least one of these projects should be located in the eastern parts of the Province.  
  - Identify project sites and undertake a status quo assessment of each that would include a biophysical template (land-type, land-use, water-model, agricultural types and extent), and an analysis of socio-economic conditions and local institutional structures  
  - Conduct a consultation process with all stakeholders  
  - Customise a collaborative implementation model for local conditions and partners  
  - Develop a Business Plan  
  - Develop a Monitoring Plan  
  - Enter implementation phase  
  - Document the process and outcomes with specific reference to building climate resilience  
  - Make recommendations for scaling up implementation |
### Potential impact

Despite a significant effort by CapeNature, Working for Water and LandCare, amongst others, to clear invasive alien plants, extensive tracts of land remain infested, and the list of species is growing. It is predicted that, at the given rates of spread (~10% / yr), current efforts will not be enough to limit further expansion. Given the scale of the problem and the expected increase in the threat, the wider testing and implementation of a well-functioning catchment management model would have a measurable impact on water yield and quality. A sustainable labour and financial model would have a significant positive impact on the livelihoods of poor rural communities.

### Scenarios

Integrated catchment management is able to provide resilience under both the “trend” and “shock” scenario. Although this kind of management cannot provide protection against significant drought or flood, the impacts of drought, floods and fire are substantially reduced when compared to a without-project scenario. Catchment water yield variability is reduced, water quality is improved, and groundwater resources are strengthened.

### Proposed Lead Institution

WCG: Agriculture (including LandCare) and the Catchment Management Agencies take the lead and provide critical capacity; service providers will be necessary for some aspects.

### Proposed Support Institutions

Water User Associations, CapeNature, WCG: EADP, DEA EPWP, Municipalities, WWF-SA, farmers, local communities and CBOs

### Beneficiaries

- Participating smallholder and commercial farmers as well as those located downstream of management activities.
- Unemployed and under-employed local workers
- Local communities and Municipalities that depend on water provisioning from catchments and effective fire management
- Indigenous species and local ecosystems

### Financing

Currently funded by a range of role players and farmers themselves. A sustainable financial model is needed that includes value-add opportunities.

### Timeframes

Start immediately; clearing takes 1-2 years; benefits can be seen after 2-5 years; regular maintenance thereafter until the invasive alien plants have been eradicated.

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### Spatial priorities

**Flagship #3: Catchment Management**

- 1 Bokkeveld
- 2 Bo-Langkloof - Outeniqua
- 3 Breede
- 4 Cape Town - Winelands
- 5 Cederberg
- 6 Grabouw - Villiersdorp - Franschhoek
- 7 GrootBrak-Plett
- 8 Hardeveld/ Sandveld-north
- 9 Hex
- 10 Knersvlakte
- 11 Koup
- 12 Little-Karoo
- 13 Montagu-Barrydale
- 14 Mossel Bay-Herbertsdale
- 15 Netspoort
- 16 Olifants irrigation
- 17 Piketberg
- 18 Rooikaroo-Aurora
- 19 Røens-East
- 20 Røens-West
- 21 Sandveld-South
- 22 Swartland
- 23 Tankwa-van Wyksdorp
4.4 Priority Project #4: Energy efficiency and renewable energy case studies to inspire the transition to low-carbon agriculture

Rationale

Energy (primarily diesel and electricity) is used at different stages of agricultural production and processing, including as fuel for farm vehicles, irrigation pumping, processing and cooling. Both diesel and electricity are mainly generated from fossil fuels, and their consumption is a significant source of greenhouse gas (GHG) emissions. Strong reliance on these energy sources in the agricultural sector is consequently increasing atmospheric CO$_2$ and anthropogenic climate change. In recent years, there has also been a significant rise in the cost of energy and the insecurity of supply.

At the same time, South African agriculture is coming under increasing pressure from export markets and consumers to reduce GHG emissions and the associated embodied emissions of agricultural products. The Catch-22 is that the projected increases in temperature as a result of climate change will escalate the need for irrigation and cooling, particularly in the Western Cape. Furthermore, the implementation of carbon taxation in South Africa may lead to further increases in energy costs.

A climate change response plan must, therefore, include priority efforts to reduce demand, increase energy-use efficiency, and transition to cleaner, renewable forms of energy such as wind, solar, hydropower and biomass.

The Energy Efficiency and Renewable Energy Priority Project achieved a high level of prioritisation at all the stakeholder workshops. It was particularly emphasised in regions with substantial irrigation farming and processing and cooling of fresh produce, the export-orientated fruit and wine industries, and intensive livestock-based operations such as the dairy industry. It is also currently highly prioritised by the Provincial Government through the Provincial Strategic Goal 1 Gamechanger “Sustainable Energy”.

Benefits accrue to the implementer (farmer, processor, agri-business) through reduced energy costs and risks of supply disruptions, potentially through future carbon tax offsets, and through more competitive global marketing. Benefits also accrue to Provincial and National Government through the contribution made to achieving government GHG emission reduction targets.

The uptake of energy-efficient and renewable energy technologies and approaches is driven within the agricultural sector by the need to secure a reliable energy supply to avert catastrophic risks, and by a conducive regulatory environment. The conditions for the former have started to become favourable, even though calculations differ widely between different farming and processing enterprises. However, the financial incentives available to farmers (e.g. tax rebates) are not well-known. The uncertainty still surrounding the regulatory environment (especially the question of feed-in tariffs) is causing many enterprises to take a “wait-and-see” approach. The factors mentioned here are considered to be some of the key barriers to implementation.
Through the stakeholder engagement process it became clear that the greatest need in this regard is for access to trustworthy information and professional service providers. This applies to both on-farm and factory energy auditing and recommendations for improvements in energy efficiency, and to the technical and financial designs for renewable energy installations.

**Implementation**

| Climate change risks which are addressed | · Reducing the cost of energy and associated costs of irrigation, processing and refrigeration will place agriculture in a better position to respond to predicted changes in temperature, rainfall and extreme events.  
· Reducing GHG emissions from the fossil-fuel dependent energy sources will contribute to global efforts to reduce anthropogenic climate change and the predicted effects thereof within the Western Cape. |
| Current barriers to scaling up and scaling out | · Uncertain regulatory framework  
· Withdrawal of previous subsidies for renewable energy  
· Lack of actionable information for specific applications |
| Factors of strength | · Growing technological capacity  
· High levels of motivation due to unreliable grid supply  
· Shrinking time for return on investment due to increasing energy prices |
| Mitigation rationale | The combustion of diesel and the use of coal-based electricity accounts for a significant fraction of GHG emissions generated by the agricultural sector in the Western Cape. Increases in efficiency of energy use and increase the use of renewable energy may significantly reduce the GHG emissions of agriculture. |
| Objectives | · Generate information based on tried-and-tested approaches to increasing energy use efficiency and developing renewable energy generation capacity on farms and in the agricultural value chain.  
· Gather information on financial models and mechanisms which can support investments by farmers and the value chain players at different scales  
· Make such information freely available using a range of web and print media |
| Proposed Activities | · Conduct and disseminate case studies across the agricultural value chain and for different contexts for energy efficiency improvements  
· Conduct and disseminate case studies across the agricultural value chain and for different contexts for renewable energy (RE) implementation  
· Disseminate the case studies  
· Encourage organised agriculture and commodity organisations to help farmers to step up the transition to reduced reliance on high carbon energy |
| Potential impact | The direct impact for the implementer is a reduction in energy costs in the medium-to long-term, and greater assurance of supply which reduces operational risks. Favourable access to international markets through reductions in the carbon footprint of producing, storing and packaging produce can also have an important impact. Indirectly, the impacts extend further to the demand for skilled manufacturers and technicians (job opportunities in the Green Economy) and the ability of government to achieve GHG emissions reductions targets as per UNFCCC processes. |
| Scenarios | Implementation of energy efficiency and renewable energy programmes encouraged by this project will reduce the GHG emissions of the agricultural sector, thus contributing to the provincial and national goals of contributing to global emissions reductions targets and transitioning to a low carbon economy. This will, in the global context and over the longer term, reduce the level of climate change, thus keeping the emerging future climate closer to the “trend” side of the scale and further from the “shock” side. |
| Proposed Lead Institution | WCG: Agriculture, GreenCape (Agriculture Sector Desk, Energy Desk) |
### Proposed Support Institutions
Commodity organisations, research institutions, WWF-SA, banks, value chain actors, WCG: EADP, WCG: EDAT, energy efficiency auditors, NCPC

### Beneficiaries
- Farmers and others in the value chain
- Audit and RE systems service providers
- Green Economy job seekers
- Provinicial and National Government striving to reach emissions reductions targets

### Financing
Energy efficiency measures and RE installations are currently funded by farmers, processors and packhouses themselves, with some financial incentives available from various sources. The Priority Project itself requires funding for the development of numerous case studies across the province. This could be obtained through the Energy Sustainability Gamechanger project, other sources of public funding, the NCPC, companies providing energy-related services, banks and companies in the agricultural value chain. Carbon revenues could become an important future source of funding.

### Timeframes
Approximately 12 months, depending on number of case studies, followed by extensive dissemination.

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**Spatial priorities**

Flagship #4: Climate Smart energy

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<th>Flagship #4: Climate Smart energy</th>
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<td>10. Knersvlakte</td>
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<td>4. Cape Town - Winelands</td>
<td>12. Little-Karoo</td>
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<td>23. Tankwa-van Wyksdorp</td>
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4.5 Priority Project #5: Climate-proofing the growth of agri-processing in the Western Cape

Rationale
Two major programmes (Project Khulisa\(^{10}\) of the WCG, and the AgriParks\(^{11}\) programme of DRDRL) which support the growth of local agri-processing, with significant job creation, are underway in the Western Cape. Agri-processing is a high-potential sector with clear competitive advantages. The long-term success of both projects depends, amongst others, on the availability of land, water and energy for increased primary production to supply the processing units, and on the provision of suitable infrastructure. It is important that the large investments made now will serve the beneficiaries for a long time, and do not turn into ‘stranded assets’ because existing and future climate risks and their impacts on land, water and energy, were not adequately taken into consideration.

The Climate-Proofing Agri-Processing Priority Project introduces the consideration of climate change into the planning and implementation phases of Project Khulisa and the AgriParks programme. The aim is to encourage the channelling of investments into climate-resilient and resource-efficient agri-processing opportunities within the Green Economy. This requires risk assessments which incorporate climate change, the development of strategies to mitigate these risks, and the identification of business models which can leverage additional opportunities presented by climate change.

The development of local value-add and smallscale processing (on-farm and in rural towns) as a climate change response measure was highly prioritised by stakeholders across the province during the SmartAgri consultations. These activities enable farmers to diversify their income, thus increasing resilience to climate risks. The results of the Multi-Criteria Analysis (MCA) of response options conducted for the SmartAgri project showed that this option ranked high in the rankings performed by nine experts.

Investment choices should consider that climate change is likely to increase the risks to primary production in some areas of the province, and increase the vulnerability of heat- and drought-sensitive crops and livestock. Climate change also increases the risks of resources needed for processing (water, energy) becoming scarcer, more uncertain, or too expensive for the production and processing of certain products. Furthermore, climate change is likely to increase the risk to critical infrastructure such as roads, storage facilities, processing plants, and airports and harbours (for exports), through the impacts of rising temperatures and increasing extreme weather events. The risks and vulnerabilities do, however, differ from district to district, depending on current and future climate scenarios.

\(^{10}\) Project Khulisa falls under the Western Cape Provincial Strategic Goal 1, which focuses on job creation and opportunities to help improve the Province’s economy, and runs between 2015 and 2019. The project focuses on what government and the private sector can do together to improve growth and job creation in the following three sectors: agri-processing, tourism and oil and gas. Through Project Khulisa, the aim is to double agri-processing in the Western Cape by 1. exploring new infrastructure projects, 2. improving regulation for this industry, and 3. promoting and supporting Western Cape products locally and abroad.

\(^{11}\) An Agri-Park (AP) as outlined in the Agri-Parks draft policy framework is a networked innovation system of agro-production, processing, logistics, marketing and training and extension services, located in district municipalities. As a network it enables a market-driven combination and integration of various agricultural activities and rural transformation services.
This project should assist in developing opportunities for both smallholder and commercial farmers at all scales, by unlocking market access and the development of niche markets and products. There are good financial reasons for the use of renewable energy and energy-efficient machinery in processing units, or the implementation of waste-to-energy systems such as biogas generation. The growth of agri-processing will depend on the provision of reliable and affordable water resources, both for production purposes and for processing facilities. This will require the identification of available water resources, and the possible need for additional water storage capacity or the introduction of water re-use systems. Water conservation and demand management plans will be essential. Crop and livestock species and breeds which are genetically suited to harsher and more variable climatic conditions should receive priority. Climate change risk assessments should be conducted for critical infrastructure along the entire value chain, to ensure the long-term sustainability of this infrastructure under a changing climate.

**Implementation**

<table>
<thead>
<tr>
<th>Climate change risks which are addressed</th>
<th>Prolonged dry spells and droughts, heavy rainfall and floods, changing rainfall seasonality, increasing temperatures and heat waves, unseasonal cold and frost, hailstorms, wildfires.</th>
</tr>
</thead>
</table>
| Current barriers to scaling up and scaling out | · Very tight timelines during the planning phases of Project Khulisa and the AgriParks programme with limited opportunity to conduct longer-term risk assessments.  
· A short-term lens emanating from political and market pressure and imminent delivery deadlines.  
· Low levels of awareness of linkages between climate change and the agricultural value chain, and of the spatial differences in impacts and vulnerability across the province.  
· Current infrastructure design standards are based on historic climate information that is not necessarily representative of future conditions under which the infrastructure will need to operate. |
| Factors of strength | · High levels of prioritisation, funding and visibility in the WCG and National Government, backed by policy.  
· Substantial benefits to smallholder and commercial farmers and to downstream communities and urban economies.  
· Opportunities to generate substantial long-term employment in remote rural areas.  
· Potential for greater promotion of climate smart agriculture through the deployment of additional extension personnel (as envisioned for AgriParks implementation). |
| Adaptation / mitigation rationale | · Adaptation: Local agri-processing based on climate-resilient crops and livestock provides a “pull factor” (market) for the production of climatically suited commodities. Processing capacity can absorb produce that is not of a suitable external quality for fresh marketing, including symptoms attributable to climate stress. More water- and energy-efficient processing will help to grow the sector and create jobs without placing undue additional stress on water and energy supplies, and can leverage the development of new water and energy sources.  
· Mitigation: The incorporation of renewable energy infrastructure would limit the additional greenhouse gas emissions arising from this type of economic development. Transport costs and cooling requirements are reduced through local processing, which also reduces greenhouse gas emissions. |
| Objectives                                                                 | · Bring climate change into the risk assessment of new processing capacity within the local context.  
|                                                                          | · Ensure that new processing plants are designed to be highly water- and energy-efficient.  
|                                                                          | · Promote the development of new and sustainable sources of water and energy to supply the agri-hubs.  
|                                                                          | · Promote the development of processing capacity based on climate-resilient crops and livestock.  
|                                                                          | · Ensure that new agri-processing infrastructure does not become a “stranded asset” as climate change takes hold. |
| Proposed Activities                                                      | · Project Khulisa is to assess and improve the resource efficiencies of prioritised agri-processing projects, thus mitigating the impact of climate change.  
|                                                                          | · Implement the commodity approach framework of WCG: Agriculture to smallholder support (or projects with a processing component) in such a way that due recognition is given to the impacts of current and future climatic realities across the value chain.  
|                                                                          | · Innovate and gain efficiency in agri-processing with a focus on mitigating the impacts of climate change.  
|                                                                          | · Bring climate change into the situational and risk assessment for each Agri-Park being developed in the Western Cape.  
|                                                                          | · Prioritise climate-resilient crops and livestock and resource-efficient processing options in Agri-Parks.  
|                                                                          | · Identify and develop investment opportunities in new processed crop-based products (including locally adapted niche products) for local and export markets.  
|                                                                          | · Promote locally processed products (primarily generated from climate-resilient crops and livestock) jointly with local agri-tourism for diversification.  
|                                                                          | · Investigate options and business models for the development of new and sustainable sources of water and energy.  
|                                                                          | · Conduct climate change risk assessments for critical infrastructure and design new infrastructure with the future climate in mind to reduce potential risks. |
| Potential impact                                                         | The current availability of water and energy have been incorporated into the assessment of challenges facing agri-processing within the Khulisa planning process, and in the planning of the AgriParks. Nevertheless, the current situation will change over time as the climate changes. Given the scale of investment and projected economic and social benefits, the broader assessment of risks brought on by climate change, and steps needed to mitigate these risks, would have a significant impact on increasing the long-term feasibility and benefits of these projects. The creation of sustainable jobs through these projects would have a significant positive impact on livelihoods of poor rural communities. |
| Scenarios                                                                | A locally integrated and resource-efficient processing sub-sector provides resilience under the “trend scenario” but can also provide some buffering under the “shock scenario” owing to its promotion of product and income diversification. |
| Proposed Lead Institution                                                | WCG: Agriculture, WCG: EDAT, GreenCape, DRDLR |
| Proposed Support Institutions                                            | District municipalities, DWS, WUAs, NGOs, research institutions, value chain actors |
| Beneficiaries                                                            | · Farmers (smallholder and commercial)  
|                                                                          | · Currently active agri-workers  
|                                                                          | · Unemployed and under-employed local workers  
|                                                                          | · Local communities  
|                                                                          | · Value chain players  
|                                                                          | · District and local municipalities |
| Financing                                                                | This project can “piggy-back” to a large extent on the resourcing for Project Khulisa and the AgriParks programme. Additional funding should be sought from public and private sources, as well as from national and global climate change financing (e.g. the Green Fund) aimed at increasing resilience and adaptive capacity. |
| Timeframes                                                               | Start immediately, complete by 2020. |
Spatial priorities

4.6 Priority Project #6: An integrated knowledge system for climate smart agricultural extension

Rationale
Agricultural extension and advisory services provided by government and the private sector play a pivotal role in increasing awareness of best agricultural practices amongst farmers. They also help farmers to plan and implement production-related activities, to monitor and keep records, and to solve problems as they arise. The SmartAgri project found that farmers need better access to information and knowledge, and context-specific guidance towards making on-farm decisions relating to climate change adaptation and mitigation. In the Western Cape, the government extension officers’ primary mandate is to provide support to smallholder and new commercial farmers (although not to the exclusion of established commercial farmers), and to support the Land Reform Programme. Extension officers also operate in other government institutions (e.g. CapeNature) and in the private sector (e.g. through some of the commodity organisations, and through WWF-SA). All of these services should play a central role in helping farmers to understand and act on the realities of climate change.

The Knowledge for Climate Smart Extension Priority Project aims to empower the agricultural (and related conservation) extension and advisory system to become the first port of call for farmers requiring relevant information and decision-support on climate smart agricultural practices and technologies. An integrated knowledge management system on climate change and agriculture, based on state-of-the-art
Science and local knowledge, is required which can be used towards mainstreaming climate change into extension training, and which provides practical and context-specific diagnostic tools for use in practice.

The strengthening of extension and advisory services in the provision of information and decision-support relating to climate change adaptation and mitigation was highly prioritised by stakeholders during the SmartAgri regional workshops. This SmartAgri response measure was also brought up as a key discussion point at the workshops and focus group meetings attended by government officials, agribusinesses, and some of the commodity-based focus groups. Furthermore, the results of the Multi-Criteria Analysis (MCA) of response options conducted during the SmartAgri project showed that mainstreaming climate change into the work of the extension and advisory services emerged as one of the highest priorities.

The key areas in which extension officers can promote climate smart agriculture include: (i) raising awareness and brokering knowledge on issues of climate change relevant to farming risks and practices in the specific agro-climatic zones; (ii) encouraging farmers to adopt tried and tested technologies for adaptation and mitigation, and to adopt improved methods of sustainable farming, (iii) helping to build resilience capacities among vulnerable farmers and farming communities, including efforts to improve household food security through the establishment of sustainable home and community food gardens; (iv) encouraging the wider participation of all stakeholders in addressing climate change risks and opportunities across the whole province; (v) informing farmers of opportunities in niche crops and markets, the green economy, agri-processing and agri-tourism, as means to build climate resilience through diversification; (vi) helping to develop appropriate frameworks for coping/adapting to climate change impacts; and (vii) providing the conduit for shared learning on local climate change risks and responses between farmers and institutions.

In this Priority Project, it is envisaged that extension officers will also play a very important role in encouraging on-farm record-keeping (e.g. recording of daily weather, pests and diseases, crop yields, and losses attributable to climate events; and recording of success stories relating to adaptation and mitigation), as well as systematic monitoring on farms to better understand the effect of climate smart practices and for early identification of changes and tipping points. Extension officers can also assist farmers in conducting a carbon footprint assessment, and guiding them to reducing their greenhouse gas emissions and energy costs. This kind of information, if fed back to the institutions responsible for sector-wide and provincial monitoring of climate change impacts and responses, will become invaluable as part of the larger integrated knowledge management system needed for SmartAgri and its monitoring component. In order to fulfil these expectations, extension officers require direct access to relevant climate and agricultural science and have the skills to use this knowledge when advising farmers.
## Climate change risks which are addressed

Prolonged dry spells and droughts, changing rainfall seasonality, increasing temperatures and heat waves, unseasonal cold and frost, more heavy rainfall and floods, hail- and windstorms, increasing risk of wildfires.

## Current barriers to scaling up and scaling out

<table>
<thead>
<tr>
<th>Barrier</th>
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<tbody>
<tr>
<td>· Lack of information materials, diagnostic and decision tools and operating procedures for practical inclusion of climate change considerations into on-farm extension and advice</td>
</tr>
<tr>
<td>· The time and commitment required to make approved changes to existing national extension training curricula</td>
</tr>
<tr>
<td>· Lack of an integrated public-private extension model that allows for collaboration and joint learning across the sector</td>
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</tbody>
</table>

## Factors of strength

<table>
<thead>
<tr>
<th>Factor</th>
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<tbody>
<tr>
<td>· Elements of sustainable agriculture and resource-use efficiency are already included in the agricultural extension programme</td>
</tr>
<tr>
<td>· Significant local expertise is available to help develop suitable training materials</td>
</tr>
<tr>
<td>· A strong and well-resourced focus exists on supporting smallholder and new commercial farmers who are most vulnerable and in need of on-farm support with regard to climate change understanding and response</td>
</tr>
<tr>
<td>· Extension services are also offered by some of the commodity groups and NGOs</td>
</tr>
</tbody>
</table>

## Adaptation / mitigation rationale

The success of both adaptation and mitigation in the agricultural sector depends critically on what actions farmers take in response to their on-farm risks. This emanates from their understanding and analysis of the issue, which in turn is framed by the broader rural knowledge system influenced by a multitude of role players (family, community, neighbours, local service providers, buyers, etc.). Effective responses require a trustworthy knowledge system that is science-based, technically and financially sound, and does not have unintended negative consequences. Extension officers can ideally provide access to such climate smart knowledge in a practical and context-specific manner, with significant benefits for building resilience to climate change at ground level and the wider impact zone.

## Objectives

<table>
<thead>
<tr>
<th>Objective</th>
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<tbody>
<tr>
<td>· Mainstream climate change into the provincial agricultural extension services through training and skills development, and the provision of decision tools</td>
</tr>
<tr>
<td>· Tailor and package climate change impacts and response information to agri-workers and farmers at all scales and for specific areas, for use in extension activities</td>
</tr>
<tr>
<td>· Include climate and impacts related monitoring in farmer record-keeping training for smallholder and new commercial farmers</td>
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</tbody>
</table>

## Proposed Activities

<table>
<thead>
<tr>
<th>Activity</th>
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<tbody>
<tr>
<td>· Develop practical, agro-climatic-zone-specific training materials for the inclusion of climate change into extension training</td>
</tr>
<tr>
<td>· Develop context-specific climate smart agriculture diagnostic tools and information materials for use by extension officers when advising farmers</td>
</tr>
<tr>
<td>· Encourage and work with DAFF to mainstream climate smart agriculture into the agricultural extension training curriculum</td>
</tr>
<tr>
<td>· Train extension trainers and existing extension officers to include climate smart agriculture in all aspects of extension provision including the value chain</td>
</tr>
<tr>
<td>· Strengthen continuous learning of extension officers on climate smart agriculture through opportunities offered by the private sector (e.g. symposia, expos, field days) and through using the GreenAgri portal</td>
</tr>
<tr>
<td>· Use the CCC project to train extension officers in using the carbon footprint calculator</td>
</tr>
<tr>
<td>· Incorporate the climate change risks and resource management guidelines for agricultural extension support into the project and proposal evaluation process of the commodity formations</td>
</tr>
<tr>
<td>· Integrate a minimum set of climate and impacts monitoring measurements into record-keeping training for smallholder and new commercial farmers</td>
</tr>
<tr>
<td>· Collaborate on the above with related extension services offered by CapeNature, WWF-SA and the private sector</td>
</tr>
<tr>
<td><strong>Potential impact</strong></td>
</tr>
<tr>
<td><strong>Scenarios</strong></td>
</tr>
<tr>
<td><strong>Proposed Lead Institution</strong></td>
</tr>
<tr>
<td><strong>Proposed Support Institutions</strong></td>
</tr>
</tbody>
</table>
| **Beneficiaries** | · Farmers (with emphasis on smallholder and new commercial but also more widely in the commercial sector)  
· Agri-workers on farms and within the value chain  
· Rural communities |
| **Financing** | To be funded primarily by DAFF and the WCG: Agriculture. Supporting funding should be sought from commodity organisations and national agricultural research and climate change research funds, the national and provincial Treasuries, and environment/conservation institutional partners such as CapeNature. Funding is mainly required for the initial mainstreaming activities – thereafter the project is run through the normal agricultural extension budgets. |
| **Timeframes** | Start immediately, mainstreaming complete by 2020, thereafter it remains embedded in agricultural extension, with curricula and tools regularly updated |
5.1 Strategic Focus Area 1

Promote a climate-resilient low-carbon production system that is productive, competitive, equitable and ecologically sustainable across the value chain.
Table 1. Strategic Focus Area 1: Promote a climate-resilient low-carbon agricultural sector that is productive, competitive, equitable and ecologically sustainable across the value chain

| Strategic goals: | • Improved availability of, equitable access to, and sustainable management of agricultural resources (land/soil, water, energy, genetic) for climate change adaptation: This includes a fair and equitable process for managing the allocation of scarce resources during critical (e.g. drought) periods, which takes into account differences in climate change vulnerability and risk  
  • Increased well-being of farm employees under climate stress  
  • Strategic land and water use planning for future climate-resilient production  
  • A transition towards low carbon agriculture and the Green Economy  
  • Climate-resilient and responsive value chain, food system and market development |

| Policy and legislative context: | • OneCape 2040: Green Cape, Working Cape, Educating Cape  
  • WC Provincial Strategic Plan: PSG1 and PSG4  
  • WC Agriculture Strategic Plan: all DSG but particularly DSG4  
  • WCG: EADP Strategic Plan: SOOG1 and SOOG4  
  • WC Green Economy Strategy Framework: Smart Agricultural Production  
  • WC Provincial Spatial Development Framework  
  • WC Sustainable Water Management Plan and River Improvement Plans  
  • WC Provincial Land Transport Framework  
  • WC Infrastructure Framework  
  • Draft Climate Change Adaptation and Mitigation Plan for the South African Agriculture and Forestry Sectors  
  • National Environmental Management Act (NEMA)  
  • National Water Act (NWA)  
  • Conservation of Agricultural Resources Act (CARA)  
  • Land Reform Act (LRA)  
  • Spatial Planning and Land Use Management Act (SPLUMA) |

| Barriers and risks: | • Land owners are unable, or unwilling to commit resources to land and catchment rehabilitation  
  • Farmers are unwilling to reduce their water consumption for fear of losing their allocations  
  • Untested technologies such as large-scale shade netting become maladaptive  
  • Market forces and value chain actors push farmers into making decisions that do not consider and may even counteract climate change adaptation and mitigation needs  
  • Rapid growth of settlements and human needs override decision making around land and water use to the detriment of resilient future agriculture  
  • Smallholder and new commercial farmers are shut out of access to the resources and technologies needed to attain resilience  
  • The sector is not well prepared for the implications of the carbon tax and it is therefore unable to capitalise on the opportunities this may offer |
**OBJECTIVE 1.1:** Promote climate smart soil and land use management practices  
**OUTCOME:** Soil and land use are managed in accordance with agro-ecological principles that take climate change into account  
**OUTCOME INDICATOR:** Continued long-term productivity of soils and agricultural landscapes

### 1.1.1 Increase Conservation Agriculture (CA) adoption rate across all commodities and farming systems

**Key enablers:** Policy environment, Financial incentives, Priority research, Partnerships

<table>
<thead>
<tr>
<th>Proposed Activities</th>
<th>Time-frame*</th>
<th>Lead &amp; support Institution</th>
<th>Link-ages</th>
</tr>
</thead>
</table>
| Develop partnerships between WCG:Agriculture and commodity organisations to drive the further adoption of CA, conduct long-term research and training on CA, and promote financial incentives for uptake of CA | S | Lead: WCG:Agriculture  
Support: commodity organisations, farmer organisations, CAWC, research institutions, training institutions, WCG:EADP, DEA, DAFF, National Treasury, organised agriculture, banks, insurance companies, WWF-SA, input suppliers, NGOs | 1.1.2  
1.2  
2.5  
3.1  
3.3  
3.4  
4.4.3 |

### 1.1.2 Scale up promotion of best practice soil fertility management in cultivated lands

**Key enablers:** Good working relationships between LandCare and farmers skills capacity in LandCare

<table>
<thead>
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<th>Activities</th>
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<th>Link-ages</th>
</tr>
</thead>
</table>
| Support land users with technical advice where water runoff control management plans and/or subsurface drainage plans are needed | S-M | Lead: WCG:Agriculture  
Support: commodity organisations, farmer organisations | 1.1.1  
1.2  
2.5  
3.1 |
| Promote strip cultivation to prevent wind erosion of cultivated fields and orchard crops | S-M | Lead: WCG:Agriculture  
Support: commodity organisations, farmer organisations, Sustainable Resource Management Committees | |

### 1.1.3 Restore ecological Infrastructure in vulnerable landscapes with the purpose of improving landscape productivity and the climate resilience of ecosystem services, while creating jobs and supporting socio-economic development

**Key enablers:** Research partnerships; Community participation

<table>
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<tr>
<th>Activities</th>
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<th>Lead &amp; support Institution</th>
<th>Link-ages</th>
</tr>
</thead>
</table>
| Plan and implement pilot landscape restoration projects with job creation objective, using appropriate implementation models and partnerships | S | Lead: WCG Departments (to be agreed)  
Research institutions  
Support: DAFF, DEA, EPWP, DWS, DRDLR, CMAs, WUAs, municipalities, CapeNature, SANBI, NGOs, SAEON, commodity organisations, farmer organisations, WWF-SA; Sustainable Resource Management Committees, communities | 1.1.2  
1.2  
2.2  
2.5  
4.4  
4.6 |

*Time needed from start to finish; S = 1-2 years, M = 3-5 years, L = >5 years, P = permanent

Indicates the parts of the Implementation Plan which are directly relevant to farmers i.e. where they can take action or get involved

Indicates Priority Projects
### Key enablers: Revised norms and standards; updated planning maps

<table>
<thead>
<tr>
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</thead>
</table>
| Agree to and adopt an ecological infrastructure zone (for climate change resilience) as a formal zoning option in land use planning maps | S          | Lead: WCG:EADP  
Support: WCG:Agriculture, CapeNature, DWS  
Support: WCG:Agriculture, CapeNature, DWS, DAFF, DEA | 2.2  
2.5  
4.4  
4.6 |
| Apply ecological infrastructure zoning to land use planning maps at provincial and municipal level | S-M        | Lead: WCG:EADP  
Support: WCG:Agriculture, CapeNature, DWS, DAFF, DEA | 2.2  
2.5  
4.4  
4.6 |
| Revise existing norms governing agricultural land use planning to incorporate climate change considerations and ecological infrastructure and optimise Area-Wide Planning and farm plans accordingly | S          | Lead: WCG:EADP  
Support: CapeNature, DAFF, WWF-SA  
Support: CapeNature, DAFF, WWF-SA | 2.2  
2.5 |
| Make stewardship and conservancy agreements with farmers less legally complicated and less costly | M          | Lead: CapeNature, WCG:EADP  
Support: WWF-SA, WCG:Agriculture  
Support: WWF-SA, WCG:Agriculture | 4.2 |
| Conduct fine-scale spatial mapping of farmer-owned areas with constrained farming potential, integrated with WCG:Agriculture’s Farm Mapper tool and CapeNature’s integrated spatial database, with the purpose of guiding the management of non-farmable areas | S-L        | Lead: WCG:Agriculture, WCG:EADP, CapeNature  
Support: WWF-SA, WCG:Agriculture  
Support: WWF-SA, WCG:Agriculture | 2.2  
2.5 |
| Increase measures to protect high potential arable land with water resources against encroachment by other land uses, including urban and peri-urban farmland | S-M        | Lead: WCG:Agriculture, WCG:EADP, DAFF  
Support: DWS, CMAs, municipalities, DRDLR, WWF-SA  
Support: DWS, CMAs, municipalities, DRDLR, WWF-SA | 1.2  
4.4 |
| Develop additional appropriate norms and standards which address climate change risks for use in the development of Environmental Management Frameworks (EMFs) of areas with high agricultural potential | S          | Lead: DEA  
Support: WCG:Agriculture, WCG:EADP, DRDLR, CSIR, WWF-SA  
Support: WCG:Agriculture, WCG:EADP, DRDLR, CSIR, WWF-SA | 1.3.2  
4.4 |
| Promote the approval of wind and solar farms without compromising agricultural objectives | M          | Lead: CapeNature, WCG:EADP  
Support: WWF-SA, WCG:Agriculture  
Support: WWF-SA, WCG:Agriculture | |
| Replicate and update fly over land use surveys (spatial intelligence) to monitor fine-scale agricultural land use and agricultural infrastructure across the Western Cape and track land use change trends | S-L        | Lead: WCG:Agriculture  
Support: DAFF  
Support: DAFF | 3.1.1 |
OBJECTIVE 1.2: Promote effective, efficient and sustainable management and use of water

OUTCOME: Water is managed and used sustainably and equitably and in support of increased resilience to climate change

OUTCOME INDICATOR: Water of sufficient quality and quantity remains sufficiently available to support optimal and appropriate agricultural water use

1.2.1 Manage and maintain agricultural water infrastructure to reduce water losses and risk, and pursue the feasibility of new water infrastructure in areas of greatest need under climate change

Key enablers: Skilled engineers

<table>
<thead>
<tr>
<th>Proposed Activities</th>
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<th>Linkages</th>
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</thead>
<tbody>
<tr>
<td>Assess the need for and feasibility of on-farm water storage capacity under current and future climate variability as per agro-climatic zone, focusing on areas where recent shifts in rainfall patterns and expected future shifts indicate an emerging need for water storage</td>
<td>S</td>
<td>Lead: WCG:Agriculture Support: DWS, WRC, farmer organisations, organised agriculture</td>
<td>1.6 2.5</td>
</tr>
<tr>
<td>Assess the additional economic importance of climate-resilient infrastructure under future climate uncertainty in the Western Cape and update methodologies for incorporating climate change into feasibility studies and design specifications</td>
<td>S</td>
<td>Lead: WCG:Agriculture, WRC, DWS</td>
<td>2.2 4.5</td>
</tr>
<tr>
<td>Reduce water losses and risk of catastrophic failure in existing ageing water distribution and on-farm water storage infrastructure through proactive maintenance and improvement where necessary, starting with the Olifants River catchment</td>
<td>S-L</td>
<td>Lead: WUA, DWS Support: WCG:Agriculture, organised agriculture, farmer organisations</td>
<td>2.2</td>
</tr>
<tr>
<td>Promote the consideration of climate change risk and incorporate adaptation options into the design of schemes currently under development to increase the storage capacity of existing dams (e.g. Clanwilliam Dam, Voëlvlei Dam, Brandvlei Dam, Steenbras Dam, etc.)</td>
<td>S-M</td>
<td>Lead: DWS Support: WCG: Agriculture, DEA</td>
<td>2.2 4.5</td>
</tr>
<tr>
<td>Re-evaluate engineering and design specifications for built infrastructure (e.g. bridges, culverts, dams, pump stations, etc.) to incorporate changing climate change risks (e.g. increased risk of flooding and flood magnitudes)</td>
<td>S-M</td>
<td>Lead: WCG:TPW, WUAs, WCG: Agriculture, DWS Support: WCG:DMC</td>
<td>2.2</td>
</tr>
<tr>
<td>Design river protection structures (e.g. groynes) to accommodate climate variability and extreme events</td>
<td>S-L</td>
<td>Lead: WCG:Agriculture Support: WCG:EADP, DWS, WCG:DMC</td>
<td>2.2</td>
</tr>
<tr>
<td>Use the River Maintenance Management Plans (MMPs) to ensure the maintenance of agricultural water infrastructure by affected community partners</td>
<td>S-M</td>
<td>Lead: WCG:Agriculture, WCG:EADP Support: farmer organisations, communities</td>
<td>2.2</td>
</tr>
<tr>
<td>Proposed Activities</td>
<td>Time-frame</td>
<td>Lead &amp; support Institution</td>
<td>Link-ages</td>
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<tr>
<td>Explore the linkages between water licensing and climate change adaptation in terms of temporary transfers and innovative context-appropriate licensing models that create more flexibility to deal with rainfall variability</td>
<td>S-M</td>
<td><strong>Lead:</strong> WRC, DWS, WCG:Agriculture, DAFF, CMAs <strong>Support:</strong> eLEAF, commodity organisations, other role players</td>
<td>1.6</td>
</tr>
<tr>
<td>Extend the spatial reach, temporal coverage (months of the year) and user base of the FruitLook programme to make it commercially viable, and provide interpretative tools for users</td>
<td>S</td>
<td><strong>Lead:</strong> WCG:Agriculture <strong>Support:</strong> eLEAF, commodity organisations, other role players</td>
<td></td>
</tr>
<tr>
<td>Promote water-saving irrigation systems and precision irrigation technologies</td>
<td>S-L</td>
<td><strong>Lead:</strong> Input suppliers, commodity organisations <strong>Support:</strong> farmer organisations</td>
<td></td>
</tr>
<tr>
<td>Assess the feasibility of increased utilisation of groundwater of suitable quality in areas of greatest need of additional water sources (per agro-climatic zone), in conjunction with available surface water sources, as a climate change adaptation strategy</td>
<td>S</td>
<td><strong>Lead:</strong> WRC, WCG:Agriculture <strong>Support:</strong> DWS, CMAs, GEOSS</td>
<td>1.2.1</td>
</tr>
<tr>
<td>Develop a model of groundwater availability and extraction which contributes to more resilient agriculture, starting with a pilot study in the Stanford-Gansbaai area</td>
<td>S-M</td>
<td><strong>Lead:</strong> BGCMA <strong>Support:</strong> DWS, WCG:Agriculture, WRC</td>
<td></td>
</tr>
<tr>
<td>As part of the promotion of best practice land management, encourage the protection / rehabilitation of recharge zones to facilitate greater infiltration and reduced surface water runoff during winter</td>
<td>S-L</td>
<td><strong>Lead:</strong> WCG:Agriculture <strong>Support:</strong> WWF-SA, DEA EPWP, commodity organisations, farmer organisations</td>
<td>1.1.1, 1.1.2, 1.1.3</td>
</tr>
</tbody>
</table>
1.2.6 Strengthen integrated catchment management (incl. clearing of invasive alien species and riparian protection and rehabilitation) for increased water flows and flood attenuation, through job creation and farmer incentives

**Key enablers:** Motivated partners, effective funding model

<table>
<thead>
<tr>
<th>Proposed Activities</th>
<th>Time-frame*</th>
<th>Lead &amp; support Institution</th>
<th>Link-ages</th>
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</thead>
<tbody>
<tr>
<td>Establish collaborative catchment management partnership projects (for increased water yield and quality) in two priority areas currently not serviced</td>
<td>S</td>
<td>Lead: WCG:Agriculture, CMAs, service provider&lt;br&gt;Support: WUAs, WCG:EADP, DEA, DWS, Municipalities, WWF-SA, CapeNature, farmer organisations, CBOs</td>
<td>2.2 2.5 4.4.3</td>
</tr>
<tr>
<td>Utilise River Maintenance Management Plans (MMPs) to support integrated catchment management and guide landowners on best practices for alien clearing, continued riverbank rehabilitation and appropriate physical infrastructure</td>
<td>S-L</td>
<td>Lead: WCG:Agriculture, WCG:EADP&lt;br&gt;Support: CMAs, WUAs, farmer organisations</td>
<td>2.2 2.5</td>
</tr>
<tr>
<td>Leverage the integrated catchment management aspects of existing sustainability certification programmes (e.g. WWF-SA Conservation Champions &amp; Sustainable Fruit Initiative) to enhance the competitive benefit of participants in the global market and encourage increased uptake</td>
<td>S-M</td>
<td>Lead: WWF-SA, IPW&lt;br&gt;Support: WiETA, SIZA, commodity organisations</td>
<td>1.7</td>
</tr>
</tbody>
</table>

1.2.6 Enhance quality of water used for agriculture through a reduction in agriculture-generated pollution and a strengthening of natural water services provided by healthy ecosystems

**Key enablers:** Key enablers: Enforcement capacity

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<tr>
<th>Proposed Activities</th>
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<th>Lead &amp; support Institution</th>
<th>Link-ages</th>
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<tbody>
<tr>
<td>Provide guidance to farmers and agri-processors on commodity-specific measures to reduce non-point and point pollution of surface and groundwater sources, in partnership with farmer and commodity organisations</td>
<td>S</td>
<td>Lead: WCG:Agriculture, farmer organisations, commodity organisations&lt;br&gt;Support: WCG:EADP, DWS</td>
<td></td>
</tr>
<tr>
<td>Protect and restore wetland ecosystems and riparian buffers for enhanced water purification services at farm and catchment scale</td>
<td></td>
<td>Lead: WCG:Agriculture, DEA EPWP&lt;br&gt;Support: WCG:EADP, WWF-SA, CapeNature, farmer organisations</td>
<td>1.2.4 1.2.5</td>
</tr>
</tbody>
</table>

**OBJECTIVE 1.3:** Promote efficient use of energy and development of renewable energy sources

**OUTCOME:** The transition to low-carbon energy sources and greater energy efficiency in agriculture reduces emissions

**OUTCOME INDICATOR:** Percentage reduction in greenhouse gas (GHG) emissions from energy use in agriculture

**1.3.1 Promote energy efficiency improvements at farm level and throughout the value chain**

**Key enablers:** Access to information
### Proposed Activities

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<tr>
<th>Time-frame*</th>
<th>Lead &amp; support Institution</th>
<th>Link-ages</th>
</tr>
</thead>
</table>
| S-L         | **Lead:** WCG:Agriculture, GreenCape (Agriculture Sector Desk)  
**Support:** WCG:EADP, commodity organisations, value chain actors | 3.6.1 |
| S           | **Lead:** WCG:Agriculture  
**Support:** commodity organisations, organised agriculture, research institutions, WWF-SA, value chain actors | 3.5.1  
3.6.1 |
| S-M         | **Lead:** WCG:Agriculture, GreenCape (Agriculture Sector Desk, Energy Desk)  
**Support:** WCG:EADP, commodity organisations, organised agriculture, WWF-SA, value chain actors | 3.5.1  
3.6.1 |

#### Key enablers: Access to information

## 1.3.2 Promote the use of renewable energy (RE) on farms and throughout the value chain

<table>
<thead>
<tr>
<th>Proposed Activities</th>
<th>Time-frame*</th>
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<th>Link-ages</th>
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</thead>
</table>
| GreenAgri portal provides referral to reputable renewable energy service providers, information on financial instruments which encourage solar photovoltaic (PV) systems installation, and information on the most up-to-date regulations regarding feed-in to grid | S-L | **Lead:** WCG:Agriculture, GreenCape (Agriculture Sector Desk, Energy Desk)  
**Support:** WCG:EADP, banks, WWF-SA, banks, commodity organisations, value chain actors | 3.6.1 |
| Conduct and disseminate case studies across the agricultural value chain and for different contexts for RE implementation, and promote uptake | S | **Lead:** WCG:Agriculture  
**Support:** commodity organisations, organised agriculture, WWF-SA, value chain actors | 3.5.1  
3.6.1 |
| Promote the use of RE in rural areas with unmet demand, where current Eskom infrastructure (supply) will not be expanded, and where future Smart Grid technology and regulatory framework can provide some farmers with a potential additional source of income and increase grid energy supply | S-M | **Lead:** WCG:Agriculture, GreenCape (Agriculture Sector Desk, Energy Desk)  
**Support:** WCG:EADP, commodity organisations, organised agriculture, WWF-SA, value chain actors, banks | 3.5.1  
3.6.1 |

## 1.3.3 Promote and provide guidance on waste-to-energy opportunities

<table>
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<tr>
<th>Proposed Activities</th>
<th>Time-frame*</th>
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<th>Link-ages</th>
</tr>
</thead>
</table>
| Assess and disseminate best practices and opportunities for waste-based co-generation to intensive livestock operations, wineries and fruit processors | S | **Lead:** GreenCape (Agriculture Sector Desk, Energy Desk)  
**Support:** WCG:EADP, WCG:Agriculture, commodity organisations, farmer organisations, value chain actors | 3.3  
3.6.1  
3.4.3  
3.4.4  
1.2 (waste water) |
OBJECTIVE 1.4: Develop and promote access to climate smart technology and genetic material

OUTCOME: Climate-resilient innovations in crops and livestock are developed and made accessible to farmers

OUTCOME INDICATOR: Farmer satisfaction with innovation, availability and accessibility of climate-resilient technologies

1.4.1 Stimulate and incentivise local technology innovation and on-farm testing for climate resilience at different operational scales

Key enablers: Access to technologies

<table>
<thead>
<tr>
<th>Proposed Activities</th>
<th>Time-frame</th>
<th>Lead &amp; support Institution</th>
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</thead>
<tbody>
<tr>
<td>Incorporate climate change considerations into crop and livestock development and testing programmes for specific agro-climatic zones</td>
<td>S-L</td>
<td>Lead: WCG:Agriculture, research institutions, input suppliers (seed companies and breeders)</td>
<td>1.4.4 3.3</td>
</tr>
<tr>
<td>Strengthen development and testing of heat- and drought-resilient cultivars and breeds of alternative crops and livestock</td>
<td>S-L</td>
<td>Lead: WCG:Agriculture, research institutions, input suppliers (seed companies and breeders)</td>
<td>1.4.4 3.3</td>
</tr>
<tr>
<td>Promote the local development of low-technology affordable production technologies and equipment with clear and early benefits for increased climate resilience and profitability (including technologies for heat stress management in crops and livestock)</td>
<td>S-M</td>
<td>Lead: Input suppliers Support: farmer organisations</td>
<td></td>
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1.4.2 Update suitability maps (indicating what crops can be grown where) to reflect current shifts and possible future new production areas for legacy and new crops

Key enablers: GIS skills and capacity

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</thead>
<tbody>
<tr>
<td>Integrate current expert knowledge of local crop suitability with state-of-the-art spatial (GIS) databases and create updated current suitability maps</td>
<td>S</td>
<td>Lead: WCG:Agriculture Support: research institutions, commodity formations</td>
<td>1.4.3 3.3</td>
</tr>
<tr>
<td>Spatially overlay future climate projections on the current maps and extend the analysis to crops not currently suitable, thereby creating a set of future suitability maps</td>
<td>S</td>
<td>Lead: WCG:Agriculture Support: research institutions</td>
<td>1.4.3 3.3</td>
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</table>

1.4.3 Invest in current climate-resilient crops with potential to scale up and scale out

Key enablers: Strong support structures

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<tr>
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<tbody>
<tr>
<td>Assess the agro-climatic suitability, market opportunities, value chain opportunities and financial models for indigenous teas, flowers, olives and other climate-resilient crops</td>
<td>S-M</td>
<td>Lead: WCG:Agriculture Support: research institutions, commodity formations, commodity organisations, value chain actors</td>
<td>1.4.2 3.3</td>
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</table>
**Proposed Activities**

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<tr>
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<tbody>
<tr>
<td>Assess the potential of new crops through a current and future climate lens according to agro-climatic zones</td>
<td>S-M</td>
<td><strong>Lead:</strong> WCG:Agriculture&lt;br&gt;<strong>Support:</strong> research institutions</td>
<td>1.4.2, 3.3</td>
</tr>
<tr>
<td>Assess the research and technology needs and development of quality standards for the identified potential new crops</td>
<td>S</td>
<td><strong>Lead:</strong> WCG:Agriculture&lt;br&gt;<strong>Support:</strong> DAFF, research institutions</td>
<td>1.4.1, 3.3.2</td>
</tr>
<tr>
<td>Promote the pioneering of on-farm testing of new crops in areas showing future potential</td>
<td>S-L</td>
<td><strong>Lead:</strong> Farmers, input suppliers&lt;br&gt;<strong>Support:</strong> WCG:Agriculture</td>
<td>1.4.1, 3.3.1</td>
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</table>

**Key enablers:** Product development research

**Proposed Activities**

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<tbody>
<tr>
<td>Strengthen the transfer of research results, new technology and practical advice relating to locally suited climate-resilient cultivars and breeds to commodity organisations and Farmer Support &amp; Development (FSD) for use in support to subsistence, smallholder and new commercial farmers</td>
<td>S-M</td>
<td><strong>Lead:</strong> WCG:Agriculture, commodity formations, commodity organisations</td>
<td>3.4.3, 3.5</td>
</tr>
<tr>
<td>Increase availability of and access to best suited zone-specific climate-resilient cultivars and breeds for subsistence, smallholder and new commercial farmers with associated advice and support</td>
<td>S-L</td>
<td><strong>Lead:</strong> WCG:Agriculture, commodity formations, ARC, input suppliers</td>
<td>3.4.3</td>
</tr>
</tbody>
</table>

**Key enablers:** Access to hard and soft technology

**OBJECTIVE 1.5: Protect agri-worker wellbeing**

**OUTCOME:** The agri-workers’ occupational health & safety and environmental quality is protected under climate change

**OUTCOME INDICATOR:** Agri-workers and their employers are enabled to understand and adapt to climate change threats and respond to opportunities

**Key enablers:** Motivated and knowledgeable trainers; Training materials available

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<tbody>
<tr>
<td>Facilitate the development of suitable materials for awareness raising regarding climate change amongst agri-workers and in rural communities</td>
<td>S</td>
<td><strong>Lead:</strong> WCG:Agriculture&lt;br&gt;<strong>Support:</strong> NGO service providers, DRDLR, organised agriculture</td>
<td>3.5</td>
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### Proposed Activities

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</table>
| Raise awareness of climate change within the WCG:Agriculture Directorate Rural Development Coordination | S-M        | **Lead:** WCG:Agriculture  
**Support:** DRDLR | 3.4.2     |
| Facilitate suitable training in terms of climate change and agri-worker awareness raising with approved/successful NGO bidders | S-M        | **Lead:** WCG:Agriculture  
**Support:** NGO service providers | 3.4.2  3.5  3.6 |
| Use existing structures provided by the CRDP Rural Nodes and NGOs to raise awareness of climate change | S-M        | **Lead:** WCG:Agriculture NGO service providers  
**Support:** DRDLR | 3.4.2  3.6.2 |
| Link agri-workers with entrepreneurial opportunities such as smallscale agri-processing, renewable energy sources, etc. | S-M        | **Lead:** WCG:Agriculture  
**Support:** NGOs, DRDLR, organised agriculture | 1.3  1.6 |

### 1.5.2 Investigate and support the development of guidelines for human heat management on farms

**Key enablers:** Motivated Provincial and National Departments

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</table>
| Facilitate a joint inter-departmental workshop on climate change health impacts on agri-workers to agree on a road map towards the development of guidelines for human heat management on farms and other climate change related health risks | S          | **Lead:** WCG:Agriculture  
**Support:** WCG:Health, WCG:Social Development, DOL, DOH, DOHS, DRDLR, organised agriculture | 4.4       |

### 1.5.3 Conduct an in-depth inter-disciplinary assessment of climate change impacts on agri-workers

**Key enablers:** Co-operative research environment

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</table>
| Conduct an in-depth inter-disciplinary assessment of climate change impacts on agri-workers and associated rural communities, including livelihood risks and the sufficiency of existing disaster relief mechanisms | S          | **Lead:** research institutions, WCG:Agriculture  
**Support:** WCG:Health, WCG:Social Development, DOL, DOH, DOHS, DRDLR, organised agriculture | 3.3  3.4.2 |

### OBJECTIVE 1.6: Build climate-resilient, low-carbon and responsive agricultural value chains and food system

**OUTCOME:** The agricultural value chain and food system is secure, stable, low-carbon and resource-efficient

**OUTCOME INDICATOR:** Growth and stability of sectoral economy with reduced environmental footprint across the value chain

### 1.6.1 Develop and invest in climate-resilient and resource-efficient agri-processing, value-adding opportunities and green job creation

**Key enablers:** Responsive and motivated Khulisa and Agri-Parks programme managers

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</table>
| Project Khulisa is to assess and improve the resource efficiencies of prioritised agri-processing projects, thus mitigating the impact of climate change | S          | **Lead:** WCG:Agriculture, WCG:EDAT, GreenCape  
**Support:** district municipalities, DWS, WUAs | 1.2  1.3 |
Proposed Activities | Time-frame* | Lead & support Institution | Link-ages
---|---|---|---
Implement the commodity approach framework of WCG:Agriculture to smallholder support in such a way that due recognition is given to the impacts of current and future climatic realities across the value chain | S-M | Lead: WCG:Agriculture Support: NGOs, WCG:EDAT, district municipalities |
Innovate and gain efficiency in agri-processing with a focus on mitigating the impacts of climate change | S-L | Lead: WCG:Agriculture Support: research institutions, value chain actors |
Bring climate change into the situational and risk assessment for each Agri-Park being developed in the Western Cape | S | Lead: DRDLR Support: WCG:Agriculture, district municipalities |
Prioritise climate-resilient crops and livestock and resource-efficient processing options in Agri-Parks | S-L | Lead: DRDLR Support: WCG:Agriculture, district municipalities, value chain actors |

### 1.6.2 Identify high-value export crops at risk that may benefit from greater opportunities for processing to absorb produce damaged by climate events

**Key enablers:** Responsive and innovative private sector

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</table>
Identify and develop investment opportunities in new processed crop-based products for local and export markets | S-L | Lead: value chain actors Support: commodity organisations, Wesgro |
Promote locally processed products jointly with local agri-tourism for diversification | S-M | Lead: value chain actors Support: commodity organisations, Wesgro |

### 1.6.3 Provide knowledge and advice, and support access to technologies and resources for climate-resilient food gardens at municipal level

**Key enablers:** A responsive FSD and NGOs; Climate change awareness in Local municipalities

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</table>
Develop and make available an assessment tool to determine commodity and resource vulnerabilities to climate risks for food garden farmers | S | Lead: WCG:Agriculture, research institutions Support: research institutions, commodity formations, local municipalities |
Make food gardens more climate-resilient through “training-of-trainers” on sustainable agro-ecological technologies for water (e.g. rainwater harvesting), energy (solar), soil (composting, mulching), integrated pest and disease management and crop choices | S-M | Lead: WCG:Agriculture Support: research institutions, NGO service providers |
Scale up and scale out the establishment of climate-resilient food gardens in impoverished settlements and farming areas using strong partnerships | S-M | Lead: WCG:Agriculture, NGO service providers Support: WCG:Health, WCG:Social Development, DOHS, district and local municipalities |
Incorporate a stronger evidence-based understanding of the linkages between agriculture and food systems / food and nutritional security, with consideration of climate change vulnerabilities, into provincial efforts to improve food security | S-L | Lead: WCG:Office of the Premier, WCG:Social Development, WCG:Health, WCG:Agriculture, WCG:Education Support: research institutions, district and local municipalities |
### Proposed Activities

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</table>
| S           | **Lead:** GreenCape  
**Support:** WCG:EADP, WCG:TPW, input suppliers (motorised equipment) | 1.3  
3.3 |

### Key enablers:
- Continued and expanded funding for development of commercially viable service Extended coverage

### Key enablers:
- Motivation and capacity of smallholder farmers

### Key enablers:
- Expert analytical capacity available within WCG:Agriculture

---

### 1.6.4 Investigate opportunities for alternative low-carbon transport fuels (pre- and post-farm-gate), including biofuels, and lower-carbon modes of transport to markets

### Key enablers:
- Relative cost of clean fuel alternatives

### Key enablers:
- Continued and expanded funding for development of commercially viable service Extended coverage

### Key enablers:
- Motivation and capacity of smallholder farmers

### Key enablers:
- Expert analytical capacity available within WCG:Agriculture
### OBJECTIVE 1.7: Develop and protect agricultural markets in a shifting climate

**OUTCOME:** Agricultural markets are stable and profitable in a shifting climate

**OUTCOME INDICATOR:** Growth and stability of sectoral economy

#### 1.7.1 Protect and promote access to existing export markets (e.g. residue and disease issues, carbon footprint, ethics)

**Key enablers:** Responsive commodity organisations

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<tbody>
<tr>
<td>Ensure that the sanitary environment in the crop and livestock industries facilitates continued access to established markets by enabling joint identification of standards which are likely to increase risk of non-compliance under climate change, with particular attention to pests, diseases and residues</td>
<td>S</td>
<td>Lead: commodity organisations, value chain actors  Support: WCG:Agriculture, DAFF, DTI</td>
<td>2.4 4.2</td>
</tr>
<tr>
<td>Make progress on the streamlining / convergence and cost reduction of audit and certification processes required for export including new requirements relating to climate change (integrating GlobalGap, sustainability, ethical and carbon footprint certifications)</td>
<td>S-M</td>
<td>Lead: commodity organisations, value chain actors – through SIZA/ Wieta  Support: WCG:Agriculture, CCC/Blue North, WWF-SA, DAFF, DTI</td>
<td>1.6.5 4.2</td>
</tr>
<tr>
<td>Develop the local market to better absorb products via increased consumer awareness of climate-resilient and sustainable local agricultural production, with greater opportunities for smallholder and new commercial farmers</td>
<td>S-L</td>
<td>Lead: WCG:Agriculture, DAFF, value chain actors  Support: commodity organisations, farmer organisations, South African Food Lab, Solidaridad</td>
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#### 1.7.2 Develop local and new export markets needed for new products developed as a result of climate change

**Key enablers:** Strong partnerships between public and private sectors

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<tbody>
<tr>
<td>Investigate the standards and requirements for market access for new products as identified in 1.4.4 and conduct market analysis</td>
<td>S</td>
<td>Lead: WCG:Agriculture, value chain actors  Support: WCG:EDAT, DAFF, DTI, Wesgro</td>
<td>4.2</td>
</tr>
<tr>
<td>Incorporate consideration of water and carbon footprints and other sustainability criteria in the understanding of opportunities in new markets for new products</td>
<td>S-M</td>
<td>Lead: WCG:Agriculture, value chain actors  Support: WCG:EDAT, DAFF, Wesgro, WWF-SA</td>
<td>1.6.5</td>
</tr>
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5.2 Strategic Focus Area 2

Strengthen effective climate disaster risk reduction and management for agriculture
| **Strategic goals:** | • Enhanced integration of agricultural disaster risk reduction into development planning and farmer support  
• Improved pro-active on-farm disaster risk reduction  
• Improved communications and early warning for farmers  
• Enhanced systems for monitoring and containment of fire, pest and disease threats |
|----------------------|-------------------------------------------------------------|
| **Policy and legislative context:** | • National Disaster Management Framework  
• WC Provincial Disaster Management Framework  
• National Drought Management Plan  
• National Agricultural Disaster Risk and Management Plan (under development)  
• WC Provincial Strategic Plan: PSG4  
• WCG: Agriculture Strategic Plan  
• WCG: EADP Strategic Plan  
• WC Climate Change Strategy & Implementation Framework  
• Municipal level Disaster Management Plans  
• National: Draft Climate Change Adaptation and Mitigation Plan for the South African Agriculture and Forestry Sectors  
• National Disaster Management Act  
• Various Acts relating to crop and animal diseases |
| **Barriers and risks:** | • Government and other role players do not have the financial and human resources to cope with increasingly frequent and intense climate-related disasters  
• DRR&M resources are preferentially allocated to protecting human lives, settlements and services infrastructure rather than agricultural landscapes and assets  
• Insufficient institutional capacity and too much red tape prevent the rapid containment of disasters and a timely recovery |
OBJECTIVE 2.1: Integrate climate change into joint disaster planning & strengthen disaster relief mechanisms

OUTCOME: Joint disaster planning and relief mechanisms are strengthened to reduce climate change impacts on agriculture

OUTCOME INDICATOR: Strengthened processes and mechanisms reduce damages suffered from climate disasters and provide support for recovery

2.1.1 Incorporate climate change risks into disaster planning and optimise internal and external co-operation

**Key enablers:** Sufficient resourcing; champion within WCG:Agriculture

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<tbody>
<tr>
<td>Integrate climate change into agricultural disaster management plans (e.g. Drought Plan, Flood Plan), in consultation with organised agriculture and commodity organisations</td>
<td>S-L</td>
<td><strong>Lead:</strong> WCG:Agriculture  <strong>Support:</strong> organised agriculture, commodity organisations, DAFF, DWS</td>
<td>4.4.3</td>
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<tr>
<td>Optimise resources and coordination by including other sub-programmes such as LandCare in all aspects of joint planning</td>
<td>S</td>
<td><strong>Lead:</strong> WCG:Agriculture  <strong>Support:</strong> DAFF</td>
<td>1.1.2 1.1.3</td>
</tr>
<tr>
<td>Strengthen disaster risk reduction through multi-stakeholder and inter-governmental dialogue on roles and responsibilities. Make specific reference to increased flood and fire risk caused by alien invasion and poor riparian management at the farming-river interface, through the joint development of River Maintenance Management Plans (MMPs)</td>
<td>S-M</td>
<td><strong>Lead:</strong> WCG:Agriculture  <strong>Support:</strong> WCG:DMC, DWS, DAFF, DEA, CapeNature, SANPARKS, WCG:EADP, organised agriculture, commodity organisations</td>
<td>1.1.2 1.1.3 1.2.5 4.4.3</td>
</tr>
<tr>
<td>Investigate self-organising collective action initiatives within farming communities which have made positive contributions to DRR&amp;M, in order to identify appropriate locally suited implementation models that can be promoted in high-risk or low-resource rural areas</td>
<td>S</td>
<td><strong>Lead:</strong> WCG:Agriculture, research institutions  <strong>Support:</strong> WCG:DMC, organised agriculture, farmer organisations, WWF-SA</td>
<td>4.4.3</td>
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2.1.2 Improve early warning systems (EWS) in co-operation with farmers and role players

**Key enablers:** Innovative approaches to communication

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<tbody>
<tr>
<td>Assess suitable, effective and low-cost communication channels for the dissemination of climate-related early warning advisories, including evaluation of successes and identification of gaps</td>
<td>S</td>
<td><strong>Lead:</strong> WCG:Agriculture  <strong>Support:</strong> SAWS, DAFF, organised agriculture, farmer organisations</td>
<td>3.6</td>
</tr>
<tr>
<td>Assess the current spatial resolution and accuracy of climate-related early warning advisories, with recommendations for improvement</td>
<td>S</td>
<td><strong>Lead:</strong> WCG:Agriculture  <strong>Support:</strong> SAWS, DAFF, organised agriculture, ARC</td>
<td></td>
</tr>
<tr>
<td>Investigate the potential for using existing crime prevention farming community networks, WUA networks, and FPA networks to disseminate climate-related early warning advisories</td>
<td>S</td>
<td><strong>Lead:</strong> WCG:Agriculture  <strong>Support:</strong> WCG:Community Safety, SAPS, SAWS, DAFF, organised agriculture, farmer organisations</td>
<td>4.4.3</td>
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</table>
OBJECTIVE 2.2: Protect agriculture’s physical and ecological infrastructure from climate disasters

OUTCOME: Climate-responsive capital infrastructure development, maintenance and investment are acknowledged as best practice

OUTCOME INDICATOR: Climate-responsive criteria are applied in project resourcing, planning and management

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<tr>
<td>Establish a provincial (WCG:Agriculture) annual contingency disaster fund for disaster relief and disaster risk reduction through implementation of the 1.2% sub-Departmental levy as per NDMF</td>
<td>S-M</td>
<td>Lead: WCG:Agriculture; Support: WCG:DMC, DAFF, WCG:Treasury</td>
<td>2.4.1</td>
</tr>
<tr>
<td>Assess previous climate-related disasters to identify historical damages and costs, and avoided costs due to risk reduction, for the purposes of future budget allocation, with incorporation of climate change trends</td>
<td>S</td>
<td>Lead: WCG:Agriculture; Support: WCG:DMC, DAFF, DWS</td>
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<tr>
<td>Promote the establishment of an improved national drought and disaster contingency fund comprised of separately-managed early response (for slow-onset disasters) and rapid response (for rapid-onset disasters) functions, and funding of risk reduction efforts in order to strengthen the resilience of high-risk communities</td>
<td>S-M</td>
<td>Lead: WCG:Agriculture; Support: DAFF, insurance companies</td>
<td>2.4.1</td>
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Key enablers: Motivated Provincial and National Departments

OBJECTIVE 2.3: Build local capacity in firefighting and fire risk reduction

OUTCOME: Firefighting capacity in high-risk agricultural areas is prioritised and resourced to meet the level of increasing risk

OUTCOME INDICATOR: Increased firefighting capacity (financial resources, registered FPAs, trained personnel) in high-risk areas

2.3.1 Train farmers and staff in firefighting and firebreak management and support the FPAs

Key enablers: Multi-institutional collaboration; champions in farming communities
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</table>
| DRM $^{25}$ unit in WCG:Agriculture with the support of Fire Fighting experts establishes proactive planning platforms with existing public and private fire protection agencies (FPAs) | S-M | **Lead:** WCG:Agriculture  
**Support:** WCG:DMC, FPASA, farmer organisations | 2.5 |
| Identify all existing institutions that provide training in firefighting for farming communities, and inform farming communities about training options in their areas | S | **Lead:** WCG:Agriculture  
**Support:** WCG:DMC, SANPARKS, CapeNature, Working on Fire, voluntary firefighting units, GEF Fynbos Fire Project, FPASA, farmer organisations | 4.4.3 |
| Identify high-risk areas without FPAs and provide support for the registration of FPAs in these areas with appropriate upskilling of members | S-M | **Lead:** WCG:Agriculture  
**Support:** WCG:DMC, SANPARKS, CapeNature, Working on Fire, voluntary firefighting units, GEF Fynbos Fire Project, FPASA, farming organisations | 4.4.3 |

**OBJECTIVE 2.4:** Strengthen co-operative systems to monitor and respond rapidly to pest- and disease-related crises brought on by climate change  
**OUTCOME:** Pest- and disease-related crises are rapidly contained through joint actions of those responsible  
**OUTCOME INDICATOR:** Estimate of economic damages avoided

**2.4.1 Strengthen understanding of and infrastructure for proactive co-operative monitoring of pests and diseases, and rapid response to outbreaks including fast-release financial mechanisms**

**Key enablers:** Motivated National Departments and commodity organisations

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| Establish bi-lateral and multi-lateral partnerships with other countries (e.g. Kenya, Benin, Sweden) to establish knowledge exchange on climate change and changing crop and livestock health risks | S-M | **Lead:** DAF, DTI, DIRCO  
**Support:** commodity organisations | 3.3 |
| Raise awareness of climate change / health and sanitary risks at key industry symposia and information days | S-M | **Lead:** commodity organisations, WWF-SA, NGOs | 3.6 |
| Construct a sterilisation / product consolidation facility to enable the Western Cape agricultural sector to continue with exports in the face of new pests migrating south owing to climate change | M | **Lead:** WCG:Agriculture, private sector investors, DTI | |
| Establish a secure contingency fund for disaster relief and compensation in the event of a major crop or livestock epidemic, with a fast-track process for the release of funds | S-M | **Lead:** WCG:Agriculture  
**Support:** WCG:DMC, DAFF, WCG:Treasury | 2.1.3 |

**2.4.2 Strengthen knowledge and technical capacity for proactive collaborative monitoring of crop pests and diseases**

**Key enablers:** Champions in the crop health sector; strong partnerships; awareness in commodity organisations

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</table>
| Develop five case studies for key pest and disease complexes using scenario planning and fundamentals including literature review:  
1. Fruit fly complex  
2. Moth complex  
3. Nematode complex  
4. Sucking insect complex  
5. Mildew complex | S | **Lead:** commodity organisations research arms (crops)  
**Support:** DAF, research institutions, value chain actors | 3.3 3.5 |
### Proposed Activities

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<thead>
<tr>
<th>Addressed thematic area</th>
<th>Time-frame</th>
<th>Lead &amp; support Institution</th>
<th>Link-ages</th>
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<tbody>
<tr>
<td><strong>Industries to fund smaller targeted research projects for ecophysiological and modelling studies</strong></td>
<td>S-M</td>
<td>Lead: commodity organisations research arms (crops) Support: research institutions</td>
<td>3.3 3.5</td>
</tr>
<tr>
<td><strong>Enable strengthening of training in entomology and pathology for industry technicians and management/leadership with inclusion of climate change risks</strong></td>
<td>S-M</td>
<td>Lead: education and training institutions Support: commodity organisations (crops), value chain actors</td>
<td>3.4 3.5</td>
</tr>
<tr>
<td><strong>Conduct a multi-disciplinary cross-industry 2-to-3-day workshop: identify issues, prioritise, inform management, and assess/estimate avoided costs of a proactive coordinated approach</strong></td>
<td>S</td>
<td>Lead: commodity organisations (crops) Support: WCG:DMC, value chain actors</td>
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</table>

#### 2.4.3 Strengthen knowledge and technical capacity for proactive collaborative monitoring of livestock pests and diseases

**Key enablers:** Champions in the livestock health sector; Strong partnerships; Awareness in commodity organisations

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</thead>
<tbody>
<tr>
<td><strong>Strengthen veterinary support for smallholder and new commercial livestock farmers through targeted advice, training and vaccinations, and awareness-raising of climate change risks</strong></td>
<td>S-L</td>
<td>Lead: WCG:Agriculture Support: DAFF, farmer organisations</td>
<td>3.4 3.5 3.6</td>
</tr>
<tr>
<td><strong>Include climate change risks to animal health in project risk assessments of the commodity formations and DRDLR, with stronger communication between WCG:Agriculture (especially FSD and Veterinary Services), DRDLR, and Municipalities from day one</strong></td>
<td>S</td>
<td>Lead: WCG:Agriculture, DRDLR Support: Municipalities</td>
<td>4.4</td>
</tr>
<tr>
<td><strong>Include climate change risks in all animal disease contingency plans</strong></td>
<td>S-L</td>
<td>Lead: WCG:Agriculture Support: commodity organisations</td>
<td></td>
</tr>
<tr>
<td><strong>Get climate change onto the agenda of the Centre for Disease Control (livestock) [CDC]</strong></td>
<td>S</td>
<td>Lead: CDC (WCG:EADP, WCG:Agriculture, COCT, WCG:DMC, Hospitals, WCG:Social Development etc.)</td>
<td>4.4</td>
</tr>
<tr>
<td><strong>Increase veterinary services capacity by filling vacant posts, especially in the Provincial Laboratory</strong></td>
<td>S-M</td>
<td>Lead: WCG:Agriculture Support: WCG:Treasury</td>
<td></td>
</tr>
</tbody>
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**OBJECTIVE 2.5:** Incentivise proactive climate change disaster risk reduction

**OUTCOME:** Broad-based incentives for climate change disaster risk reduction are available and accessible to farmers

**OUTCOME INDICATOR:** Innovative incentives are offered to proactive farmers

#### 2.5.1 Incentivise / reward proactive on-farm climate disaster risk reduction based on best practice environmental, conservation and land management

**Key enablers:** Buy-in by government and insurance companies

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<tbody>
<tr>
<td><strong>Expand the criteria for on-farm disaster assessments to include sustainable and climate smart agricultural practices in order to encourage proactive disaster risk reduction within a viable business model</strong></td>
<td>S</td>
<td>Lead: WCG:Agriculture Support: WCG:DMC, organised agriculture, industry best practice initiatives, WWF-SA Sustainable Agriculture, insurance companies</td>
<td>1.1 1.2 2.2</td>
</tr>
<tr>
<td><strong>Assess the viability of establishing appropriate micro-insurance and/or index insurance schemes for smallholder farmers</strong></td>
<td>S</td>
<td>Lead: micro-insurance and insurance companies Support: WCG:Agriculture</td>
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### Proposed Activities

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<td>S</td>
<td><strong>Lead:</strong> WCG:Agriculture (link to Simfini financial record keeping programme) <strong>Support:</strong> organised agriculture, commodity organisations, farmer organisations, banks, insurance companies</td>
<td></td>
</tr>
</tbody>
</table>

**Key enablers:** Buy-in from senior management

### OBJECTIVE 2.6: Strengthen and optimise the WCG:Agriculture’s role in the bigger DRR&M system

**OUTCOME:** WCG:Agriculture is recognised and resourced to play a strong role in enabling disaster risk reduction and relief for farmers

**OUTCOME INDICATOR:** Disaster relief is allocated more quickly and subsequently reaches qualifying farmers faster

#### 2.6.1 Re-evaluate the human and financial capacity of the DRM unit and optimise its role in the DRM system

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<tr>
<td>S</td>
<td><strong>Lead:</strong> WCG:Agriculture</td>
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**Key enablers:** Willingness to share experience

### Proposed Activities

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<tr>
<td>S-M</td>
<td><strong>Lead:</strong> WCG:Agriculture</td>
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**Key enablers:** Buy-in from senior management

### 2.6.2 Formalise the role of LandCare (Western Cape) and other sub-programmes in promoting proactive disaster risk reduction and post-disaster relief and recovery

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<tr>
<td>S-M</td>
<td><strong>Lead:</strong> WCG:Agriculture</td>
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</table>

**Key enablers:** Buy-in from senior management
5.3 Strategic Focus Area 3

Strengthen monitoring and data and knowledge management and sharing, and lead strategic research regarding climate change and agriculture.
Table 3. Strategic Focus Area 3: Strengthen monitoring, data and knowledge management and sharing, and lead strategic research for climate change and agriculture

| Strategic goals: | • Improved monitoring to support better planning, operational support, improved efficiencies, and adaptive management  
| | • Improved and open access databases supporting climate smart agriculture  
| | • Consolidated knowledge base and pursuance of gaps in knowledge  
| | • Better access to knowledge for all in a user friendly format and through effective outreach  
| | • Inclusion of climate change in agricultural education, training and skills development |

| Policy and legislative context: | • WCG: Agriculture Strategic Plan: All DSG and specifically DSG7  
| | • WC Green Economy Strategy Framework: knowledge management  
| | • WC Sustainable Water Management Plan and River Improvement Plans: Strategic Goal - Ensure effective and appropriate information management, reporting and awareness-raising of sustainable water management  
| | • National Agricultural Research and Development Strategy  
| | • National: Draft Climate Change Adaptation and Mitigation Plan for the South African Agriculture and Forestry Sectors |

| Barriers and risks: | • The private sector gains an increasing monopoly on data, knowledge, intellectual property (e.g. patented technologies) and extension services, making these accessible only to wealthier farmers  
| | • The sector is unable to attract an interested and skilled new generation of farmers, service providers, researchers and extension officers who can become agents of transformation  
| | • Agricultural research remains critically underfunded |
**OBJECTIVE 3.1:** Conduct long-term monitoring of parameters relevant to agriculture and climate change  
**OUTCOME:** Long-term data on trends in climate change impacts and responses in agriculture are captured and managed  
**OUTCOME INDICATOR:** Data exist and are used to track trends

### 3.1.1 Design and implement a Monitoring Programme drawing on existing databases and filling key data and analytical needs

**Key enablers:** Financial, human and IT resourcing

<table>
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<tr>
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<tbody>
<tr>
<td>Identify relevant existing databases (e.g. agri statistics, marketing, disasters, LandCare and veterinary data) within WCG:Agriculture and WCG:EADP, and render these suitable for climate change impacts and response monitoring for SmartAgri Plan</td>
<td>S</td>
<td><strong>Lead:</strong> WCG:Agriculture, WCG:EADP</td>
<td>1.1.1 2.4.1 3.4.4 1.2.3</td>
</tr>
<tr>
<td>Identify key data gaps for M&amp;E indicators</td>
<td>S</td>
<td><strong>Lead:</strong> WCG:Agriculture, WCG:EADP</td>
<td>1.1.2 1.1.3</td>
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</tbody>
</table>
| Develop and implement an M&E and documentation model for collaborative LandCare (Western Cape) projects in order to capture long-term outcomes, impacts and costs and benefits, and the building of climate change resilience, which can be replicated to other landscape-level initiatives | S          | **Lead:** WCG:Agriculture  
**Support:** CapeNature, SANBI, DAFF, research institutions |           |
| Initiate a dialogue with SAEON, DST, DEA, DWS, SANBI, ARC, CSIR, WWF-SA, CapeNature and commodity organisations on collaborative opportunities for long term monitoring and data collection and management for M&E to fill identified gaps | S          | **Lead:** WCG:Agriculture, WCG:EADP  
**Support:** SAEON, DST, DEA, DWS, SANBI, ARC, CSIR, WWF-SA, CapeNature, commodity organisations, CCC project |           |
| Incorporate regularly updated fly-over land use surveys (spatial intelligence) at agreed-upon intervals into M&E process in order to monitor changes and trends in agricultural land use across the Western Cape Province over time | S-L        | **Lead:** WCG:Agriculture                   | 1.1.4     |
| Develop a Monitoring Programme for the SmartAgri Plan                               | S          | **Lead:** WCG:Agriculture, WCG:EADP         |           |
| Identify a designated staff member in both WCG:Agriculture and WCG:EADP to manage data access, collection, quality control, analysis and “fit for purpose” as per Monitoring Programme, and make this information available for M&E reporting | S          | **Lead:** WCG:Agriculture, WCG:EADP         |           |

### 3.1.2 Include climate- and impacts-related monitoring in record-keeping training for smallholder and new commercial farmers

**Key enablers:** Easy-to-use system for farmer-led monitoring

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</table>
| Agricultural extension services integrate a minimum set of climate and impacts monitoring measurements into record-keeping training for smallholder and new commercial farmers | S          | **Lead:** WCG:Agriculture  
**Support:** commodity organisations | 3.1.1 3.4.3 |
**OBJECTIVE 3.2:** Strengthen climate data and services for agriculture

**OUTCOME:** Climate data and services for agriculture meet user needs

**OUTCOME INDICATOR:** Users are satisfied as assessed through a user survey

### 3.2.1 Strengthen existing weather forecasting services and assess the feasibility of new forecasting services to deal with climate variability under climate change more effectively

**Key enablers:** Accessible forecast data and information

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<tbody>
<tr>
<td>Support and refine Agri-Outlook services to provide more timely and directed livestock- and crop-specific information and interpretation of climate data for planning and disaster risk management purposes</td>
<td>S</td>
<td>Lead: WCG:Agriculture</td>
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<td></td>
<td></td>
<td>Support: commodity organisations</td>
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<tr>
<td>Assess the feasibility of providing 10-to-15-day forecasts that quantify level of uncertainty, seasonal outlooks, and medium-term (2-10-year) climate outlooks for farming applications necessary for responding to changing climate variability, and identify capacity amongst partners to provide these services</td>
<td>S</td>
<td>Lead: SAWS, DAFF</td>
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<td>Support: CSAG, CSIR</td>
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### 3.2.2 Provide leadership in negotiations around open access to data and data integration

**Key enablers:** Motivated partners

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<tbody>
<tr>
<td>Establish a dialogue between WCG:Agriculture, SAWS, ARC, DAFF and WCG:DMC to discuss and agree on modalities and fee structures for improved access to climate data as part of the Open Data Policy for the Western Cape</td>
<td>S</td>
<td>Lead: WCG: Agriculture, SAWS, ARC, DAFF, WCG:DMC</td>
<td></td>
</tr>
<tr>
<td>Conduct negotiations between WCG:Agriculture, public research institutions and data holders (SAWS, ARC) to ensure that climate data required for agricultural research are made available free of charge</td>
<td>S</td>
<td>Lead: WCG: Agriculture, SAWS, ARC, DAFF</td>
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<tr>
<td>Support: CSAG, CSIR</td>
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<tr>
<td>Compile and maintain a list of metadata on existence, locality and modes of access to climate data</td>
<td>S-M</td>
<td>Lead: WCG:Agriculture, DAFF</td>
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<tr>
<td>Support: CSAG, CSIR, SAEON, service providers</td>
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### 3.2.3 Maintain a widely approved and accessible ensemble of climate model data, upon which future impacts research and scenario development for agriculture is based

**Key enablers:** A champion who can facilitate wide-ranging discussions between modellers, intermediaries and agriculture

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<tbody>
<tr>
<td>Develop a Memorandum of Understanding between WCG:Agriculture, CSAG and CSIR that ensures modalities of access to agricultural researchers of an approved ensemble of climate models and data, with necessary interpretative guidelines and caveats</td>
<td>S</td>
<td>Lead: WCG:Agriculture, CSAG, CSIR</td>
<td></td>
</tr>
</tbody>
</table>
### OBJECTIVE 3.3: Lead strategic research partnership

**OUTCOME:** Agricultural research forum has leverage to encourage and direct coordinated climate change-related research to fill strategic research gaps

**OUTCOME INDICATOR:** Increased number of targeted climate change-related research projects

#### 3.3.1 Promote and incentivise practical, on-farm, locally relevant research on climate change impacts, adaptation and mitigation in partnership with smallholder and commercial farmers

**Key enablers:** Champions for on-farm research

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<tbody>
<tr>
<td>Capture climate- and sustainability-related project experiences on smallholder and new commercial farms as part of a long-term research project within WCG:Agriculture, and feed results into decision making and advice within CPAC/DPAC and FSD</td>
<td>S-M</td>
<td><strong>Lead:</strong> WCG:Agriculture</td>
<td>1.6.1, 3.4.3</td>
</tr>
<tr>
<td><strong>Support:</strong> commodity formations within the commodity approach framework</td>
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<tr>
<td>Promote field days for mixed groups of new and established commercial and smallholder farmers to view and discuss on-farm research relating to climate change risks, adaptation and mitigation</td>
<td>S-M</td>
<td><strong>Lead:</strong> commodity organisations, farmer organisations, input suppliers, organised agriculture</td>
<td>3.4.4, 3.6.2, 3.4.3</td>
</tr>
<tr>
<td><strong>Support:</strong> WCG:Agriculture</td>
<td></td>
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<tr>
<td>Investigate options for acknowledging and rewarding farmers who collaborate with researchers on significant on-farm climate-related research and knowledge dissemination</td>
<td>S</td>
<td><strong>Lead:</strong> commodity organisations, farmer organisations, organised agriculture, private sector</td>
<td>3.4.4, 3.6.2, 3.4.3</td>
</tr>
<tr>
<td><strong>Support:</strong> WCG:Agriculture</td>
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<tr>
<td>Promote legal entity status for alternative and new crops with structures and capacity for the promotion of on-farm research relating to climate change risks and adaptation</td>
<td>S-M</td>
<td><strong>Lead:</strong> farmer organisations</td>
<td></td>
</tr>
<tr>
<td><strong>Support:</strong> WCG:Agriculture</td>
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#### 3.3.2 Jointly map research gaps against current data availability and knowledge, then identify new research needs for targeted focus and implementation

**Key enablers:** Champion for research mapping and coordination

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<tbody>
<tr>
<td>Perform a sector-wide integrated information assessment and mapping of research gaps and priorities, drawing on commodity-driven gap analyses, and identifying areas of common current research and future research needs for possible collaboration and greater research efficiency</td>
<td>S</td>
<td><strong>Lead:</strong> research institutions, WCG:Agriculture (WCARF)</td>
<td>3.5.1</td>
</tr>
<tr>
<td><strong>Support:</strong> WCG:Agriculture, commodity organisations</td>
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</tr>
<tr>
<td>Provide a coordinating, steering and review function, through the WCARF (or similar), for the implementation of research projects and programmes to address identified needs</td>
<td>S-M</td>
<td><strong>Lead:</strong> research institutions, WCG:Agriculture (WCARF)</td>
<td>3.1, 3.2, 3.3.1, 3.4, 3.5, 3.6</td>
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<tr>
<td><strong>Support:</strong> all institutions doing relevant research</td>
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</table>
### OBJECTIVE 3.4: Training and skills development and extension for climate smart farming

**OUTCOME:** Public-Private-Partnership and other models for extension training and agricultural education supporting climate change up-skilling are launched

**OUTCOME INDICATOR:** Climate change up-skilling in extension and education is launched

### 3.4.1 Stimulate climate change awareness amongst children in rural areas

**Key enablers:** Responsive programme managers

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<tbody>
<tr>
<td>Junior LandCare to update and expand climate change education in their activities</td>
<td>S-M</td>
<td>Lead: WCG:Agriculture, Support: WCG:Education, CBOs, rural schools</td>
<td>1.6.3</td>
</tr>
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### 3.4.2 Mainstream climate smart agriculture and the Green Economy into agricultural training at secondary and tertiary level, with provision of bursaries for this field of study

**Key enablers:** Responsive curriculum and course developers

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<tbody>
<tr>
<td>Target identified gaps (in climate smart agriculture and green economy knowledge and skills across the value chain) with specific training interventions for agri-workers sourced from existing registered training service providers</td>
<td>S-M</td>
<td>Lead: WCG:Agriculture, Support: NGO service providers, WCG:Education, AgriSETA</td>
<td>1.5.1</td>
</tr>
<tr>
<td>Include climate change related training (with identification of climate change and green economy related work opportunities across the value chain) in existing rural youth development programmes (see training of NGOs in 1.5)</td>
<td>S-M</td>
<td>Lead: WCG:Agriculture, Support: DRDLR, AgriSETA</td>
<td></td>
</tr>
<tr>
<td>Lobby the DOBE to mainstream climate smart agriculture into the secondary school curriculum</td>
<td>S-M</td>
<td>Lead: WCG:Agriculture, WCG:Education, Support: DOBE, DAFF</td>
<td></td>
</tr>
<tr>
<td>Lobby the DOHET to mainstream climate smart agricultural science into the higher education curriculum</td>
<td>S-M</td>
<td>Lead: WCG:Agriculture, DOHET, Support: Ebenburg Agricultural Training Institute (EATI), Boland College (FET), AgriSETA, CPUT, SU, NMMU, DAFF, UWC</td>
<td></td>
</tr>
<tr>
<td>canvass bursary and internship providers to provide climate smart agriculture and green economy bursaries and internships to deserving tertiary students</td>
<td>S-M</td>
<td>Lead: Tertiary agricultural training institutions, WCG:Agriculture, commodity organisations, Support: DAFF, NRF, DST</td>
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### 3.4.3 Mainstream climate change into the provincial agricultural extension services through training and skills development, and the provision of decision tools

**Key enablers:** Strategic and critical emphasis on climate change in extension

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<tbody>
<tr>
<td>Mainstream climate smart agriculture into the agricultural extension training curriculum and further training of extension officers, and include opportunities offered by the private sector (e.g. symposia, expos, field days, walks and talks)</td>
<td>S-M</td>
<td>Lead: WCG:Agriculture, Support: DAFF, commodity formations, commodity organisations, farmer organisations, SASAE, WWF-SA</td>
<td>1.1.1, 1.2.3, 1.3.3, 1.4.5, 1.6.3, 3.1.2, 3.3.1, 3.4.3, 3.5.1, 3.5.2</td>
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### Key enablers: Willingness by role players

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</table>
| Engage with all opportunities to contribute to current DAFF-led discourse and development of public-private agricultural extension policy in South Africa that will offer increased capacity to integrate climate change understanding and responses into extension work | S-M | Lead: WCG:Agriculture, DAFF  
Support: commodity organisations, commodity formations, research institutions | 3.1.1  
1.1.1  
1.3.3  
3.4.3  
3.5.1  
1.6.3 |

### OBJECTIVE 3.5: Develop user-friendly information products relating to climate change and agriculture

**OUTCOME:** User-friendly information products about climate change and agriculture are available

**OUTCOME INDICATOR:** Examples of products

### 3.5.1 Tailor and package climate change impacts and response information for agri-workers and farmers at all scales and for specific areas

**Key enablers:** Communication and subject expertise

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</table>
| Identify information needs for agri-workers and farmers, develop information material that is spatially aimed and commodity-specific with regard to target audiences, and disseminate using various communication channels, extension and industry development programmes | S | Lead: WCG:Agriculture  
Support: NGO service providers, commodity organisations, organised agriculture, communications service providers, WCG:EADP | |

### 3.5.2 Capture and make available local knowledge and institutional memory relating to climate variability, impacts, and responses on farms, with focus on smallholder and new commercial farmers

**Key enablers:** Interest and co-operation from older sector experts; time and research budget available

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</table>
| Form a task team to assess the most effective way to capture local and institutional knowledge relating to historically effective climate responses and make this knowledge available to smallholder and new commercial farmers | S | Lead: WCG:Agriculture  
Support: commodity organisations, organised agriculture, research institutions, particularly the ARC | |
**OBJECTIVE 3.6:** Provide easy access to information products relating to climate change and agriculture  
**OUTCOME:** Information products relating to climate change and agriculture are accessible to users  
**OUTCOME INDICATOR:** Existing web portals and other dissemination channels are used

### 3.6.1 Maintain and promote a credible, accessible, user-friendly and up-to-date information portal for a climate-resilient agricultural sector, with links to other sectoral and private portals

**Key enablers:** Strength of ICT infrastructure in rural areas

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<th>Proposed Activities</th>
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</table>
| Conduct a marketing campaign for the GreenAgri portal (with SmartAgri component) across the Western Cape Province and through commodity organisations and extension services | S          | Lead: WCG:Agriculture, GreenCape (Agriculture Sector Desk)  
Support: commodity organisations                                           |           |
| Develop and maintain the SmartAgri component of the GreenAgri portal to serve as the primary one-stop information source for a climate-resilient agricultural sector based on emerging knowledge as well as farmer information needs, and drawing on cross-linkages to other sectoral and private web portals relevant to SmartAgri | S-M        | Lead: WCG:Agriculture, GreenCape (Agriculture Sector desk)  | 1.1.1  
1.2.3  
3.3  
1.3 |

### 3.6.2 Promote climate change knowledge-sharing at grassroots level through farmer days and tours, radio, study group meetings with expert input, and making use of local community information hubs (e.g. libraries, municipal offices)

**Key enablers:** Champions

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| Establish a communications campaign to promote climate change knowledge sharing, building on the SmartAgri 2015/16 campaign, identifying climate change champions from within the farming communities, and engaging other sectors with expertise in climate change (e.g. conservation, water, health) to participate in the campaign | S          | Lead: WCG:Agriculture  
Support: commodity organisations, organised agriculture, farmer organisations, WCG:EADP, CapeNature, WWF-SA | 3.3.1     |
5.4 Strategic Focus Area 4

Ensure good co-operative governance and joint planning for effective climate change response implementation for agriculture
Table 4. Strategic Focus Area 4: Strengthen monitoring, data and knowledge management and sharing, and lead strategic research for climate change and agriculture

**Strategic goals:**
- More efficient processing (with less red tape) of applications and registrations for climate smart products and activities
- Stronger transversal governance on climate change responses in the agricultural sector and beyond
- Effective joint planning for climate change response at the local level with participation from all three tiers of government and other key local decision makers
- Climate change integrated into longer-term economic planning with discussions around possible radical transformation (continued scenario assessment)
- Improved sharing of knowledge and responses between government, agribusiness and farmers through more effective communication

**Policy and legislative context:**
- OneCape 2040: Leading Cape
- WC Provincial Strategic Plan: PSG5 – Embed good governance and integrated service delivery through partnerships and spatial alignment
- WCG: EADP Strategic Plan: SOOG3 – Good governance and integrated management
- WC Provincial Spatial Development Framework: Spatial Governance Framework
- WC Sustainable Water Management Plan and River Improvement Plans: Strategic Goal - Ensure effective co-operative governance and institutional planning for sustainable water management

**Barriers and risks:**
- Short-term political and social drivers override longer term planning for sustainability and climate resilience
- Continued distrust between role players prevents meaningful cooperation and partnership building
- Role players are unable or unwilling to envisage a more radical transformation of the sector, which would lead to a more equitable and more resilient future agrarian structure
### OBJECTIVE 4.1: Enable senior leadership to envision a transformed climate-resilient future agrarian system in the long-term

**OUTCOME:** Senior leadership has a clear vision of a future climate-resilient agrarian system for the Western Cape

**OUTCOME INDICATOR:** WCG:Agriculture reports and communications reflect a vision of a future transformed and climate-resilient agrarian system (e.g. website, documents, presentations, staffing)

#### 4.1.1 Lead an open scenario-based discourse on agriculture’s role in long-term sustainable and climate-resilient economic development, which may require transformative social and resource-use approaches and a more radical departure from “business-as-usual”

**Key enablers:** High level champion in government

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</table>
| Start a Mont Fleur-type round table to begin the visioning for a climate-resilient future agrarian system leading to long-term sustainable socio-economic development and transformation, and resolving of difficult decisions and policy trade-offs | S | **Lead:** WCG:Agriculture, WCG:Office of the Premier  
**Support:** WCG:EDAT, WCG:EADP, Provincial Treasury, BFAP, organised agriculture, commodity organisations, senior leaders in private sector, DOL, labour/unions, DWS, DRDRLR, NGOs such as WWF-SA and others | |
| Revise existing climate-agriculture system-wide scenario planning started by the SmartAgri project, on a regular basis | S-L | **Lead:** WCG:Agriculture, WCG:Office of the Premier, WCG:EADP  
**Support:** CSAG, CSIR | |

#### 4.1.2 Develop the scientific and socio-economic case for more radical transformation needed to ensure a long-term resilient future for agriculture

**Key enablers:** Champion researcher

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<tr>
<td>Initiate inclusive, interdisciplinary and systems based research to provide evidence to support the Mont Fleur-type process in 4.1.1, and which captures pockets of innovations and their impact</td>
<td>S-L</td>
<td><strong>Lead:</strong> research institutions, NGOs, WCG:Agriculture, WCG:EADP</td>
<td></td>
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</table>
### OBJECTIVE 4.2: Strengthen policy and legislative integration and alignment at the interface between agriculture and the environment

**OUTCOME:** Agriculture and the environment are aligned at the provincial policy and legislative level

**OUTCOME INDICATOR:** Documentation from Standing Committees on Economic Opportunities, Tourism and Agriculture and on Environment and Development Planning

#### 4.2.1 Remove legislative hurdles through sensitive re-alignment of environmental, water, and agricultural policies which enable farmers to be climate-responsive

**Key enablers:** Champions in Provincial and National Parliaments

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<tr>
<td>Based on detailed evidence, align provincial environmental, water, and agricultural policies, plans and laws with a view to achieving an integrated climate change response through Standing Committee processes and the working groups of Provincial Strategic Goals 1 and 4</td>
<td>S-M</td>
<td>Lead: WCG:Agriculture, WCG:EADP, working groups of Provincial Strategic Goals 1 and 4</td>
<td>Support: DAFF, DEA, DWS</td>
</tr>
<tr>
<td>Engage with national government to address misalignments of climate-related national environmental, agricultural, and water-related policies and laws that are beyond the mandate of the Western Cape Province, through appropriate processes</td>
<td>S-M</td>
<td>Lead: WCG:Agriculture, WCG:EADP</td>
<td>Support: DAFF, DEA, DWS</td>
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### OBJECTIVE 4.3: Fast-track authorisations and registrations for early adoption of products which can confer climate resilience

**OUTCOME:** Products and technologies for climate change responses are quickly and easily authorised and registered

**OUTCOME INDICATOR:** Typical turn-around periods for authorisations and registration

#### 4.3.1 Address regulatory hurdles impeding the registration of agricultural products and technologies in order to enable the agricultural sector to be climate-responsive

**Key enablers:** Champion in WCG:Agriculture

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<tr>
<td>Engage with DAFF and DOH to prioritise accelerated registration of new safe agro-chemicals needed to respond to climate change impacts</td>
<td>S</td>
<td>Lead: WCG:Agriculture</td>
<td>Support: DAFF, DOH</td>
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### Proposed Activities

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<td>S</td>
<td>WCG:Agriculture</td>
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<td></td>
<td>WCG:EDAT, WCG:EADP,</td>
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<td>commodity organisations</td>
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**Proposed Activities**

**Key enablers:** Champion in WCG:Agriculture

**Objective 4.4:** Transversal joint planning and implementation at Provincial and Local level

**Outcome:** Cross-cutting joint planning and implementation occurs at Provincial and Local level

**Outcome Indicator:** Climate change is mainstreamed into provincial and municipal processes and plans

#### 4.4.1 Include climate change risks and responses in agriculture in Municipal strategic planning documents and Joint Planning Initiatives (JPI)

**Key enablers:** Responsive Provincial and Municipal Managers

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<tr>
<td>Agree on a framework with minimum requirements for what the strategic plans (IDPs, SDFs) need to include in terms of climate change risks and responses for agriculture</td>
<td>S</td>
<td>WCG:Agriculture, WCG:EADP, WCG:Local Government</td>
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</tr>
<tr>
<td>Include climate change risks and responses for agriculture in all new IDPs according to relevant requirements, in support of the provincial climate change mainstreaming process - progress is assessed annually</td>
<td>S</td>
<td>WCG:Agriculture WCG:EADP, WCG:Local Government</td>
<td>Municipalities, SALGA</td>
</tr>
<tr>
<td>Include climate change risks and responses for agriculture in all new SDFs according to relevant requirements, in support of the provincial climate change mainstreaming process</td>
<td>S</td>
<td>WCG:Agriculture WCG:EADP, WCG:Local Government</td>
<td>Municipalities, SALGA</td>
</tr>
<tr>
<td>Discuss climate change risks and responses (agriculture) at annual Joint Planning Initiatives (JPI) meeting and at bi-annual engagements with municipalities and key departments</td>
<td>S</td>
<td>WCG:Agriculture WCG:EADP, WCG:Local Government</td>
<td>WCG:Office of the Premier, WCG:Treasury, Municipalities</td>
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### 4.4.2 Provide oversight and direction to the implementation of the SmartAgri Plan through provincial working groups

**Key enablers:** Senior leadership flags climate change as a priority

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<tr>
<td>Conduct joint planning, coordination and M&amp;E review as a standing item on implementation of the SmartAgri Plan at PSG4 climate change working group meetings</td>
<td>S-M</td>
<td>Lead: WCG:EADP Support: WCG:Agriculture</td>
<td></td>
</tr>
<tr>
<td>M&amp;E findings on SmartAgri Plan successes and challenges are used to steer implementation of the SmartAgri Plan at PSG4 working group meetings</td>
<td>S-M</td>
<td>Lead: WCG:EADP Support: WCG:Agriculture</td>
<td></td>
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<tr>
<td>Climate change risks, opportunities and responses are mainstreamed transversally across other relevant provincial working groups (e.g. Green Economy)</td>
<td>S-M</td>
<td>Lead: WCG:Agriculture with chairs of working groups</td>
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### 4.4.3 Provide platforms for joint transversal implementation of the SmartAgri Plan across the public and private sectors through Public-Private Partnerships

**Key enablers:** Buy-in by role players

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<tr>
<td>WCG:Agriculture uses existing partnerships to implement aspects of the SmartAgri Plan (e.g. BRIP, Stewardship programmes), and identifies new partnership opportunities or needs that will assist with the SmartAgri Plan</td>
<td>S-L</td>
<td>Lead: WCG:Agriculture, WCG:EADP Support: WWF-SA, commodity organisations</td>
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### OBJECTIVE 4.5: Integrate climate change risk assessment and reduction into all economic development planning

**OUTCOME:** Economic development plans have integrated climate change risk assessments for agriculture

**OUTCOME INDICATOR:** Climate change risks to agriculture are identified and mitigated

### 4.5.1 Take cognisance of climate change risks to agriculture in WCG–driven economic development, within a systems framework

**Key enablers:** Senior leadership flags climate change as a priority

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<tr>
<td>Conduct climate change risk assessments as part of economic development planning to minimise risks to agriculture of unsustainable development options</td>
<td>S-L</td>
<td>Lead: WCG:EADP, WCG:EDAT Support: WCG:Agriculture, Provincial Treasury, DWS, WCG:TPW, organised agriculture</td>
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### OBJECTIVE 4.6: Develop capacity in climate change and agriculture at local government level

**OUTCOME:** Local government has capacity to proactively handle climate change implications for agriculture

**OUTCOME INDICATOR:** Municipal staff and councillors who have received training

4.6.1 As part of the provincial climate change mainstreaming process, develop greater awareness and understanding of climate change impacts and responses at local government level and their role in promoting a resilient rural economy

**Key enablers:** Champions in Local Government

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</table>
| Develop climate change material and short training courses (including information on agriculture) tailored to local government decision-makers | S-M        | **Lead:** WCG:EADP, WCG:Local Government  
**Support:** WCG:Agriculture, academic institutions, NGOs, SALGA                  |                               |
| Create greater awareness and decision-making capacity among councillors and senior managers as part of the climate change mainstreaming process | S-M        | **Lead:** WCG:EADP, WCG:Local Government  
**Support:** WCG:Agriculture, academic institutions, NGOs, SALGA                  |                               |
| Develop understanding, skills and decision making capacity regarding climate change and agriculture among municipal technical managerial staff as part of the provincial climate change mainstreaming process | S-M        | **Lead:** WCG:EADP, WCG:Local Government  
**Support:** WCG:Agriculture, academic institutions, SALGA                        |                               |

### OBJECTIVE 4.7: Develop linked M&E system for provincial/sectoral climate change response plans and establish processes for organisational learning

**OUTCOME:** The linked M&E system exists and provides feedback to organisational learning

**OUTCOME INDICATOR:** The linked M&E system is used regularly

4.7.1 Establish monitoring feedback loops at the provincial management level with linkages to sectoral implementation

**Key enablers:** Emerging understanding of best practice climate change response M&E

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</table>
| Develop a linked M&E system for the provincial and agricultural climate change implementation plans | S          | **Lead:** WCG:EADP  
**Support:** WCG:Agriculture                                                            |                               |
**OBJECTIVE 4.8:** Improved communications channels between farmers and government

**OUTCOME:** Farmers are linked to senior government staff through known communication channels

**OUTCOME INDICATOR:** Farmer satisfaction survey

### 4.8.1 Utilise and expand accessible channels of communication to support an effective joint climate change response

**Key enablers:** Greater levels of trust between government and the agricultural sector

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| Identify key communication channels that are most effective for facilitating direct communication between senior government staff and farming communities | S | **Lead:** WCG:Agriculture, WCG:EADP  
**Support:** Sustainable Resource Management Committees, organised agriculture | |
| Utilise identified communication channels for rapid and effective two-way communication on issues relating to climate change and agriculture | S-L | **Lead:** WCG:Agriculture, WCG:EADP  
**Support:** organised agriculture | |
| Establish and update contact list for information/support requests of farmers and disseminate this list widely, including through the GreenAgri portal | S-M | **Lead:** WCG:Agriculture, GreenCape (Agriculture Sector Desk)  
**Support:** WCG:EADP | |
| WCG:Agriculture field officers (e.g. LandCare, Farmer Support and Development, Veterinary Services) become two-way conduits for communication of climate change information and response | S-M | **Lead:** WCG:Agriculture  
**Support:** Sustainable Resource Management Committees | |
A Monitoring and Evaluation (M&E) Plan is available separately. The following diagrams summarise the M&E Framework at a high level (integrated) and at lower levels (Outcomes and Outputs).

Figure 5. SmartAgri Integrated Monitoring & Evaluation Framework
Western Cape Climate Change Response Framework and Implementation Plan for the Agricultural Sector

**Figure 6. SmartAgri High Level Diagram for Strategic Focus Area (SFA) Outcomes**

**OC1.1:** Soil & land are managed with agro-ecological principles taking climate change into account

**Ind:** Continued long-term productivity of soils and agricultural landscapes

**OC1.2:** Water is managed & used sustainably & equitably & in support of resilience to climate change

**Ind:** Water (quality & quantity) remains sufficiently available for optimal & appropriate agricultural use

**OC1.3:** Transition to low-carbon energy sources & greater energy efficiency in agriculture reduces emissions

**Ind:** Percentage reduction in greenhouse gas emissions from energy use in agriculture

**OC1.4:** Climate-resilient innovations in crops & livestock are developed & made accessible to farmers

**Ind:** Farmer satisfaction with innovation, availability & accessibility of technology

**OC1.5:** The agri-workers' occupational health & safety & environmental quality is protected under climate change

**Ind:** Agri-workers & employers can understand & adapt to climate change threats

**OC1.6:** The agricultural value chain & food system is secure, stable, low-carbon & resource-efficient

**Ind:** Growth & stability of sectoral economy with reduced environmental footprint of the value chain

**OC1.7:** Agricultural markets are stable & profitable in a shifting climate

**Ind:** Growth & stability of sectoral economy

**OC2.1:** Joint disaster planning & relief mechanisms are strengthened to reduce climate change impacts

**Ind:** Strengthened mechanisms reduce damages suffered from climate disasters and provide support for recovery

**OC2.2:** Climate-responsive capital infrastructure development, maintenance & investment are acknowledged as BP

**Ind:** Climate-responsive criteria are applied in project resourcing, planning and management

**OC2.3:** Firefighting capacity in agricultural areas is prioritised & resourced to meet the level of increasing risk

**Ind:** Increased firefighting capacity in high-risk areas

**OC2.5:** Broad-based incentives for disaster risk reduction are available and accessible to farmers

**Ind:** Innovative incentives are offered to proactive farmers

**OC2.6:** WCG:Agriculture recognised & resourced to play strong role in enabling disaster risk reduction and relief

**Ind:** Disaster relief is allocated more quickly and reaches qualifying farmers faster

**OC3.1:** Long-term data on trends in climate change impacts & responses in agriculture are captured and managed

**Ind:** Data exist and are used to track trends

**OC3.2:** Climate data & services for agriculture meet user needs

**Ind:** Users are satisfied as assessed through a user survey

**OC3.3:** Agricultural research forum has leverage to encourage & direct coordinated research to fill strategic gaps

**Ind:** Increased number of targeted climate change-related research projects

**OC3.5:** User-friendly information products about climate change & agriculture are available

**Ind:** Examples of products

**OC3.6:** Information products relating to climate change & agriculture are accessible to users

**Ind:** Existing web portals & other dissemination channels are used

**OC4.1:** Senior leadership has a clear vision of a future climate-resilient agrarian system for the Western Cape

**Ind:** WCG:Agriculture reports and communications reflect vision

**OC4.2:** Agriculture & environment are aligned at provincial policy and legislative level

**Ind:** Documentation from relevant Standing Committees

**OC4.3:** Products & technologies for climate change responses are quickly & easily authorised & registered

**Ind:** Typical turn-around periods for authorisations & registrations

**OC4.4:** Cross-cutting joint planning & implementation occurs at Provincial and Local level

**Ind:** Climate change is mainstreamed into provincial & municipal processes & plans

**OC4.6:** Local government has capacity to proactively handle climate change implications for agriculture

**Ind:** Municipal staff and councillors who have received training

**OC4.7:** The linked M&E system exists & provides feedback to organisational learning

**Ind:** The linked M&E system is used regularly

**OC4.8:** Farmers are linked to senior government staff through known communication channels

**Ind:** Farmer satisfaction survey
Figure 7: SmartAgri Intermediate Level Diagram for Strategic Focus Area (SFA) Outputs
OTHER PUBLICATIONS WHICH ARE PUBLICALLY AVAILABLE:

A Status Quo Review of Climate Change and the Agricultural Sector of the Western Cape Province

A Review of Climate Change and the Agricultural Sector in the Western Cape: Executive Summary

A Climate Change Response Framework for the Agricultural Sector of the Western Cape

Briefs for the Agricultural Sector of the Western Cape:
• Brief for the Grain and Livestock sector: Swartland and greater West Coast region
• Brief for the Grain and Livestock sector: Rûens
• Brief for Mixed Farming and Regional Commodities: Little Karoo
• Brief for Dairy and other Regional Commodities: Southern Cape
• Brief for the Livestock sector: Central Karoo
• Brief for the Citrus sector
• Brief for the Table Grape sector
• Brief for the Deciduous Fruit sector
• Brief for the Olive sector
• Brief for the Wine sector
• Brief for the Honeybush sector
• Brief for the Rooibos sector
• Brief for the Fynbos Cutflower sector
• Brief for the Potato and Vegetable sectors
• Brief for the Intensive Livestock sector
• Brief for Food Gardens and Food Security

SmartAgri Case Studies for the Western Cape:
The six SmartAgri case studies listed below show-case best practices (i.e. successful implemented climate change adaptation and mitigation measures) but also highlight barriers and enabling factors for proactive climate change adaptation and mitigation in the Western Cape Province. The case studies are intended to inspire stakeholders throughout the agricultural sector (including farmers, agricultural organisations and government agencies) and to identify current drivers for climate change adaptation and mitigation.

CASE STUDY #1: FRUITLOOK
A state-of-the-art information technology that helps deciduous fruit and grape farmers to be water efficient and climate smart

CASE STUDY #2: CONSERVATION AGRICULTURE
Promoting climate smart intensification of winter grain production while improving soil health in the Western Cape

CASE STUDY #3: SMALLHOLDER FARMING
Increasing climate change awareness and proficiency among smallholder farming communities
**CASE STUDY #4: DISASTER RISK REDUCTION AND MANAGEMENT**
The need for joint systematic planning and proactive reduction in extreme weather risks

**Case Study #5: (PERI-)URBAN AGRICULTURE**
The role of (peri-)urban agricultural production areas for resilient local food systems under climate change

**CASE STUDY #6: RENEWABLE ENERGY**
Renewable energy and energy efficiency paving the way to a low-carbon, energy secure future