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GENERAL NOTICE

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DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES

DRAFT CLIMATE CHANGE SECTOR PLAN FOR AGRICULTURE, FORESTRY AND FISHERIES

I, Tina Joemat-Pettersson, Minister of Agriculture, Forestry and Fisheries hereby invite all interested parties to submit written inputs and comments on the **Draft Climate Change Sector Plan.**

Inputs and comments must be submitted in writing for attention lkalafengK@daff.gov.za and Mittaa@daff.gov.za within *60 days* from the date of this publication. Alternatively inputs and comments can be sent to:

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CLIMATE CHANGE SECTOR PLAN

FOR

AGRICULTURE, FORESTRY AND FISHERIES

Updated June 2012

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EXECUTIVE SUMMARY

The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.

Climate change, especially global warning, is a serious threat to agriculture, forestry and fisheries, the providers of food, feed, fibre, timber and energy, and a contributor to the GDPs of many economies worldwide. This sector forms the basis of a green economy.

As agriculture, forestry and fisheries are the mainstay of livelihoods and economic growth, the Department of Agriculture, Forestry and Fisheries (DAFF) has been proactive in initiating sector-related climate change strategies and scenarios to promote climate change awareness and knowledge; to advocate sustainable terrestrial and aquatic ecosystems-based production practices the least conducive to the emission of greenhouse gases; to conserve the sector's natural environments; to promote adaptation; and to mitigate the effects of climate change as far as possible.

These proactive initiatives include a Discussion Document on Climate Change and the Agricultural Sector in South Africa; and the 2009 Agricultural Climate Change Sector Plan (CCSP) containing a framework and action plans pertaining climate change activities. These documents were deliberated during national stakeholder workshops.

The CCSP for Agriculture, Forestry and Fisheries has been developed to address institutional arrangements, vulnerability assessment, mitigation and adaptation in the agricultural, forestry and fisheries sector.

The background to climate change is discussed, including the greenhouse effect, implications, the United Nations process and South Africa's involvement in international climate change initiatives. Obligations relating to the UNFCCC, such as the South African Initial and Second National Communication and the National Climate Change Response Strategy are also discussed.

The World Summit on Sustainable Development (WSSD), held in South Africa in 2002, and the concurrent United Nations Commission on Sustainable Development (CSD) are considered in context of the Climate Change Sector Plan and its implications, as well as the synergies between other UN Conventions, such as the CBD and CCD.

The role of the National Committee on Climate Change (NCCC) and the Intergovernmental Committee on Climate Change (IGCCC) in coordinating climate change-related activities in the country is explained.

Contributions towards reducing the levels of anthropogenic greenhouse gas production need to be actively encouraged. These include innovative alternatives in a fossil fuel-based economy. Adaptation strategies need to be developed and applied simultaneously, in order to deal with the vagaries of climatic variation and the negative impacts of severe weather events on both first and second economies. These need to be informed by vulnerability assessments and a comprehensive vulnerability audit for agriculture, forestry and fisheries.

It is, above all, the poorer population groups in developing countries that will be the most adversely affected by climate change. They suffer most from the impacts of both climate change and climate variability, as they are mostly directly dependent on the natural terrestrial and marine ecosystems for survival. The ongoing process of climate change impacts both of these ecosystems and therefore food, feed, fibre, timber and energy self-sufficiency. Due to poverty, insufficient knowledge and sometimes poor education, insufficient land to allow a nomadic lifestyle and poor infrastructure notably in remote rural areas, there is little chance of switching to other sources of income. This is why balance between the three pillars of sustainability namely people, prosperity and planet are so important.

Whilst the main crop growing areas are likely to remain the same, there are likely to be changes in crops and cultivars, with heat tolerance and water use efficiency paramount. Disease, pests and insect distribution will alter, affecting humans, plants and animals. Handling the vagaries of climatic variation and positioning the agricultural sector to maximize opportunities as well as dealing with the negative impacts of severe weather events and climate change will remain a challenge to the sector.

The forestry sector includes complex ecosystems that provide a range of economic, social, food production, household consumption and environmental benefits to a wide range of people. The countrywide forested estate is projected to undergo some changes with increased temperature. Due to the increase in dry spells and temperature, the fire scenario under climate change is an increase in frequency and intensity. A decrease in rainfall will decrease forest productivity while stress and pest/pathogen risks are likely to increase. A noticeable escalation in the number of pests has been reported; pathogens are spreading much faster and with increased intensity; and the frequency and level of devastation of forest fires have increased in recent years. As the impact of climate change-associated pests, diseases and fire is at landscape level, all forestry beneficiaries are affected. Fire mitigation; rapid response to forest fires; and the rehabilitation and restoration of forest plantations and conservation areas are some of the challenges facing the forestry sector.

Inland and coastal/wild and capture fisheries and aquaculture contribute significantly to food security and the economic and social welfare of small-scale fisheries and coastal livelihoods. Most aquatic living resources are sensitive to small-scale changes in their surrounding environments and impacts associated with the changing climate may affect the abundance and availability of aquatic resources which may, in turn, affect the resilience of both the fisheries and aquaculture sectors in South Africa. Anticipated changes to the character of water masses, variability of water temperatures and rainfall, increases in sea level rise, changes in ocean acidity and the occurrence of extreme weather events and coastal erosion, will most likely disrupt the biological flow of aquatic ecosystems and result in coastal and inland aquatic systems deterioration. In terms of fisheries trade and economics, the possible displacement of aquatic resources across boundaries due to changes in the character of water bodies may require the reinforcement of existing international agreements via policy, legal instruments and institutional mechanisms to ensure on-going trade of aquatic living resources between countries. Aquaculture on the other hand, is dependent on the wild capture fishery for feed, energy and broodstock inputs. With the recent decline in aquatic resources, there is much expectation for aquaculture to alleviate the pressure on wild capture fisheries and to assist with ensuring national food security. The need to develop scenarios for both the fisheries and aquaculture sectors, based on future climate change projections for South Africa in order to determine the level of risk and vulnerability has become evident.

Reducing greenhouse gas emissions through cleaner technology is the challenge on the one hand, but devising alternative strategies for adapting to the imminent effects of climate change are equally opportune and appropriate, especially for poorer communities and the second economy.

There has been much debate on both mitigation and adaptation possibilities and this will no doubt continue unabated. As mitigation is largely concerned with innovative ways of reducing emissions and adaptation with ways of dealing with changed or changing conditions, the sector's main focus will be on adaptation while, mitigation practices will be intensified.

South Africa has developed a number of disaster management plans which are aligned to the National Disaster Management Framework. Against the increasing awareness of the devastating social, economic and environmental effects of climate change, a Climate Change Sector Plan was developed to address institutional arrangements, vulnerability assessment, mitigation and adaptation.

The four Key Performance Areas (KPAs) identified, each with appropriate imperatives and Key Performance Indicators (KPIs) are:

- Institutional Arrangements for Climate Change
- Vulnerability Assessment to Climate Change
- Mitigation and Adaptation
- Response and Recovery.

The means of facilitating the process are discussed under three enablers, namely:

- Information Management and Communication
- Education, Training, Public Awareness and Research
- Funding Arrangements.

The CCSP for Agriculture, Forestry and Fisheries was developed by DAFF in line with the National Disaster Management Framework of 2005 and in fulfilment of the requirements of the National Climate Change Response Strategy. Due to the fact that the manifestations of climate change are difficult to distinguish from those of natural disasters such as droughts and floods, these are catered for by specific actions to manage such events. Nevertheless, it was considered desirable to put into place a climate change-related plan of action to increase climate intelligence namely awareness and knowledge of, and to plan actions related to, anthropogenic activities impacting the future of all.

The basic approach of the sector plan is climate smart agriculture, which entails the integration of land suitability, land use planning, agriculture, forestry and fisheries to ensure that synergies are properly captured and that these synergies will enhance resilience, adaptive capacity and mitigation potential.

1. INTRODUCTION

Climate change refers to a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. Human activities include the burning of fossils fuels (oil, coal, natural gas), unsustainable land use systems and clearing of forests resulting in increasing the concentration of the greenhouse gases (GHGs) such as carbon dioxide (CO_2), methane (CH_4), nitrous oxides (N_2O), water vapour and chlorofluorocarbons (CFCs) in the atmosphere. These gases act to trap the energy from the sun resulting in global warming.

Major parts of the climate system respond slowly to changes in greenhouse gas concentrations, and even if greenhouse emissions were stabilised at today's levels, climate would continue to change as it adapts to the increased emission of recent decades. The major challenge to the Climate Change Sector Plan (CCSP) is, therefore, to take prompt, cost-effective steps which will contribute to substantial and long-term reduction in net global greenhouse gas emissions and to reduce the causes of climate change; to recognise that delayed action will increase the risk of adverse environmental effects likely to incur a greater cost; to adapt to its impacts; to build a scientific and technological capacity enabling innovative solutions to mitigate and adapt to the adverse effects of climate change; and to ensure that climate change issues are included in all relevant national agricultural, forestry and fisheries strategies and action plans.

In view of the above, the CCSP is focused on the Key Performance Areas (KPAs) institutional arrangements for climate change; vulnerability assessment to climate change; mitigation and adaptation; and response and recovery, using information management and communication; education, training, public awareness and research; and funding arrangements for climate change activities as Enablers.

Climate change is causing grave concern at all levels of society worldwide as plants, animals and aquatic resources may not be able to cope with, and adapt to, the progressive and projected change in climate as well as humans can and this poses a serious threat to terrestrial and marine ecosystems. The climate system is extremely complex and not well understood, especially regarding its extent, timing and impacts. What is currently known, however, points to many dramatic negative effects that climate change can have on food security, socio-economic activities, human health, water resources, extreme weather events, low lying areas and infrastructure. The effects are not necessarily always negative, however. Positive spin-offs need to be identified and maximised.

South Africa's agriculture is particularly vulnerable to climate change, as productive farming is affected directly by the quality of the rainy season, temperature, climate variability, extreme weather events and CO_2 concentrations in the atmosphere. The frequency and intensity of drought, for example, in combination with higher temperatures, seriously impact on food, pasture grasses and on water availability. This impact extends beyond food shortages and negatively affects national economies as it reduces the country's ability to export crops and generate foreign revenue, while food has to be imported.

The agriculture sector places much emphasis on prevention and mitigation strategies such as supporting risk management initiatives; research of large-scale epidemics and hazards; providing early warning information to farmers on markets, weather and climate, and on insurance matters. The increasing frequencies of disasters such as droughts, heat waves and

floods which pose serious threats and risks to agricultural production and ultimately food security is a great concern to the country and the community at large.

Woodlands, commercial plantations, natural and urban forests are complex ecosystems providing a range of economic, social and environmental benefits and ecosystem services to a wide range of people, contributing significantly to national and provincial economies and employment. Pests, diseases and fire are the three major risk factors from which forests need to be protected. These are in addition to risks such as climate events including hail, frost and snow damage; climate change; invasive plants; animal damage; illegal logging; and illegal trade in forest products.

Climate change impacts on forests arise from increases in atmospheric CO_2 concentration enhancing photosynthesis and root growth. On the converse, however, the positive effects of higher atmospheric CO_2 could be countered by increased respiration, carbon partitioning to roots, and lower levels of available soil water or high vapour pressure deficits. Changes in photosynthetic efficiency may, in addition, be capped by soil fertility and nutrient supply as soil water availability affects nutrient uptake. Under elevated atmospheric CO_2 levels, nitrogen levels of forest foliage and in the litter layer decrease resulting in higher quality litter. The effect of elevated CO_2 concentrations on nutrient mineralization and litter decomposition, however, remains uncertain. Changes in temperature and rainfall regimes are likely to have a marked impact on the size and location of land area suitable for specific genotypes. Area selection will be exacerbated by biotic and abiotic risks to be considered, including atmospheric pollutants. The impact of climate change on forests is complex and not fully understood but there is a significant risk that the adaptive capacity of forest ecosystems will be exceeded, compromising their ability to provide vital goods and services and their responsive resilience

There has been a noticeable escalation in the number of non-native pests and diseases as well as outbreaks arising from host shifts; and pathogens are spreading much faster and with increased intensity. This often results in forests being clear felled and/or taken out of production following an adverse event. A similar trend is evident in the increasing frequency and level of devastation of forest fires.

According to recent studies, numerous long-term changes in physical forcing have been observed at various scales as a result of climate and other anthropogenic changes. Impacts of these on biological processes supporting fish and fisheries production in marine as well as freshwater ecosystems have already been observed and thus may be used as proxies to estimate further global climate change impacts. These physical factors include atmospheric circulation, intensity and variability patterns, ocean currents and mixing, stratification, seasonal patterns and hydrological cycles.

Research indicates that changes in sea temperature, atmospheric pressure/wind fields, sea level, carbon dioxide concentration, rainfall and ultra violet radiation will affect fish stocks in South Africa. Both commercial and small-scale recreational fisheries contribute minimally to the South Africa's GDP, however, aquatic living resources have high nutritional value and harvesting thereof contributes to the livelihood of coastal communities. Communities dependent on fisheries are vulnerable and may struggle to maintain their livelihoods due to increased control of quotas and compliance enforcement in the sector. The collapse of the sardine stocks off Namibia in the 1960s had a vast impact on the coastal communities who were forced to relocate due to the availability of fish in other areas.

The capacity to adapt to climate change is unevenly distributed across and within fishing communities. In South Africa, it has already been observed that there have been changes to the characteristics of water bodies, resulting in decreased availability of resources to the fishing community with commercial boat owners adapting better than the small-scale fishermen. Inshore aquatic resources such as rock lobsters and pelagic stocks of sardine and anchovy have already shown an eastward shift in distribution over the past decade. Furthermore, harsh weather conditions at sea and venturing deeper offshore away from landing sites to search for fish, place fisherman at risk. The pressures of having to exert more effort to catch greater numbers of scarce resources and travelling farther distances to fish, results in increased fuel usage and emissions from large-scale industrial fisheries and will in turn contribute to GHG emissions. It is important to highlight patterns of vulnerability of fishermen to climate change which are determined by their capacity to adapt to change and by the observed and future changes to ecosystems and fisheries productivity.

Implications for the inland and freshwater fisheries are similar to that posed to marine fisheries. Literature shows that climate change impacts on terrestrial ecosystems are associated mainly with water quantity and quality and the responses of particular lake ecosystems to climate change will depend strongly on the size, depth, and trophic status of the lake. The rates of change of freshwater systems to climate will depend on the existence of dispersal corridors which can be strongly altered by human activities. Temperature changes are likely to affect fish species and result in changes in their natural distribution patterns. Variations in the timing of flooding events may affect fish migration and spawning patterns. Fresh water systems are also high in biodiversity, supporting up to 40% of all fish species despite accounting for only a small proportion of aquatic habitats. Though accurate data is challenging to collect, some studies show that up to 20% of freshwater species are threatened, endangered or extinct in some areas. It is noteworthy that the protection of freshwater biodiversity is increasingly recognized as a major international conservation priority and it is prudent the same approach is adopted locally.

Currently, the global contribution of aquaculture to food fish consumption is slightly over 45%. This figure is expected to rise even further in efforts to meet future demand for fish. Locally, the contribution of capture fisheries to food security and employment has declined since the 1950s. Aquatic aquaculture is consequently seen as an "alternative" to wild capture fisheries, with some valid reason. In 2010, the sector contributed 0.029% towards the South African Gross Domestic Product (GDP), providing employment to a total of 1 556 persons. The total value of Aquaculture in 2010 was estimated at R378 million, with Abalone sales representing 93.9% of the entire sector, and the freshwater sub-sectors production was 2 621 tons. Clearly, aquaculture is a growing sector with potential to thrive. It is reiterated that most aquatic species are sensitive to small-scale changes in their surrounding environments and the potential implications of various changes in water temperature (which may be beneficial to some aquaculture species but detrimental to others), rainfall, sea level and the increase occurrence of extreme weather events associated with a changing climate, may pose a threat to the aquaculture industry. Implications for the aquaculture sector range from a loss of farmable land due to sea-level rise, to limitations for freshwater abstraction due to drought and water stress, to limitations on feeds due to declines in wild fish populations, and to an increase in disease and pest prevalence on farms. .

Fortunately, South Africa being a relatively newcomer to aquatic and freshwater aquaculture arena is in a position to learn from past experiences of countries with established industries and

develop an economically viable, globally competitive aquaculture industry in a responsible and resilient way.

It is important that these implications of climate change be understood and interrogated for both first and second economies in the agricultural, forestry and fisheries sector and its value chain in South Africa, to ensure sustainable development.

South Africa, as an important role player in the international arena and notably in Africa, takes full cognisance of climate change concerns and the CCSP is one of the most important means to address these concerns.

1.1 REQUIREMENTS OF THE UNFCCC AND KYOTO PROTOCOL

South Africa is signatory to both the UNFCCC and the Kyoto Protocol. The requirements of these are briefly discussed:

The UNFCCC entered into force in 1994. The UNFCCC recognized the accelerated change in the Earth's climate over 200 years and that the cause of this is an increase in concentrations of greenhouse gases in the atmosphere, causing warming of the Earth's surface. The main objective of the UNFCCC was to stabilize atmospheric concentrations of greenhouse gases at a level that would prevent dangerous anthropogenic interference with the climate system. All parties committed themselves, through common but differentiated responsibilities, to undertake measures to address greenhouse emissions and to prepare for the predicted impacts of climate change.

Article 12 of the UNFCCC requires countries or parties to communicate their measures by developing National Communications within a specified time, to which South Africa complied in 2004 and in 2010. Countries are also required to review the national communications periodically to reflect progress. Countries are required to communicate to the Conference of Parties (COP) under the UNFCCC, the following elements of information:

(a) A national inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases;
(b) A general description of steps taken or envisaged by the country to comply to the requirements of the Convention;
(c) Any other information that the country considers relevant to the achievement of the objective of the Convention and suitable for inclusion in its communication, including, if feasible, material relevant for calculations of global emission trends.

The Kyoto Protocol (KP) is an international agreement that is separate from, but linked to, the UNFCCC. It is a legal instrument that sets binding targets for 37 industrialized countries and the European community for collectively reducing greenhouse gas (GHGs) emissions. According to the KP, these amount to an average of five per cent against 1990 levels over the five-year period 2008-2012. The major distinction between the Protocol and the Convention is that while the Convention encourages developed countries to stabilize GHGs emissions, the Protocol commits them to do so.

The KP identifies policies and measures that can be adopted (by countries or parties. Under the Treaty, countries must meet their targets primarily through national measures. However, the

Kyoto Protocol offers them an additional means of meeting their targets by way of three markets-based mechanisms. These Kyoto mechanisms are:

- Emissions trading – known as "the carbon market";
- The clean development mechanism (CDM); and
- Joint implementation (JI).

Under the KP, countries with commitments are allowed to participate in emission trading among themselves in accordance with Article 17-ET. The Kyoto Protocol allows joint implementation with crediting among developed countries. In accordance with article 12 of the Clean Development Mechanism (CDM), the CDM enables projects in developing countries to achieve sustainable development, contribute to the ultimate objective of the Convention and assist developed countries in complying with the quantified emission reduction and commitments. The underlying rationale of these co-operative mechanisms helps stimulate green investment and help countries or parties meet their emission targets in a cost-effective way.

In addition to South Africa's Initial National Communication prepared in accordance with Article 12 of the Convention, detailed South African Country Study reports have been compiled on a sectoral basis.

1.2 SYNERGY BETWEEN ENVIRONMENTAL CONVENTIONS

At international fora such as negotiations on the Convention on Biodiversity (CBD), the Convention to Combat Desertification (CCD), UNFCCC, the Montreal Protocol and other related conventions/protocols as well as the continued Commission on Sustainable Development (CSD) process, the synergies between environmental conventions are being debated increasingly. This applies to a broad front, but especially so when biological carbon sequestration is considered. The increase in soil organic carbon and its stabilising effect on physical, chemical and biological soil properties plays a fundamental role in achieving the social, economic and environmental goals of these and other conventions and treaties.

1.3 SOUTH AFRICAN INVOLVEMENT

Informal debates on environmental issues have been going on since before the 1990s but due to the political isolation of South Africa, there was no effective participation in the Earth Summit at Rio in 1992. By the time the UNFCCC had entered into force in 1994, however, South Africa had become involved in the climate change debate and activities.

Department of Environmental Affairs (DEA) is the country focal point for environmental conventions and they co-ordinate actions and monitor compliance with international obligations related to climate change. The South African Government ratified the UNFCCC in August 1997. After it was recognised that the commitments under the UNFCCC were inadequate for achieving its ultimate objectives, the Kyoto Protocol was adopted in 1997, following protracted international negotiations. South Africa acceded to the Kyoto Protocol in July 2002.

1.3.1 SOUTH AFRICA'S NATIONAL COMMUNICATION

The Initial National Communication was prepared in accordance with Article 12 of the UNFCCC and reported on the national circumstances; the national inventories of greenhouse gases for 1990 and 1994; South Africa's vulnerability to climate change and its capacity to adapt; the

systematic observation and research undertaken in this field; education, training and public awareness programmes required; projections and policies made and measures taken; mitigation options and possibilities for adaptation and a preliminary needs assessment.

South Africa's Second National Communication (SNC) under the United Nations Framework Convention on Climate Change was developed in 2009 in terms of South Africa's commitments under the UNFCCC by DEA as coordinating department in Climate Change to which the DAFF actively contributed. The SNC provides the baseline for the national Climate Change policy development process and draws on work that outlines South Africa's national situation with respect to greenhouse gas emissions. Information was gained by a comprehensive South African Agricultural Greenhouse Gas Inventory for 2004 and GHG inventory projects for the agricultural sector already underway, the relevant aspects of the national socio-economic position, latest findings relating to climate scenarios, impacts, vulnerability, mitigation and adaptation strategies.

From this work, in conjunction with information generated from the Intergovernmental Panel on Climate Change (IPCC) Third Assessment report, DEA, in consultation with other government departments and stakeholders, has developed a National Climate Change Response Strategy. The latter has been approved by Cabinet and is to be reviewed on a regular basis, empowering government committal to this important subject. It also places climate change on the agendas of all government departments. The Strategy was followed by the 2010 National Climate Change Response Green Paper.

1.3.2 WSSD

The World Summit on Sustainable Development (WSSD), held in Johannesburg in 2002, firmly established the importance of the trilogy of social, economic and environmental dimensions in development. Its plan of implementation, the Johannesburg Plan of Implementation (JPOI), highlights specific actions to ensure progress, including mitigation and adaptation relating to climate change. The Department of Agriculture, Forestry and Fisheries (DAFF) analysed this document and circulated it to all directorates for comments and implementation.

On the second anniversary of the WSSD (WSSD+2), a dedicated high-level event was held in South Africa. Government departments were afforded the opportunity of hosting concurrent workshops and DAFF presented a highly successful session, show-casing what the agricultural sector had achieved in the preceding two years. The highlights of this were presented during a concluding ministerial plenary session.

1.3.3 LEGISLATIVE MANDATE AND CABINET APPROVED ACTION PLANS

The National Climate Change Response Strategy and Green Paper developed using country study reports compiled on sectoral basis together with information from the IPCC Third Assessment report and approved by Cabinet, recognises that climate change is a cross cutting issue that has ramifications for diverse activities in other government departments and thus requires the joint action of government departments in a coordinated manner, to ensure that response measures are acceptable to all and synergistic towards a clear national focus. The strategy recognises the limited general awareness on the likely impacts of climate change and readiness for such impacts and thus emphasizes building capacity within government by efficiently harnessing available skills and competencies.

The Strategy and Green Paper therefore calls for the formulation of policies that will adequately address climate change adaptation and mitigation in all sectors. With a number of key interventions on various adaptation and possible mitigation options proposed, the strategy also calls for the development of detailed action plans with defined time scales which can, potentially, boost sustainable economic and social development, thereby supporting the major and New Growth Path objectives of government including poverty alleviation and the creation of jobs.

In March 2006, Cabinet mandated a national process of developing possible greenhouse gas emission scenarios for the future, informed by the best available research and information, to define not only our future commitments under international treaties, but also to shape our long-term climate change policy. This resulted in launching the Long-Term Mitigation Scenario (LTMS) process where stakeholders, relevant role players, industry, labour, civil society and government departments, including Agriculture, and Water Affairs and Forestry provided inputs. The idea was to assist South African stakeholders in the understanding of climate change and focusing on a range of ambitious but realistic scenarios concerning climate change-related actions required at sectoral, national and international levels, based on best available information, long-term emissions scenarios and cost implications. Cabinet policy informed by these scenarios will assist future and concerted action to create public awareness and to support government initiatives.

An efficient and effective South African climate change response will need the participation and commitment of all spheres of government, business, academia, research, industry and civil society in general. The possible roles and responsibilities of national departments in developing and implementing a coordinated, coherent, efficient and effective response to the challenge of climate change as defined by Cabinet Lekgotla in 2008 are summarised as follows:

The following provides the possible roles and responsibilities for climate change mitigation for national departments:

- The development and implementation of policies, strategies, action plans and/or regulations to mitigate GHG emissions from:
    - Changes in land use (i.e. land use changes that convert land from GHG sinks to sources);
    - Enteric fermentation (i.e. emissions from livestock);
    - Intensive tillage;
    - Stubble and trash burning (e.g. sugarcane burning);
    - Emissions from fossil-fuel powered agricultural vehicles, equipment and appliances.
- Ensure agricultural policy and strategy alignment with the National Climate Change Response Policy.
- Monitor and report GHG emission reduction interventions in the agricultural sector.
- Forestry-related aspects including fire alerts and REDD+ initiatives
- Monitor and report agricultural GHG emissions to the national GHG inventory.

1.3.4 NATIONAL CLIMATE CHANGE RESPONSE STRATEGY FOR SOUTH AFRICA

This strategy took a relatively long time to develop, largely because of the value attached by DEA to comprehensive consultation and buy in by a wide range of stakeholders. The current document was released in September 2004, following Cabinet approval and was followed by the related 2010 Green Paper.

Since climate change is recognized as a cross cutting issue that has ramifications for diverse activities in other government departments, the national climate change response strategy called for the development of plans by all sectors including agriculture, forestry and fisheries. This ensured integration of climate change response in government; education, training and capacity building; research, development and demonstration.

The main objective of the strategy is to support current government policy and national programmes on related matters. These include the National Environment Management Act of 1998, Disaster Management Act no. 57 of 2002, the Government White Paper on Integrated Pollution and Waste Management as well as on other national policies related to energy, water agriculture, forestry and fisheries. As regards agriculture, forestry and fisheries the following are especially relevant:

- Conservation of Agricultural Resources Act (Act 43 of 1983)
- National Forests Act (Act No. 84 of 1998) as amended
- National Forestry strategy
- Small-scale Fisheries Policy
- Draft Policy for the Development of a Sustainable Marine Aquaculture Sector in South Africa
- National Aquaculture Strategic Framework
- National Guidelines for Intergraded Management of Agricultural Water Use
- Communal Land Rights Act (CLARA) (2002)
- Integrated Food Security and Nutrition Programme
- Farmer Settlement Programme
- Comprehensive Agricultural Support Programme (CASP)
- Agricultural Black Economic Empowerment (AgriBEE) Programme
- World Overview of Conservation Approaches and Technologies (WOCAT)
- Land Degradation Assessment in Drylands (LADA) project
- LandCare programme
- Land and Agrarian Reform Project.
- White Paper on Sustainable Forest Development (1996)
- National Veld and Forest Fires Act (Act No. 84 of 1998) as amended
- Forest Sector Transformation Charter

Because climate change has so many ramifications, it is important that it be centre-staged in all developmental agendas.

1.3.5 INVOLVEMENT BY THE AGRICULTURE, FORESTRY AND FISHERIES SECTOR

In its attempt to create awareness on the impacts of climate change DAFF, in partnership with the Agricultural Research Council (ARC), established the Working Group on Climate Change (WGCC) convened, coordinated and chaired by the Directorate Climate Change and Disaster

Management (D:CCDM). The Working Group, prior to the merger of Forestry and Fisheries comprised the DAFF directorates Land Use and Soil Management (LUSM), Water Use and Irrigation Development (WUID) and Research and Technology Development (RTD). The then Working Group (DWGCC) developed the climate change discussion document: "*Climate Change and the agricultural sector in South Africa*" which was approved by DEXCO. This document sought to synthesize the sector and create awareness on the current perceptions and follow-up actions necessary to address the risks and challenges relating to the impacts of climate change on agriculture. After the merger of the department both Forestry and Fisheries joined DWGCC and have since participate effectively in the committee.

1.4 VULNERABILITY, MITIGATION AND ADAPTATION

Vulnerability, mitigation and adaptation are three key concepts relating to climate change and its manifestations of critical importance to the sector.

Vulnerability encompasses the potential problems that both communities and natural resources may experience and their ability to cope with these. Sensitive terrestrial and marine ecosystems and poor rural communities, the disabled, aged, women and children are generally considered the most vulnerable. Quantitative and qualitative information relating to these needs to be obtained, also in view of prioritising appropriate interventions as part of a comprehensive vulnerability assessment for the sector.

Mitigation relates to avoiding or minimising sources of pollution that can have a deleterious effect on levels of GHGs, global warming and climate change. Contributions towards reducing the levels of anthropogenic greenhouse gas production need to be actively encouraged. This includes fossil fuel- related activities, methane and nitrous oxide emissions.

Adaptation refers to adoption of appropriate coping strategies to minimise the negative effects of climate change and includes a range of activities such as response farming, crop selection and breeding, animal selection, rainfall use efficiency, timing of agricultural activities as well as forestry and fisheries-related issues.

It is, above all, poorer population groups in developing countries that will be the most adversely affected by climate change. They suffer most from its impacts, as they are mostly directly dependent on the natural environment and ecosystem services for their survival and livelihoods. The on-going process of climate change will impact both. Due to poverty, insufficient knowledge, financial constraints and poor infrastructure, there is little chance of switching to other sources of income. This is why the balance between the three pillars of sustainability, namely people, prosperity and the planet is so important in South Africa as a developing country.

1.5 CLIMATE CHANGE IMPLICATIONS AND POSSIBLE INTERVENTIONS

Agriculture

Whilst the main crop growing areas are likely to remain the same, there are likely to be changes in crops and cultivars, with heat tolerance and water use efficiency paramount. As several insect-carried diseases affecting humans, plants and animals are sensitive to changes in climate, pests and disease manifestations may take a different form to what we are used to and may require adapted strategies and management approaches to curtail disease and pest

patterns concerned. It is postulated that new diseases and pests affecting both plants and animals will emerge.

Handling the vagaries of climatic variation and positioning DAFF to maximise both opportunities and the negative impacts of more frequent severe weather events and climate change will be the challenges of the future.

There has been much debate on both mitigation and adaptation possibilities and this will no doubt continue unabated. As mitigation is largely concerned with innovative ways of reducing greenhouse gas emissions and adaptation with ways of dealing with changed or changing conditions, the focus of agriculture needs to include both adaptation and mitigation to minimize greenhouse gas emissions.

Reducing greenhouse gas emissions through cleaner technology is the challenge on the one hand, but devising alternative strategies for adapting to the negative effects of climate change is equally opportune and appropriate, especially for poorer communities and the vulnerable economy. Climate change can have negative impacts on the economy as it affects agricultural production and will ultimately affect food security. The benefits of strong, early action on climate change outweigh the costs. Adopting early adaptation and mitigation strategies and/or measures will assist in reducing the costs of addressing climate change impacts in the future.

Agriculture can reduce GHGs emissions by providing bio-fuels derived from biomass sources such as wheat, maize, soya beans, and crop residues. Bio-fuel production is one of the cleaner fuels that can bring positive spin-off to the economy provided that proper and efficient technologies are available, that biofuels are affordable and that food security is not jeopardised through, for example, alternative crops being grown that cannot be used for food in time of need. With the employment of new technologies, many employment opportunities will be created, contributing to the New Millennium Development Goals of halving poverty and unemployment by 2014.

The challenge is to balance the producing scale of food and cleaner fuels, through regulatory measures if necessary.

Forestry

Similar to agriculture, the forestry sector is highly sensitive to the effects of climate change such as pests and disease; the effect of temperature, including die-back; wild fires; and competition for water. These potential implications for the forestry sector call for innovative ways to reduce greenhouse gas emissions, to adapt to changed and changing environment, and to become more energy-efficient.

Fisheries

There are a number of developmental programmes and interventions to improve the fisheries and aquaculture in South Africa. There is an on-going process of developing a Small-scale Fisheries Policy that seeks to empower and develop communities dependent on subsistence fish, thus promoting food security whilst maintaining the health of aquatic ecosystems. Aquaculture is included in the New Growth Path and also highlighted in the Industrial Policy Action Plan.

Possible interventions to address the impacts of climate change on fisheries and aquaculture were recommended by the FAO (2008), they are as follows:

- To assess the contribution of fisheries and aquaculture to GHG emissions
- To investigate the impact of emissions from the fisheries and aquaculture sectors in order to improve energy efficiency.
- To develop and reinforce regional and international agreements for dealing with trans-boundary issues for fisheries and aquaculture.
  To raise stakeholder awareness on climate change impacts for the fisheries and aquaculture sectors.
- To conduct climate change risk and social impact assessments to determine the adaptive capacity of small-scale communities for fisheries and aquaculture and develop and implement strategies to enhance communities' capabilities to adapt.
- To secure adequate funds to implement mitigation and adaptation strategies and climate change research related to fisheries and aquaculture and monitor and report on progress in this regard.
- To ensure that the fisheries and aquaculture sectors are considered in integrated coastal planning strategies.
- To support the growth of aquaculture in order to alleviate the pressures on offshore fisheries stocks.
- To conduct research on fisheries, aquaculture and climate change and to participate actively on a regional and international level to remain up to date and make use of this information to develop contingency plans for fisheries and aquaculture sectors.
- To ensure that fisheries communities livelihoods are sustained by addressing community vulnerabilities such as health risks, unemployment and conflicts (FAO 2008).

2. PROBLEM STATEMENT

Climate change is largely attributed to anthropogenic activities by the human race such as industrial activities, energy generation, agriculture and forestry, resulting in the increase of greenhouse gases (GHG) in the atmosphere, to such an extent, that these gases exceed natural variation essential to regulate the earth's temperature and to support life. These additional gases trap heat and thus enhance the greenhouse effect resulting in global warming and climate change. The three main greenhouse gases are carbon dioxide ($CO_{2)}$, methane ($CH_{4)}$ and nitrous oxide (N_2O) of which nitrous oxide (N_2O) is commonly regarded the most aggresive. The concentrations of these gases have increased since the Industrial Revolution (1800). The global figures show that carbon dioxide, methane and nitrous oxide have increased by 32%, 157% and 18% respectively from 1800 to 2005.

Agriculture and forestry contributes to increased emissions through various activities. Anthropogenic emission from these sector branches include enteric fermentation, unsustainable soil and land management, prescribed burning of savannas and field, burning of residues such as practices used in sugarcane production, forest fires, the destruction of soil cover to name but a few.

Carbon dioxide production from land degradation, monoculture and other non-sustainable practices, methane through enteric fermentation of livestock and nitrous oxide from incorrect fertilizer management of soils are important sources that need to be quantified and managed.

Agriculture's global share of anthropogenic emissions has been estimated to be about 20% of carbon dioxide, 50% of methane and 70% of nitrous oxide. Aggregated emissions from agriculture in South Africa were estimated at 6% in the 2004 inventory study. It should be noted, however, that SA has undertaken a national GHG inventory study including a detailed study for the agricultural sector which will be expanded to include forestry. An agricultural GHG database has been developed and populated.

Carbon dioxide emissions are expected to increase due to the increasing demand for food, feed, fibre, timber and energy as well as shifts in diet. Growing demand for meat and animal feeds, for example, may induce further changes to land use i.e. from forestlands to grasslands often increasing the potential for higher CO_2 emissions. However, an emerging trend for switching to renewable energy use (e.g., bio-plastics, bio-fuels and biomass for energy) has the potential to reduce GHG emissions in future. The problem for developing countries such as South Africa and the region is that there are already some concerns for food security which will be exacerbated if many producers switch exclusively to the production of bio-fuels. Biofuel production, in addition, could add substantially to GHG emissions should sustainable conservation production practices not be used.

The fourth assessment report by the IPCC highlighted some serious implication for agriculture such as pressure for competing uses of agricultural land and water, population growth and subsequent high demands for agricultural products and high input costs of enabling technologies. There is increasing evidence that the western parts of South Africa could become dry as a result of climate change. Shifts in rainfall pattern and temperature will affect not only food production but also pasture grasses and possibly commercial forestry. South Africa is a water scarce country which has on average 450 mm of rain as compared to the world's average of 860 mm annual rainfall. This does not augur well for our sector communities who rely greatly on rainfall for their production operations neither for water supply, which directly affects irrigated agriculture of critical importance to supplement rainfed food production and to stabilize food security.

The forestry sector will be affected in similar ways as agriculture as the result of shifting rainfall and temperature regimes. Due to increasing climate variability, natural hazards such as drought, floods and forest fires have been ravaging the country for many years and are increasing in frequency and intensity. This is already and progressively affecting forests, livestock grazing and ultimately agricultural and animal production as well as land degradation.

There is a variety of useful mitigation and adaptation options promoting soil, water and nutrient conservation for agricultural production such as soil carbon sequestration (enhanced sinks), soil cover and improved crop and grazing management conducive to sustainable agricultural and soil productivity. The latter include improved agronomic practices, water and nutrient use efficiency, conservation agriculture and residue management, restoration of soil organic matter and restoration of degraded lands. The challenge to the agricultural sector is to promote the adoption of climate-smart processes. The intricate process involved in the adoption of best practice technologies is of the utmost importance and needs to be encouraged.

It is indisputable that climate change will result in food, feed, fibre, timber and energy insecurity, notably in rural areas. The impact of climate change particularly at grassroots level is noticed in terms of deficiencies in food production, food supply, energy and devastating forest fires. Shortage of water, food, changing spread of diseases vectors and new pests and disease will all lead to a greater health and life risk. Agricultural crop and forest yields are also expected to be affected by changes in climate in terms of precipitation, temperature and CO_2 levels. A detailed biophysical study conducted on the impacts of climate change on the country's largest field crop, maize, shows a total value of lost maize production of R681 million without the CO_2 fertilizing effect compared to R46 million with a CO_2 fertilizing effect. In the case of forests, root growth and the mortality of fine roots will increase under elevated atmospheric CO_2 concentrations but the nitrogen levels in foliage will decrease resulting in a decrease in the nitrogen level of litter. The effect of increased atmospheric CO_2 levels on nutrient mineralization and decomposition is, however uncertain.

South Africa has developed a number of disaster management plans within the parameters of the National Disaster Management Framework. Against the increasing awareness of the dramatic social, economic and environmental effects of climate change, the CCSP has been developed to address institutional arrangements, vulnerability assessment, mitigation and adaptation.

2.1 AIMS AND OBJECTIVES

The overriding aims of the DAFF Climate Change Sector Plan are to respond to the South African National Climate Change Response Strategy which calls for individual plans for all sectors and to ensure a sustainable, profitable agricultural, forestry and fisheries sector in general.

The objectives of the climate change sector plan are as follows:

- To ensure compliance with international obligations on climate change;
- To minimise or reduce the negative impacts and risks associated with climate change in order to increase and improve food, feed, fibre, timber and energy production;
- To promote climate change programmes that will build capacity, raise awareness and improve education and training in agriculture, forestry and fisheries;
- To ensure a sound knowledge base, information management and goal-directed research;
- To ensure a climate change implementation programme.

Since climate change is a cross cutting issue, support from all stakeholders and role players involved in climate change within and outside the department will be crucial in achieving the abovementioned objectives.

3. CHALLENGES

There are a number of imminent challenges related to climate change that need to be addressed to ensure effective action to combat deleterious climate change effects on environmental, social and economic integrity. The main challenge is to ameliorate the negative

impact that climate change potentially have on food, feed, fibre, timber and energy production and on related export and GDP. The most important challenges include the following:

- Creating awareness on climate change and climate intelligence;
- Developing an enabling mitigation and adaptation environment;
- Improving knowledge on and understanding of climate change;
- Increasing capacity to respond to climate change impacts;
- Research;
- Sufficient funding of research projects.

3.1 CREATING AWARENESS ON CLIMATE CHANGE

Although the threats of climate change are well publicised, there is a widespread lack of insight into and acceptance of its reality at all levels of society. This affects readiness for the effects of climate change; vigilance towards extreme weather events; adaptation and mitigation.

Concerted action needs to be taken to address this in the most effective manner, including at school and tertiary level; all tiers of government; the private and public sector; NGOs; CBOs; industry and value chains; organised agriculture, forestry and fisheries; farmers, foresters and fishers and their communities; the media; and the public at large.

Innovative and traditional means of communication to reach urban dwellers as well as deep rural communities who lack access to communication infrastructure and resources need to be utilised.

Creating awareness in the sector needs to be prioritised in developing awareness programmes by involving all the role players and stakeholders within the sector. Awareness needs to be created by firstly visiting the relevant directorates, management and programme managers/coordinators within the sector to ensure that climate change is incorporated into their activity plans. Events such as workshops and seminars should be organised in partnership with all the role players in contact with the sector and notably with provinces and communities to facilitate effective awareness of climate change.

3.2 IMPROVING KNOWLEDGE ON CLIMATE CHANGE

Without the necessary knowledge on the impact of climate change at all levels of society and insight into climate change, little effective action can be expected. The knowledge gap can be bridged by skills development and by gaining knowledge and understanding which will promote the adoption of sustainable best management practices and climate-friendly behavioural changes. Indigenous knowledge, often not documented, should be taken cognisance of in transferring knowledge. The youth at all institutional levels should be targeted as, at present, scant attention is paid to climate change in school and tertiary education *curricula*.

3.3 INCREASING CAPACITY TO RESPOND TO CLIMATE CHANGE IMPACTS

The capacity to respond to the challenge is coupled to both knowledge and means to act through appropriate interventions both pre-emptively as well as post-event such as through disaster management support by all levels of government and other stakeholders concerned.

The interventions will need to be client-, ecosystem- and disaster-specific, as individuals and communities differ vastly in their needs and abilities to take appropriate action. Ecosystems, in similar fashion, differ vastly. Capacitation of communities towards self-reliance, providing knowledge and measures for both mitigation and adaptation to enable response to short-term, medium-term and long-term effects of both climate variability and climate change, tailor-made per ecosystem, are of particular importance. This can be accomplished through participation in the negotiation and implementation of adequate strategies at all levels that showcase initiatives in increasing preparedness of climate change.

Government has to provide capacity by providing a policy framework with clear guidelines for short-, medium- and long-term actions. Collaborative efforts with all role players at all levels are essential. More resources enabled by infrastructure will have to be provided to communities involved, especially the vulnerable, to increase preparedness and to build disaster resilience.

3.4 RESEARCH

Appropriate, timeous and proactive basic and action-oriented research needs to be conducted, based on a participative and coordinated research agenda. This would include a comprehensive vulnerability audit of the different sectors in agriculture, forestry and fisheries; climate science; scenario modelling; mitigation; adaptation; and the relationship between natural disasters and climate change.

Some research is currently being undertaken, but the research effort needs to be expanded and more holistic in nature. The institutional arrangements and funding mechanisms articulated in the National Agricultural Research and Development Strategy , provides an excellent platform to ensure goal-directed, applied, multi-stakeholder and partnership research. This Strategy needs to be adapted for the forestry and fisheries sectors.

3.5 FUNDING OF RESEARCH PROJECTS

Insufficient funding, lack of accessibility to funding resources for climate change research projects both nationally and internationally, is a long standing challenge. The funding sources envisaged by the National Agricultural Research and Development Strategy should be accessed for climate change-related research and include forestry and fisheries research projects. Sourcing the increasing amounts of research funding available internationally, including the Green Economy Fund, is also a priority issue. This has the added advantage of creating wider international networking opportunities.

3.6 IDENTIFYING SUITABLE KEY PERFORMANCE AREAS (KPAs) AND ENABLERS

In order to ensure development of an effective sector programme on climate change , it was deemed necessary to identify suitable KPAs and enablers. These are discussed in the following sections.

4. KEY PERFORMANCE AREAS (KPAs)

The action plan of the Climate Change Sector Plan is addressed under a structure of four key performance areas, namely institutional arrangements for climate change; vulnerability assessment to climate change; mitigation and adaptation; and response and recovery.

4.1 Institutional Arrangements for Climate Change

This KPA strives for effective institutional arrangements for policy development and coordinated action related to climate change and its influence on the sector. The following are involved:

4.1.1 Establish arrangements for the development and adoption of a climate change policy

The former Department of Agriculture Working Group on Climate Change (WGCC) was established and operated effectively as reflected below:

- Climate Change Sector Plan for Agriculture initiated by DAFF to align with national policies;
- DAFF developed a discussion document: "Climate Change and the Agricultural Sector in South Africa";
- DAFF, the Intergovernmental Committee on Climate Change (IGCCC), the National Committee on Climate Change (NCCC) and other stakeholders contributed to the national climate change response strategy which was developed under the leadership of DEA;
- DEA in collaboration with government departments and sectors including agriculture and NCCC members developed a Long-term Mitigation Scenario (LTMS);
- With general recognition of its importance a National Climate Change Response Policy on climate change being developed under the leadership of DEA, with inputs from all stakeholders, including DAFF, IGCCC and NCCC;
- DAFF and government departments including DST as the leading department and other stakeholders developed the national R&D Strategy on Climate Change and the national Technology Needs Assessment (TNA).

4.1.2 Establish arrangements for government cooperation in Climate Change activities.

The Department of Environmental Affairs (DEA) is the focal department addressing climate change issues nationally, regionally and internationally.

- DAFF is an active member of National Committee on Climate Change (NCCC) and the Intergovernmental Committee on Climate Change (IGCCC) and both committees are chaired by DEA. Acceptance of the importance of the IGCCC at high level (Ministerial Committee on Climate Change), ensures its effective functioning with active participation of all national departments, including DAFF, DST, DME, DTI, DSD, DH, DoT, DWA and NDMC.
- Government Departments such as DST, DME, DTI, DSD, DH, DoT, DWA and COGTA have specific roles and mandates related to climate change. Communication with other government structures and their involvement in appropriate climate change activities is strengthened by DEA in cooperation with COGTA.
- The National Climate Change Response Strategy (NCCRS) has been developed by DEA and members of the NCCC, including other government departments and clearly identifies roles and responsibilities of departments. DEA ensures the alignment, cohesion and coherence of government responses to climate change by coordinating and driving its climate change responses and interventions. NCCC continues effective functioning and participation of all stakeholders in climate change issues, activities and responsibilities.
- PDAs and district Municipalities need to have action plans in place to address climate change, including vulnerability assessment, mitigation and adaptation strategies.
- Active participation in the on-going Commission on Sustainable Development (CSD) process and appropriate UN conventions should be ensured.

The role and responsibilities of DAFF as a national institution involved in climate change include the following:

i. Enhanced cooperation with all stakeholders involved in the sector including organised agriculture, forestry and fisheries; the private sector; research and academic institutions; NGOs; CBOs and others;
ii. A Plan of Action on Climate Change activities developed;
iii. Meets reporting requirements of international agreements;
iv. Vulnerability risk assessment conducted;
v. Strategies on climate change in the sector developed;
vi. Early warning system in support of risk management implemented;
vii. Implement the sector plan for sustainable development;
viii. Maintain liaison with and expand networking with relevant climate change role players nationally, regionally and internationally;
ix. Ensure climate change is incorporated into other sector programmes and policies to foster a shared understanding of the nature of climate change and its consequences;
x. Appropriate mitigation and adaptation strategies developed;
xi. Climate Change awareness campaigns conducted;
xii. The development of climate change strategies at provincial and local level encouraged and coordinated.
xiii. Draft climate change action plan guidelines for PDAs.

4.2 Vulnerability Assessment to Climate Change

Conducting a comprehensive vulnerability assessment to climate change should be conducted for the sector as a cost-effective way to identify areas prone to climate variability and climate change and to identify actions required to improve adaptation to and mitigation of climate change.

4.2.1 Conduct vulnerability assessments to climate change in the sector

DAFF is to develop guidelines for conducting vulnerability assessments in the sector.

4.2.2 Generate a National Climate Change Vulnerability Profile representative of all levels of society

Mechanisms to understand, document, map and make accessible information on South Africa's climate change vulnerability need to be put into place. This is required for risk analysis and to identify appropriate research on climate change.

4.2.3 Monitor and disseminate climate change-related information

Mechanisms need to be established by national, provincial and local government to transfer climate change-related information to all stakeholders and to ensure regular updating of such databases/mechanisms in view of monitoring their effectiveness.

4.3 Mitigation and Adaptation

Appropriate mitigation and adaptation strategies need to be identified to minimise the negative effects of climate change on the sector.

4.3.1 Ensure stakeholder awareness of relevant mitigation and adaptation strategies related to climate change

Workshops, awareness programmes and regular advisories on relevant mitigation and adaptation strategies related to climate change are pursued by all appropriate stakeholders to encourage their adoption.

4.3.2 Determine priority disaster prone areas, vulnerable communities and households

National priority disaster prone areas related to climate change need to be identified. Disasters such as droughts, floods, wild fires and other related disasters that may have a significant influence on socio-economic, sector and environmental impacts need to be analysed and mapped. This will assist vulnerable communities to put in place mechanisms for preparedness in case such disasters occur.

4.3.3 Identify and develop climate change-related plans, projects, systems and programmes

Joint plans, projects, systems and programmes related to climate change vulnerability, mitigation and adaptation should be identified and developed by all appropriate stakeholders.

The Early Warning Systems (EWS) for climate change-related disasters can be regarded as one of the most important mitigation and adaptation tools that has been developed.

4.3.4 Mainstream climate change awareness and actions into strategic integrating structures and processes

Climate Change awareness and actions mainstreamed into projects, initiatives and programmes including IDPs and departmental programmes such as LRAD, CASP, MAFISA and LARP as well as in related spatial development frameworks.

4.4 Response and Recovery

Identifying and implementing appropriate response and recovery strategies to minimise the negative effects of climate change on the sector.

4.4.1 Manage disasters related to climate variability and climate change

To avoid duplication, these should be aligned with existing disaster management plans/policies/strategies and actions bearing in mind that it is difficult to apportion disasters to climate change *per se*. Existing plans include managing the effects of drought, floods, diseases and other disasters and can include the climate change dimension.

4.4.2 Protect livelihoods and manage natural resources in response to disasters

Promote sustainable production practices to conserve the natural resource base and to ensure resilience.

Develop integrated needs-based rehabilitation programmes aimed at restoring livelihoods and recovery of natural resources in affected areas.

4.4.3 Evaluate the effectiveness of Early Warning Systems (EWS) for climate change

To ensure that climate change is fully considered and reflected in the four elements of agricultural early warning systems and be expanded, as far as possible, to include a forestry and fisheries early warning system. An effective EWS must be multi-hazard; people centred and incorporate the following four elements:

Risk Knowledge - Prior knowledge of the risks faced by communities
Risks arise from both the hazards and the vulnerabilities concerned. People must be aware of the patterns of, and trends in, climate-related risks. Risk assessment and mapping will help to prioritize early warning system needs; to guide preparations for response and to implement prevention measures related to climate change impacts.

Monitoring and Advisory Service – Technical monitoring and advisory service
There is a need for a sound scientific basis to predict the risks concerned. Improved, accurate climate predictions, particularly for rainfall and storm patterns are essential as well as the constant monitoring of possible disaster precursors to generate accurate advisories in a timely fashion.

Dissemination and communication of understandable advisories
High-quality climate information and tools for risk management will help drive efficient sector markets. The advisories need to reach those at risk. Consequently, people at risk need to understand these advisories, which should contain useful information that enables proper responses. Communication channels need to be pre-identified.

Response Capability
It is essential that communities and especially political authorities understand risks and take cognizance of advisories in preparation of looming risks. Preparedness can be defined as a pre-disaster activity that is undertaken within the context of disaster risk management and is based on sound risk analysis. This includes the development /enhancement of an overall preparedness strategy, policy, institutional structure, warning and forecasting capabilities, and plans that define measures geared to helping those at risk.

5. ENABLERS

The action plan has been constructed with the following enablers in place:

5.1 Information Management and Communication

For information management and communication to be a successful enabler in the sector plan, users should be able to focus attention on the information content of the data, rather than how to find, access, and use it. Maximising the effectiveness of information management and dissemination will assist in this regard.

5.1.1 Identifying Climate Change-related data and information sources

All data sources related to climate change to be identified in view of networking and data exchange related to climate change being promoted. Networking with other established climate change networks among science experts, managers and planners across sectors nationally, regionally and internationally should be strengthened. Easily understandable information on climate change and climate variability should also be easily accessible. The following are examples of what is required:

a) Data and data sources need to be collected from grass roots to high level. New data sets that integrate information from multiple sources as well as a database and list server to be developed.
b) Resources, particularly infrastructure, finance, and technology, should support short to long-term electronic data management and scientific data that is not scientifically managed, especially raw data.
c) Criteria for acquiring knowledge and wisdom in the selection of data to gather, what to do with it, what information to pass on, and how to interpret and use the results need to be developed.
d) Data to be collected and managed from multiple locations and institutions; integration of many types of data from different suppliers to be made available in a manner consistent with user requirements.
e) Climate change knowledge information system should be created/ developed - this system should efficiently link observations to data management, analysis, and archiving systems.

f) Risk profile maps to be developed whereby maps are consolidated with areas that are most likely to be affected by climate change.

5.1.2 Information dissemination, promoting a culture of mitigation and adaptation related to climate change

The following has to be ensured for information dissemination programmes to be successful and channels of communication between all spheres of government, communities and the media need to be established and strengthened.

a) Climate change-related information easily accessible for all: Easy access to the correct climatic, bio-physical and socio-economic data and information needs to be provided to scientists, policy makers and the sector at large.
b) Socio-economic perspective for agriculture and geographical areas to be outlined.
c) Undertake socio-economic impact studies and provide results through awareness programmes.
d) Investing in personnel with skills to translate scientific information on mitigation and adaptation strategies into the local languages.
e) Inculcate the youth that are currently at schools with climate change activities which will help to promote the culture of mitigating and adapting to climate change, shape and sustain future policy-making.
f) Conducting stakeholder workshops involving producers, organised agriculture, forestry and fisheries; and research including other institutions involved with producers should ensure that farmers regard climate change as a priority challenge to their livelihoods and inspire them to adopt adaptation and best practice measures such as conservation agriculture, more climate-resilient crops and technologies which will have local benefits.
g) Developing a Climate Change Information System that will provide platform-independent access to timely, accurate, integrated data and products. This can be implemented through web services such as the Agricultural Geo-referenced Information System (AGIS).

5.2 Education, Training, Public Awareness and Research

Ensuring that appropriate education, training and public awareness actions are in place and that research is focused and adequately funded.

5.2.1 Inclusion of climate change in educational *curricula*

Relevant climate change issues should be included in the educational *curricula* to facilitate understanding and awareness of climate change. This can be achieved by the following:

- Investigating if climate change is addressed in the *curricula* of government and private schools and promote such inclusion. Investigate other formal and informal channels to reach the youth and children with information.
- Doubling the number of postgraduate studies on climate change by creating more funding opportunities for postgraduate students such as bursaries for specified climate change projects which will build future capacity on climate change.
- Government departments providing bursaries should be sensitized to give employees the opportunity to study climate change mitigation and adaptation at national or international institutions.

5.2.2 Training

- Registration of programmes and trainers with the relevant regulatory bodies (SETA, SAQA and NQF); ensuring that all training service providers on climate change are registered and recognised.
- Status of training material (courses, handbooks): Training materials to be developed according to national qualification framework standards. Training materials to be translated into all official languages.
- Establishment of climate change PDAs/ NGOs/ sector study groups to be encouraged by government by providing the necessary resources. PDAs in consultation with DAFF will assist with the establishment of study groups which are viable and can be monitored.
- Sector communities to be involved in and encouraged to participate in most pilot projects, applied research and training following teamwork processes such as Participatory Rural Appraisal (PRA).
- Ensuring effectiveness of knowledge transfer: DAFF to ensure that the trained officials are imparting skills and knowledge in climate change to the sector communities. This can be accomplished through collaboration with the provincial departments and local municipalities.

5.2.3 Public Awareness

(a) Create and promote national climate change awareness

- Developed awareness programmes whereby all stakeholders, private companies, role players and community organisations such as churches and schools will be creating more awareness within their ranks.
- Climate change awareness within the sector: Organise climate change conferences/workshops including road shows.
- Awareness of the implications of climate change at all levels of society, including at a personal level created and promoted by involving the local electronic and print media.
- Awareness programmes at different levels developed by all appropriate stakeholders.

5.2.4 Research

(a) Identify research needs related to climate change

- Establish in consultation with research and academic institutions to identify new climate change research areas and determine needs and gaps;
- Ensure that climate change considerations are included as criteria in the evaluation of new agricultural research and development projects;
- Research priorities related to vulnerability, mitigation and adaptation to climate change identified through the R & D Strategy. DAFF to ensure active participation in the development of Climate Change research and development strategies.

(b) Promote research programmes and advisory services

- Climate change-related activities in government and private sectors promoted according to their mandate.

- National, regional and international exchange, co-operation and networking promoted.

5.3 Funding Arrangements for Climate Change Activities

Identifying and sourcing adequate international and national funding for appropriate research activities.

Integration of the funding needs in line with the guidelines for national funding through the National Agricultural Research and Development Strategy.

5.3.1 Sourcing funding for climate change activities including research

- The Department of Agriculture, Forestry and Fisheries to fund the climate change programme and to establish mechanisms in approaching potential national funding institutions including the national treasury for financial assistance for climate change activities.
- Climate change research project proposals to be submitted to be funded by the National R&D Strategy presently being rolled out.
- National and international institutions and private donors for research and other activities related to climate change in the sector could be sourced through institutions such as GEF which can be accessed through DEA , CDM funding for climate change activities especially research accessed through DoE as well as other institutions such as NRF under DST.
- Adequate funding for all relevant climate change activities planned, budgeted and accessed by all spheres of government according to their mandate.

5.3.2 Funding for the Key Performance Areas (KPAs)

Since climate change is a cross cutting issue, funding mechanisms should be addressed in an integrated manner involving all stakeholders and role players in addressing the following KPAs:

(a) Institutional Arrangements for Climate Change
(b) Vulnerability Assessment to Climate Change
(c) Mitigation and Adaptation
(d) Response and Recovery

5.3.3 Funding for the Enablers

It is the responsibility of government to ensure that the enablers are effective through the provision of adequate funding. However, where the resources are lacking, international donors can be approached to assist, especially in collaborative activities, by providing funding for the following enablers:

(a) Information Management and Communication
(b) Education, Training, Public Awareness and Research

Funding for climate change is one of the major challenges that needs to be addressed to ensure the successful implementation of the Climate Change Sector Plan. It is therefore suggested that DAFF adopt a mechanism through which funds can be secured through MTEF within a period of

three (3) years. It is further recommended that additional funding for climate change research should be sourced through the sector's R & D Strategy and other relevant funding institutions nationally and internationally.

DAFF should therefore propose a mechanism for approaching institutions such as the National Treasury with financial assistance for Climate Change activities. International institutions such as the Global Environmental Facility (GEF) linked to the UNFCCC and accessed through DEA could assist with financial aid. CDM funding for climate change activities, especially research, can be accessed through DoE as well as other institutions such as NRF under DST. However, it remains the responsibility of DAFF to secure adequate funding for Climate Change activities especially operational activities hence it is important for the department not to rely too heavily on outside funding. Proper planning and budgeting needs to be ensured by the implementing agencies within DAFF.

6. IMPLEMENTATION GUIDELINES

DAFF will coordinate the implementation of the Climate Change Sector Plan at national, provincial and local level. The implementation of, and follow-up to, the strategic goals and priorities for action set out in this Sector Plan (CCSP) should be addressed by appropriate stakeholders. Civil society, including volunteers and community-based organisation, the scientific community and the private sector are vital stakeholders in ensuring reduction of the impacts of climate change by reducing GHG emissions and by resorting to sustainable conservation practices.

6.1 Strategic issues

Some strategic issues to be considered and adopted for implementation include:

- Development and implementation of climate change sector action plans at provincial level linked to information management systems;
- Development of systems to share climate change information with stakeholders;
- Establishment and maintenance of monitoring systems to adapt, mitigate, prevent and respond to disasters;
- Provision of support to establish and improve institutional and organizational capacity with special focus on human and financial resources;
- Developing contingency plans and policies at all levels with a particular focus on the most vulnerable areas;
- Awareness creation within communities concerned by promoting the engagement of the media in order to stimulate a culture of disaster resilience and strong community involvement in sustained public campaigns at all levels.
- Continued participation in NCCC, IGCCC, CSD, UNFCCC and Land-Use Change and Forestry (LULUCF) processes especially on matters relating to sustainable agriculture, forestry and fisheries; impacts; vulnerability and adaptation to climate change; land use; and deforestation;
- Alignment of DAFF to ensure effective interventions to minimize the negative effects of climate change on South African agriculture, forestry and fisheries, including risk assessment and management;
- Contribute to the regulation, promotion and co-ordination of the conservation of agricultural and forestry land and water resources to ensure sustainable development and environmental integrity;

- Conduct a research audit in consultation with research and academic institutions to identify new climate change research areas and establish needs and gaps;
- Research priorities related to vulnerability (audits), socio-economic and environmental implications, mitigation and adaptation to climate change identified through the R & D Strategy.
- Climate change to be incorporated into departmental programmes such as LRAD, CASP, MAFISA and LARP and *vice versa* where applicable.

6.2 Implementation tools

The climate change sector plan embodies the principles and guidelines contained in the following documents:

The Constitution;
The White Paper on Agriculture, 1995;
The White Paper on Disaster Management, 1999;
The Disaster Management Act, 2002 (Act No.57 of 2002);
The National Disaster Risk Management Framework, 2005;
The Strategic Plan for the Department of Agriculture 2001;
The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983);
Agricultural Pests Act, 1983 (Act No.36 of 1983);
Animal Health Act, 2002 (Act No.7 of 2002);
Livestock Brands Act, 1962 (Act No.87 of 1962);
Animal Identification Act, 2002 (Act No.6 of 2002);
Fencing Act, 1963 (Act No.31 of 1963);
National Veld and Forest fire Act, 1998 (Act No. 101 of 1998);
National Environmental Management Act 1998 (Act No. 107 of 1998;
Government White Paper on Integrated Pollution and Waste Management;
Integrated Food Security and Nutrition Programme;
National Guidelines for integrated Management of Agricultural Water Use;
Communal Land Rights Act (2002);
Farmer Settlement Programme;
Comprehensive Agricultural Support Programme;
Agricultural Black Economic Empowerment Programme;
World Overview of Conservation Approaches and Technologies;
Land Degradation Assessment in Drylands (LADA) and
LandCare programmes.
The Marine Living Resources Act, 1998 (Act No. 18 of 1998), ("the Act"); The National Environmental Management Act, 1998 (Act No. 107 of 1998),
The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), The National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003),
The Seashore Act, 1935 (Act No. 21 of 1935) and
The National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008).
The National Health Act, 2003 (Act No. 61 of 2003).
The Foodstuffs, Cosmetics and Disinfectants Act, 1972 (Act No. 54 of 1972),

7. REVIEWS AND UPDATES OF THE PLAN

The Climate Change Sector Plan will be reviewed every five (5) years or sooner if necessary. DAFF will develop procedures for reviewing progress against this plan, which should include systems for cost benefit analysis and ongoing monitoring and assessment of vulnerability and risks. Reviews will focus mainly on achievements regarding key performance indicators at the end of the financial year in accordance with the National Climate Change Response Strategy and National Disaster Risk Management Framework (NDRMF).

8. CONCLUSION

The Climate Change Sector Plan has been developed by DAFF within the parameters of the Disaster Management Framework and in fulfilment of the requirements of the National Climate Change Response Strategy for the RSA. Due to the fact that the manifestations of climate change are difficult to distinguish from those of natural disasters such as droughts and floods, they will be handled by actions that have been put into place to handle such events. It needs to be emphasised, however, that climate change is a cross-cutting issue, and that all spheres of Government, parastatals, the private sector, organised agriculture, groups and individuals – in fact all stakeholders involved in agriculture, forestry and fisheries need to take cognisance of its realities and put into place appropriate mitigation and adaptation measures to minimise its negative effects and to cope with its realities.

ANNEXURES

Annexure 1: **LIST OF ACRONYMS**

ADRM	Climate Change and Disaster Management of the Department of Agriculture
AGIS	Agricultural Geo-reference Information System
ARC	Agriculture Research Council
CASP	Comprehensive Agricultural Support Programme
CBD	Convention on Biodiversity
CBO	Community based organizations
CC	Climate Change
CCD	Convention to Combat Desertification
CCSP	Climate Change Sector Plan
CDM	Clean Development Mechanism
CFCs	Chlorofluorocarbons
COGTA	Department of Cooperative Governance and Traditional Affairs
CH_4	Methane
COPs	Conference of Parties
COP3	3rd Conference of Parties
CO_2	Carbon dioxide,
CSD	Commission on Sustainable Development
CSIR	Council for Scientific and Industrial Research
DEAT	Department of Environmental Affairs and Tourism
DEXCO	Departmental Executive Committee
DH	Department of Health,
DoE	Department of Energy
DAFF	Department of Agriculture
DoT	Department of Transport
DPLG	Department of Provincial and Local Government
DSD	Department of Social development
DST	Department of Science and Technology
DTI	Department of Trade and Industry
DWAF	Department of Water Affairs and Forestry
EWS	Early warning systems
GDP	Gross Domestic product
GEF	Global Environmental Facilities
GHGs	Greenhouse gases
IDPs	Integrated Development Plans
IGCCC	Intergovernmental Committee in Climate Change
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
KPAs	Key Performance Areas
KPIs	Key performance Indicators
LARP	Land and Agrarian Reform Project
LRAD	Land Redistribution for Agricultural Development
LTMS	Long Term Mitigation Scenarios
LUSM	Land Use and Soil Management of the Department of Agriculture
MAFISA	Micro-Agricultural Financial Institutions of SA

MTEF	Medium Term Expenditure Framework
NCCC	National Committee on Climate Change
NDMC	National Disaster Management Centre
NEMA	National Environment Management Act
NEPAD	New Partnership for Africa's Development,
NGOs	Non-Governmental Organisation
N_2O	Nitrous-oxides
NQF	National Qualifications Framework
NRF	National Research Foundation
PRA	Participatory Rural Appraisal
R&D	Research and Development
RSA	Republic of South Africa
RTD	Research, Technology and Development
SACAN	South African Climate Action Network
SADC	Southern African Development Community
SANBI	South African National Biodiversity Institute
SAQA	South African Qualifications Authority
SAWS	South African Weather Services
SETA	Sector Education and Training Authority
SNC	Second National Communication
TNA	Technology Needs Assessment
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
WGCC	Working Committee on Climate Change
WSSD	World Summit on Sustainable Development
WWSD+2	Second Anniversary of World Summit on Sustainable Development
WUID	Water Use and Irrigation Development of the Department of Agriculture

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ADDENDUM

Aspects related to Climate Change and additional information

1. Climate Change

Climate Change is commonly regarded as an increase in the concentration of so-called greenhouse gases (GHGs). A number of gases that normally occur in the atmosphere in relatively small amounts, such as water vapour, carbon dioxide (CO_2), methane (CH_4), nitrous oxides (N_2O) and chlorofluorocarbons (CFCs) allow short wave solar radiation to reach the earth's surface, but tend to absorb the long-wave radiation emitted from the earth's surface.

This absorption leads to warming of the lower atmosphere, allowing the temperatures we experience. Without this warming effect, the earth would be considerably colder than is currently the case.

2. The Greenhouse Effect

Gases such as carbon dioxide and methane are referred to as "greenhouse gases", as they play a role in regulating temperature, similar to the process in greenhouses. Normal fluctuations of these gases occur and this does not have any lasting effect on climatic conditions. Climate as such is characterised by fluctuations or cycles that occur naturally. Over the last 100 - 200 years, following the industrial revolution, large increases in GHG emissions have occurred, mainly through anthropogenic (human-induced) activities. It is estimated that 50% of the increase in concentrations of GHGs can be attributed to the use of fossil fuel (coal, oil), 20% to chemical industries and the rest to agriculture (including deforestation). These increases have enhanced the greenhouse effect. Whilst the climate of the world displays natural variation, the preponderance of scientists believe that the ever rising amounts of greenhouse gases is over-shadowing this natural variation and causing serious climate change.

3. The United Nations Process

The first United Nations Summit on Sustainable Development was held in Rio de Janeiro in 1992. The links between environment and development based on deep concerns that development often had an adverse effect on the environment and did little to alleviate poverty, were the focus of discussions.

At the Rio Summit, the United Nations Framework Convention on Climate Change (UNFCCC) was signed and entered into force on 21 March 1994. The Convention recognised the accelerated change in the earth's climate over the last 200 years and that the cause of this is an increase in concentrations of greenhouse gases in the atmosphere, causing a warming of the earth's surface. Most of these increases emanate from industrialised nations and their largely fossil-fuel energy-based economies that can be traced back to the Industrial Revolution.

The main objective of the UNFCCC was to stabilise atmospheric concentrations of greenhouse gases caused by human activities and thereby counter dangerous climate changes. In an attempt to achieve this, the third Conference of the Parties, (COP3) to the UNFCCC, held in Kyoto, Japan in December 1997, adopted the "Kyoto Protocol", which obliges industrialised countries to reduce greenhouse emissions by an average of 5,2% compared to 1990 levels, by the first commitment period between 2008 and 2012.

Since the Convention entered into force in 1994, annual meetings of the Conference of Parties (COPs) have taken place, together with numerous specialised workshops and meetings on specific matters. The Kyoto Protocol attempts to commit industrialised countries to achieve quantified targets for decreasing their emissions of greenhouse gases. These targets came into force on 16 February 2005.

The Intergovernmental Panel on Climate Change (IPCC), that has done tremendous work on the science of climate change, has estimated that greenhouse gas reductions need to be at least 60% by the end of the 21st Century to avoid the dangerous effects of climate change.

4. NCCC AND IGCCC

In order to assist the DEA in its mandate regarding the UNFCCC, the National Committee on Climate Change (NCCC) was established to act as advisory body to the Minister of Environmental Affairs.

Representatives from relevant government departments as well as representatives from business and industry, mining, labour, community based organisations and non-governmental organisations constitute the NCCC. The NCCC currently functions well, with frank and honest debate about the many contentious issues involved.

More recently it was deemed advisable to establish the Intergovernmental Committee on Climate Change (IGCCC), to allow representatives of government to caucus internally and present a more united front. Problems currently encountered relate to commitment and continuity, both of which are essential in ensuring the active promotion of issues involved.

In both of these committees specific tasks have been assigned to ad-hoc sub-committees, which have increased efficiency. DAFF has played a visible and valuable role and intends to continue to do so.

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