Drought Management Plan: Department of Agriculture Land Reform and Rural Development: Northern Cape Province
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References

Reference AB: National disaster Management Act (Act 57 of 2002)

Reference AC: National Disaster Management Framework

Reference A: Contingency plan

Reference B: Guidelines for disaster declaration

Reference C: Drought Indicators

Reference D: Template for drought report

Reference E: Template for drought relief plan
Acronyms

CMI: Crop Moisture Index
DMP: Drought Management Plan
DAFF: Department of Agriculture Forestry and Fisheries
DWA: Department of Water Affairs
MAL: Mean Annual Loss
MDMC: Municipal Disaster Management Centre
NAFU SA: National African Farmers Union of South Africa
NC: Northern Cape
NDMC: National Disaster Management Centre
NDMF: National Disaster Management Framework
NDVI: Normalised Difference Vegetation Index
PDI: Palmer Drought Index
PDSI: Palmer Drought Severity Index
PDMC: Provincial Disaster Management Centre
SAWS: South African Weather Services
SPI: Standard Precipitation Index
SPEI: Standard Precipitation Evapotranspiration Index
VCI: Vegetation Condition Index
Glossary of terms

The different concepts and definitions used in this report are discussed and explained in the following section: In order to remain in line with international concepts and definitions, the main source for definitions is the United Nations International Strategy for Disaster Reduction (UNISDR) (www.unisdr.org/eng/library/lib-terminology-eng, 2004). Definitions are discussed in alphabetical order.

Acceptable Risk: The level of loss a society or community considers acceptable risk given existing social, economic, political, cultural, technical and environmental conditions (UNISDR, 2004). Knutson et al. (1998) refers to acceptable risk as a level of vulnerability that is considered to be “acceptable,” balancing factors such as cost, equity, public input, and the probability of drought.

Capacity: A combination of all the strengths and resources available within a community, society or organization that can reduce the level of risk, or the effects of a disaster. Capacity may include physical, institutional, social or economic means as well as skilled personal or collective attributes such as leadership and management. Capacity may also be described as capability (UNISDR, 2004).

Capacity Building: Efforts aimed to develop human skills or societal infrastructures within a community or organization needed to reduce the level of risk. In extended understanding, capacity building also includes development of institutional, financial, political and
other resources, such as technology at different levels and sectors of the society (UNISDR, 2004).

**Climate Change:** The climate of a place or region is changed if over an extended period (typically decades or longer) there is a statistically significant change in measurements of either the mean state or variability of the climate for that place or region. Changes in climate may be due to natural processes or to persistent anthropogenic changes in atmosphere or in land use (UNISDR, 2004). The definition of climate change used in the United Nations Framework Convention on Climate Change (UNFCCC) is more restricted, as it includes only those changes, which are attributable directly or indirectly to human activity (UNFCCC, 2008). According to the UNDP (2008) climate change refers to deviations from natural climatic variability observed over time that are attributed directly or indirectly to human activity and that alter the composition of the global atmosphere. Both the UNFCCC and the UNDP use the definition that attributes climate change to human activity. In the context of this study the UNFCCC and UNDP definitions hold.

**Coping Capacity:** The means by which people or organizations use available resources and abilities to face adverse consequences that could lead to a disaster. In general, this involves managing resources, both in normal times as well as during crises or adverse conditions. The strengthening of coping capacities usually builds resilience to withstand the effects of natural and
human-induced hazards (UNISDR, 2004).

**Desertification:** The process of land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities (UNDP, 2008).

**Disaster:** A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources. A disaster is a function of the risk process. It results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk (UNISDR, 2004).

**Disaster Risk Management:** The systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the adverse impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards (UNISDR, 2004). IDRM (2009) describe DRM as a development approach to disaster management, this focuses on underlying conditions of the risks, which lead to disaster occurrence. The objective is to increase capacities to effectively
manage and reduce risks, thereby reducing the occurrence and magnitude of disasters.

**Disaster Management:**

The IDRM (IDRM International, 2009) explains DM by noting that there could not be a single organization solely responsible for all aspects of disaster management. The management task is to bring together, in an integrated organizational structure, the resources of many organizations that can take appropriate action in times of disasters. UNDHA (1999) defines DM as the body of policy and administrative decisions and operational activities which pertain to the various stages of a disaster at all levels.

**Disaster Risk reduction:**

The conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development.

The disaster risk reduction framework is composed of the following fields of action (Living With Risk, 2002):

- Risk awareness and assessment including hazard analysis and vulnerability/capacity analysis.
- Knowledge development including education, training, research and information.
- Public commitment and institutional frameworks, including organisational, policy,
legislation and community action.

• Application of measures including environmental management, land-use and urban planning, protection of critical facilities, application of science and technology, partnership and networking, and financial instruments.

Early warning systems including forecasting, dissemination of warnings, preparedness measures and reaction capacities.

Droughts: A deficiency of precipitation from expected or “normal” that, when extended over a season or longer period of time, is insufficient to meet demands. This may result in economic, social, and environmental impacts. It should be considered a normal, recurrent feature of climate. Drought is a relative, rather than absolute, condition that should be defined for each region. Each drought differs in intensity, duration, and spatial extent (Knutson et al., 1998). The UNDP (2008) defines drought as the naturally occurring phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances that adversely affect land resource production systems.

Drought Contingency Plan: A document that identifies specific actions that can be taken before, during and after a drought to mitigate some of the impacts and conflicts that result. Frequently these actions are triggered by a monitoring
Drought Impact: A specific effect of drought. People also tend to refer to impacts as “consequences” or “outcomes.” Impacts are symptoms of vulnerability (Knutson et al., 1998).

Drought Impact Assessment: The process of looking at the magnitude and distribution of drought’s effects (Knutson et al., 1998)

Dry period: Refers to a period of below mean precipitation where vegetation and water resources are impacted negatively. The dry period is not as serious as drought.

Drylands: Areas with an aridity value of less than 0.65; they comprise dry sub-humid, semi-arid, arid and hyper-arid areas (Middleton and Thomas, 1997) The UNDP (2008) defines drylands in terms of water stress; as terrestrial areas where the mean annual rainfall (including snow, fog, hail) is lower than the total amount of water evaporated to the atmosphere.

Early warning: The provision of timely and effective information, through identified institutions, that allows individuals exposed to a hazard to take action to avoid or reduce their risk and prepare for effective response. Early warning systems include a chain of concerns, namely: understanding and mapping the hazard; monitoring and forecasting impending events; processing and disseminating understandable warnings to political authorities and the population, and undertaking appropriate and timely actions in response to the
warnings (UNISDR, 2004).

**Ecosystem:** A complex set of relationships of living organisms functioning as a unit and interacting with their physical environment (UNISDR, 2004). The boundaries of what could be called an ecosystem are somewhat arbitrary, depending on the focus of interest or study. Thus the extent of an ecosystem may range from very small spatial scales to, ultimately, the entire Earth (IPCC, 2001).

**Environment:** The combination of external physical conditions that affect and influence the growth, development and survival of organisms. This includes all of the biotic and abiotic factors that act on an organism, population, or ecological community and influence its survival and development. *Biotic* factors include the organisms themselves, their food and their interactions. *Abiotic* factors include such items as sunlight, soil, air, water, climate and pollution. Organisms respond to changes in their environment by evolutionary adaptations in form and behaviour (UNDP, 2008).

**Environmental Degradation:** The reduction of the capacity of the environment to meet social and ecological objectives, and needs. Potential effects are varied and may contribute to an increase in vulnerability and the frequency and intensity of natural hazards. Some examples are: land degradation, deforestation, desertification, wild fires, loss of biodiversity, land, water and air pollution,
climate change, sea level rise and ozone depletion (UNISDR, 2004).

Environmental impact assessment (EIA):

A public process by which the likely effects of a project on the environment are identified, assessed and then taken into account by the consenting authority in the decision-making process.

Farming System:

A farming system is defined as a population of individual farm systems that have broadly similar resource bases, enterprise patterns, household activities and constraints, and for which similar development strategies and interventions would be appropriate. Depending on the scale of the analysis, a farming system can encompass a few dozen or many millions of households (FAO, 2001).

Forecast:

Definite statement or statistical estimate of the occurrence of a future event (UNESCO, WMO).

Geographic Information System (GIS):

Analysis that combine relational databases with spatial interpretation and outputs often in form of maps. A more elaborate definition is that of computer programmes for capturing, storing, checking, integrating, analysing and displaying data about the earth that is spatially referenced. GIS is used in this study for hazard, vulnerability and resilience mapping and analysis (UNISDR, 2004).
Hazard: A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydro-meteorological and biological) or induced by human processes (environmental degradation and technological hazards). Hazards can be single, sequential or combined in their origin and effects. Each hazard is characterised by its location, intensity, frequency and probability (UNISDR, 2004). Hazard in the context of this study refers to drought caused by hydro-meteorological elements causing dry periods such as lack of precipitation, high temperatures, high winds and evapotranspiration.

Hazard Analyses: Identification, studies and monitoring of any hazard to determine its potential, origin, characteristics and behaviour (UNISDR, 2004).

Hydro-meteorological Hazards: Natural processes or phenomena of atmospheric, hydrological or oceanographic nature, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation (UNISDR, 2004). Drought is a hydro-meteorological hazard, but in the context of this study only the term “hazard” is used.

La Niña: A cooling of the surface water of the eastern and central Pacific Ocean, occurring somewhat less...
frequently than El Niño events but causing similar, generally opposite disruptions to global weather patterns. La Niña conditions occur when the Pacific trade winds blow more strongly than usual, pushing the sun-warmed surface water farther west and increasing the upwelling of cold water in the eastern regions. Together with the atmospheric effects of the related southern oscillation, the cooler water brings drought to western South America and heavy rains to eastern Australia and Indonesia.

**Land-use Planning:** Physical and socio-economic planning that determines the means and assesses the values or limitations of various options in which land is to be utilized, with the corresponding effects on different segments of the population or interests of a community taken into account in resulting decisions. Land-use planning involves studies and mapping, analysis of environmental and hazard data, formulation of alternative land-use decisions and design of a long-range plan for different geographical and administrative scales (UNISDR, 2004).

Land-use planning can help to mitigate disasters and reduce risks by discouraging high-density settlements and construction of key installations in hazard-prone areas, control of population density and expansion, and in the siting of service routes for transport, power, water, sewage and other critical facilities.

**Land degradation:** The reduction or loss in arid, semi-arid and dry sub-humid areas of the biological or economic productivity
and complexity of rain-fed cropland, irrigated cropland, or range, pasture, forest and woodlands. Land degradation results from a process or combination of processes, including those arising from human activities and habitation patterns that include: (i) soil erosion caused by wind and/or water, (ii) deterioration of the physical, chemical and biological or economic properties of soil and (iii) long-term loss of natural vegetation (UNDP, 2008).

**Livelihood:** The means for securing the necessities of life so that individuals, households and communities can sustain a living over time, using a combination of social, economic, cultural and environmental resources (UNDP, 2008).

**Livelihood:** Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards (UNISDR, 2004).

**Mitigation:** Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards (UNISDR, 2004).

**Natural hazards:** Natural processes or phenomena occurring in the biosphere that may constitute a damaging event. Natural hazards can be classified by origin namely: geological, hydro-meteorological or biological.
Hazardous events can vary in magnitude or intensity, frequency, duration, area of extent, speed of onset, spatial dispersion and temporal spacing (UNISDR, 2004).

**Natural resources:** Non-renewable resource such as minerals, fossil fuels and fossil water, and renewable resources such as non-fossil water supplies, biomass (forest, grazing resources) marine resources, wildlife and biodiversity.

**Preparedness:** Activities and measures taken in advance to ensure effective response to the impact of hazards, including the issuance of timely and effective early warnings and the temporary evacuation of people and property from threatened locations (UNISDR, 2004).

In the context of this study preparedness refers to the “readiness” of the agricultural sector or individual farmers or communities to overcome the negative impacts of drought. These include measures such as fodder banks, savings, insurance, alternative sources of income.

**Relief/Response:** The provision of assistance or intervention during or immediately after a disaster to meet the life preservation and basic subsistence needs of those people affected. It can be of an immediate, short-term, or protracted duration (UNISDR, 2004).

In the context of this document relief refers to measures such as subsidies for fodder purchases,
interest subsidies or soft loans, extension of debt repayments, or any other measure that support the agricultural sector, communities or farmers in order to financially survive the negative impacts of drought. Relief and response in this context does not include risk reduction measures for future droughts.

**Resilience/resilient:** The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures (UNISDR, 2004).

In the context of this study resilience refers to the capacity of agriculture, farmers or communities to withstand the negative effects of drought without any additional support. The term capacity is also used in the study in the same context.

**Risk:**

The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions (UNISDR, 2004).

Conventionally risk is expressed by the notation; Risk = Hazards x Vulnerability. Some disciplines also
include the concept of exposure to refer particularly to the physical aspects of vulnerability. Beyond expressing a possibility of physical harm, it is crucial to recognize that risks are inherent or can be created or exist within social systems. It is important to consider the social contexts in which risks occur and that people therefore do not necessarily share the same perceptions of risk and their underlying causes.

**Risk Assessment/Analysis:** A methodology to determine the nature and extent of risk by analyzing potential hazards and evaluating existing conditions of vulnerability that could pose a potential threat or harm to people, property, livelihoods and the environment on which they depend. This study also includes resilience or coping capacity as part of risk (UNISDR, 2004). Knutson *et al.* (1989) define drought risk analysis as “the process of identifying and understanding the relevant components associated with drought risk as well as the evaluation of alternative strategies to manage that risk”.

The process of conducting a risk assessment is based on a review of both the technical features of hazards such as their location, intensity, frequency and probability; and also the analysis of the physical, social, economic and environmental dimensions of vulnerability and exposure, while taking particular account of the coping capabilities pertinent to the risk scenarios.

**Small-scale farmers:** Small-scale farmers are by definition those farmers in...
transition between subsistence and commercial farmers. They are normally too small to apply modern technology and to mechanise and most of their inputs are labour intensive yet they already produce surplus food and fibre for the market (Jordaan & Jooste, 2003).

**Subsistence farmers:** Individuals farming with livestock, horticulture or any system but they do not produce any surplus. Agriculture is a livelihood means and subsistence farmers utilise products only for personal and their own livelihood means. This group of farmers do not produce any surplus food for the market (Jordaan & Jooste, 2003).

**Sustainable development:** Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development is based on socio-cultural development, political stability and decorum, economic growth and ecosystem protection, which all relate to disaster risk reduction (UNISDR, 2004).

**Vulnerability:** The conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards (UNISDR, 2004).
1 Introduction

The vision for Agriculture as stated in the Agricultural Sector Plan is a united, non-racial and prosperous agricultural sector. Climate and weather conditions are some of the main determinants of agricultural production and ultimately a prosperous agricultural sector as described in the Vision for the South African Agriculture.

The Disaster Management Act (South Africa, 2002) and the National Disaster Management Framework (South Africa, 2005) provides the legislative and policy frameworks for the provincial drought management framework.

Drought has no universal definition as droughts are region specific reflecting differences in climatic characteristics with different socio-economic and physical variables. Some of the most common definitions are the following:

- The UNDP (2008) define drought as “the naturally occurring phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances that adversely affect land resource production systems”.
- Knutson et al. (1998) define drought as; “a deficiency of precipitation from expected or “normal” that, when extended over a season or longer period of time, is insufficient to meet demands. This may result in economic, social, and environmental impacts. It should be considered a normal, recurrent feature of climate. Drought is a relative, rather than absolute, condition that should be defined for each region. Each drought differs in intensity, duration, and spatial extent”.
- The Director of Common Wealth Bureau of Meteorology during 1965 suggested a broad definition for drought as “severe water shortage”.
- Palmer (1965) states that “Drought is an interval of time, generally of the order of months of years in duration, during which the actual moisture supply at a given place rather consistently falls short of the climatically expected or climatically appropriate moisture supply”.

1
• Chopra (2006) define drought as; “a period of rainfall deficiency, extending over months or year of such nature that crops and pastures for stock are seriously affected, if not completely burnt up and destroyed, water supplies are seriously depleted or dried up and sheep and cattle perish”

• McMohan and Diaz Arena (1982) define drought as; “a period of abnormally dry weather sufficiently for the lack of precipitation to cause serious hydrological imbalance and carries connotations of a moisture deficiency with a mass usage to water”.

All the above definitions only consider meteorological influences and have little reference to the socio-economic and environmental impact of drought and dry periods. Wilhite & Glantz (1985), Wilhite (2000) and Castillo (2009) recognized the challenge for a universally accepted definition and categorized drought into four different categories with specific definitions. The four most common definitions describing the different types of drought are (i) meteorological drought, (ii) agricultural drought, (iii) hydrological drought and (iv) socio-economical drought. These are illustrated in Fig. 1.

**FIG. 1. DROUGHT CATEGORIES**
(Wilhite and Glantz 1985; Wilhite, 2000; Castillo, 2009)
• **Meteorological drought** is usually defined by a precipitation deficiency threshold over a predetermined period of time. This is a reduction in rainfall supply compared with a specified average condition over a specified period of time. Different indexes and methodologies are used to define the meteorological drought such as standard precipitation index (SPI), standard precipitation evapotranspiration index (SPEI), percentage of normal rainfall, etc. The SPI is currently the most sophisticated index used worldwide to measure meteorological droughts.

• **Agricultural drought** is commonly defined by the availability of soil water to support crop and forage growth. It is a reduction in water availability below the optimal level required by a crop during each different growth stage, resulting in impaired growth and reduced yields. Agricultural drought relates to an imbalance in the water content of the soil during the growing season, which although influenced by other variables such as the crop water requirement, the water-holding capacity and degree of evaporation, is also largely dependent upon rainfall amount and distribution.

• **Hydrological drought** is normally determined by a departure of surface and subsurface water supplies from some average condition at various points in time. It occurs when there is substantial deficit in surface runoff below normal conditions or when there is a depletion of groundwater supplies. Hydrological drought reduces the supply of water for irrigation, hydro-electrical power generation, and other household and industrial uses.

• **Socio-economic drought** differs markedly from the other types of drought. It concerns the relationship between the supply and demand for some commodity or economic good that is dependent of precipitation. It represents the impact of drought on human activities, including both indirect and direct impacts. This relates to a meteorological anomaly or extreme event of intensity and/or duration outside the normal range of events taken into account by enterprises and public regulatory bodies in economic decision-making, thereby affecting production and the wider economy.
Van Zyl (2006) also provides some alternative and practical definitions for drought types usually experienced in South Africa. These are commonly used by farmers:

- **False drought**: This type of "drought" occurs when rainfall is normally below the long-term average, but as a result of overgrazing the veld and fodder supply becomes prematurely depleted, giving the impression of a prevailing drought. In some instances false droughts have been wrongly declared as disaster droughts.

- **Premature drought**: This type of drought occurs when a chronic dry situation is so aggravated by overgrazing that a disaster drought is prematurely declared. In many instances, adjoining farms may differ widely as the intensity of a drought is in this case a result of veld management practices and the exploitation of grazing capacity.

- **Prolonged drought**: A drought situation can be prolonged for months where high stock numbers are maintained. This results in a more or less chronic food shortage even after rains have fallen. Plants become severely damaged. It is also possible that areas, which have been declared drought stricken, do not recover after moderate rainfall. After a few months the drought could be even worse.

- **Green drought**: Green drought occurs when excessive grazing pressure is maintained in semi-dry periods. This causes food shortages even though the vegetation appears green and soil moisture reserves are favourable, or where natural causes such as rain showers during a drought promote a short spell of green growth, but not enough for breaking the drought. A green drought can also occur where insects severely attack plants and deplete the fodder to such a degree that it takes on the appearance of a drought situation. There is thus a shortage of fodder in spite of favourable circumstances. The most common pests are locusts, Karoo caterpillar and the commando caterpillar.

- **Financial drought**: Farmers exert pressure to obtain financial assistance in order to improve cash flow. Therefore a region is sometimes declared drought stricken even though a drought does not prevail (the declaration of such a
region as a disaster drought area has a negative effect on the interpretation of rainfall records because a drought is indicated when it does not exist).

2 Drought Management

Climate variability is a given fact and the vegetation in a region is the result of a specific climate profile. It is important to remember that drought is a temporary anomaly, unlike normal arid and semi arid climatic conditions, and one needs to distinguish between drought and aridity. Understanding the difference between these two concepts is important for the development of drought risk reduction plans, which are based on the assessment of drought risks (WMO, 2006). The typical Kalahari vegetation, Karoo shrubs and Namaqua winter shrubs, is the result of a combination of climate, soil, and topography in the Northern Cape Province. Farmers in the arid Northern Cape are well aware of the climate limitations in the province and farming practices were adapted through many years of experience to fit the climate profile of the region (Du Pisani et al., 1998). Farmers should also be conscious of the fact that weather fluctuates from wet periods to dry periods and they therefore must adapt their agricultural practices to fit within the two extremes.

Figure 2 on the next page illustrates the interaction between long-term production potential and climate profile in the agricultural sector. Within this climate profile certain years might receive above normal rainfall with potentially above normal production, whereas below normal precipitation in other years might result in lower than normal or average production outputs (IPCC, 2001). However, this is not always the case since some farmers reported that with good agricultural practices, it is possible to receive the same profits during dry years as well (Olivier, 2010).

Market forces (supply and demand) more than often complement below average production outputs during dry years. The ideal production situation though, is located between the two extremes since farmers can then plan accordingly (See Fig. 2). (International environment have larger impact on local economy. Global forces become more important)
The purpose of drought risk assessment and drought early warning is to allow farmers to make timely tactical decisions instead of crisis management during the extreme climatic situations – See illustration in Fig. 2.11. Farmers, the private sector and government should therefore include drought planning as part of the normal management process. Budgeting for drought according to the calculated drought mean annual loss, insurance schemes and fodder banks are some of the risk reduction measures to be included in planning.

3 Acts and Regulations

The 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 (57 of 2002);
• The Strategic Plan for the NCDoALRE&C;
• The Conservation of Agricultural Resources Act (43 of 1983);
• National Disaster Management Framework (NDMF)(1995)
• National Drought Management Framework (2008)

The National Disaster Management Framework and the National Drought Management Framework consists of four key performance areas and three enablers. These provide the framework and structure for the provincial drought management plan and are addressed in the following two sections.

4 Key Performance Areas

The four KPA's are:

• KPA 1: Integrated constitutional capacity for drought management
• KPA 2: Drought risk assessment
• KPA 3: Drought risk reduction
• KPA 4: Response and recovery

4.1 KPA 1: Integrated Institutional capacity for drought management

Objective

Establish integrated institutional capacity within the province to enable the effective implementation of drought management that includes drought risk reduction and drought response and relief.

The primary responsibility for the implementation of the Disaster Management Act (Act 57 of 2002) (Reference AB) is the Department of Provincial Government and Traditional Affairs (COGTA). The Northern Cape Provincial Disaster Management Centre (PDMC) together with the District Disaster Management Centres in the Northern Cape are therefore pivotal in the coordination and implementation of the Act within the Province. The NCDoALRD
on the other hand is primarily responsible for Agriculture and drought impacting on the Agricultural sector.

Other role players involved in drought management includes the commercial farming sector as well as the small-scale and communal farming sector. That includes therefore the different farmers’ organizations, commodity organizations and local municipalities as land-owners of communal land.

The term drought governance is used instead of drought management, which is more focused at the operational or farm level. The farmer and land owner must manage dry conditions in order to prevent disaster droughts on the farm while government have the responsibility to provide policy guidelines and govern dry conditions and drought in order to prevent permanent economic loss and ensure sustainable resource use in the agricultural sector and the province.

4.1.1 Provincial intergovernmental drought management structures

This section deals with drought governance at provincial level. The proposed institutional organization and framework is illustrated in Figure 3. A Provincial drought strategy and plan is imperative for efficient drought governance in the NC Province. The NCDoALRD and the PDMC are the two key institutions responsible for drought governance and management in the province. In order to assist them with drought related issues and ensure coordination of all sectors, ad hoc structures should be developed with the primary role of assisting NCDoALRD and PDMC with drought management in the province. The following are proposed:

- Provincial Drought Task Team at provincial level
- District Drought Task Team at district municipality level
- Reference farms in each of the quaternary catchments
- Drought Early Warning and Monitor Unit responsible for data capturing, analysis and early warning. Such a unit can be located within the NCDoALRD or it can be outsourced to a institution with the capacity to maintain such a unit.
The proposed structure is illustrated in Figure 3.

Fig 3. Proposed structure for drought governance

**4.1.1.1 Interdepartmental working group on Drought (Provincial Drought Task Team)**

The NCDoALRD is responsible for the establishment and support to a drought committee or an interdepartmental working group on drought (Drought Task Team). This group should be multi-disciplinary and should consist of the following representatives:

- NCDoALRD (Chair)
- NCPDMC (Co-Chair)
- DWA
- Organised Agriculture (NC Agri, NAFU and AFASA)
- Water User Associations
- SAWS
- Specialists coopted from Industry, Higher Education, Research Institutes etc.

The role of the NC Provincial Drought Task Force is as follows:
• Oversee the development and implementation of a detailed drought plan
• Oversee the updating and roll down of drought risk assessments at municipal level
• Provide guidance and advise to the HOD NCDoALRD and HOD NCCOGHSTA with regards to drought declaration
• Provide guidance and advise to the HOD NCDoALRD and HOD NCCOGHSTA with the application and approval of relief schemes
• Provide guidance and advise to the NC NCDoALRD and HOD NCCOGHSTA with regards to mitigation and prevention programs
• Review and recommend on the effectiveness of early warning systems
• Recommend on the improvement of drought plans
• Assist the NCDoALRD with drought impact assessments
• Provide guidance and assistance to NCDoALRE&C during drought relief and response

4.1.1.2 District Drought Task Team

4.1.1.2.1 Representatives

• DoA District Manager
• District Disaster Manager (Co-Chair)
• Extension Officer
• Organised Agriculture
  — DFA
  — NAFU & AFASA
  — Chiefs where applicable
• Local Catchment Management Agency
• Local Business
• Experts as required

4.1.1.2.2 Tasks

• Support and advise to extension officer
• Local identification of reference farms
• Local coordination of reference farms
• Support to PDoA during process on drought declaration
• Support PDoA with drought relief actions
• Reporting to representing structures, eg to DFA
• Monitoring of local conditions
• Validate local conditions
• Assist with coordination of drought relief actions (fodder distribution etc)

4.1.2 Provincial Disaster Management Centre

The role of the PDMC is mainly coordination and support to all provincial departments, district municipalities and local municipalities and the private sector in disaster management issues. The role of the PDMC in context of droughts are as follows:

• Coordinate and maintain drought early warning systems in collaboration with SAWS, DAFF and NCDoALRD.
• Coordinate drought relief and response in collaboration with municipalities and NCDoALRD.
• Ensure inter-institutional collaboration and coordination.
• Develop and maintain an all inclusive provincial drought management framework and plan.
• Conduct an all inclusive drought risk assessment for the province.
• Coordinate, maintain and implement drought risk reduction awareness, training and education programs in collaboration with other role players.
• Include drought issues (drought early warnings, drought risk reduction, awareness, monitoring and drought relief) as a standing point on the agenda of the provincial disaster management forum
• Execute administrative responsibilities for disaster declaration and relief activities
4.1.3 Northern Cape Department of Agriculture, Land Reform and Rural Development (NDoALRD)

The NDoALRD deals primarily with agricultural related droughts\(^1\) and is the leading agent for agricultural related droughts. The NDoALRD is responsible for the following:

- Development and maintenance of an agricultural drought management plan that includes:
  - Drought risk assessment
  - Drought risk reduction plan
  - Drought response plan
  - Drought relief and recovery plan
- Establish and Chair the provincial interdepartmental working group on agricultural droughts (Drought Task Team).
- Develop and oversee a research program on drought related issues
- Assist district municipalities and the farming sector with drought risk assessments
- Develop and execute extension programs with a focus on drought risk reduction and agriculture best practice in given climate zones
- Promote conservation farming principles
- Lead education and awareness programs for drought risk reduction in collaboration with the PDMC and other role players
- Provide additional extension services with focus on conservation farming and good agricultural practices to small-scale and communal farmers
- Provide additional support to communal farmers in terms of markets and timely marketing of animals during dry periods
- Participate actively in disaster management forums at provincial and district levels
- Develop and implement a system for drought monitoring and evaluation

\(^1\) Note the difference between agricultural related droughts and agricultural droughts according to the definition.
Develop and implement an information management system

Develop and maintain a drought early warning system in collaboration with the DAFF, SAWS, DWA, and the PDMC

Compile vegetation indicator maps by using technology at national and provincial level as well as other research institutions

Disseminate timely information amongst all clients

Provide provincial guidelines for drought classification in line with national guidelines

Apply and monitor dry periods according to agreed upon national guidelines

Ensure and monitor timely destocking of animals during dry periods

Compile drought impact assessments and source funding for drought relief and response in collaboration with the PDMC. The following should be adhered to:
  o Coordinate drought relief applications
  o Evaluate and verify drought relief applications
  o Conduct the damage costs and a cost benefit analysis
  o Prepare reports
  o Maintain records
  o Verify impact assessments and prepare final reports for drought relief assistance at national level in collaboration with the PDMC

Coordinate and manage drought relief in collaboration with the relevant DDMC and the PDMC. The following should be adhered to:
  o Management and control of funds according to guidelines from Treasury and the Auditor General
  o Record keeping
    o Timely and efficient support to farmers according to drought relief guidelines
  o Appoint and pay service providers to deliver services to affected farming communities

Ensure sufficient capacity for drought management

Provide the necessary funding to develop and maintain an online facility for the capturing of farmer data.
• Provide funding for the development of an departmental or outside facility for the monitoring and maintaining of meteorological and on-farm data from reference farms.

4.1.4 District municipalities

District municipalities are mandated according to the NDM Act (Act 57 of 2002) to coordinate disaster management at district and local level. They should play a pivotal role in drought management as follows:

• Provide information concerning drought in the municipal area
• Conduct detailed drought risk assessment at district level
• Assist the NCDoALRD and PDMC with dissemination of information
• Assist local municipalities with local drought management plans
• Coordinate and collaborate with NCDoALRD and PDMC on drought relief and response actions within district
• Participate in the district drought task team
• Assists the NCDoALRD and PDMC with data gathering and data storage

4.1.5 Local municipalities

Local municipalities in most cases own the communal land within its boundaries and as land-owners they are responsible for the sustainable use of its resources. Local municipalities should contribute to drought risk reduction as follows:

• Ensure the existence of lease and usage contracts for the use of commonages (land belong to municipality)
• Maintain infrastructure such as fences and water provision on commonages (land belong to municipality)
• Ensure the sustainable use of resources by applying grazing capacity guidelines as provided by NCDoALRD
• Prevent over-grazing of commonages
• Ensure the application of good agricultural practices on all commonages
• Provide support to extension officers in extension programs directed at communal farmers
• Develop drought management plans for commonages. These plans include:
  o Drought risk assessment of commonages
  o Drought risk reduction plan
  o Drought relief plan
  o Drought recovery and rehabilitation plan
• Assist the NCDoALRD in the control and distribution of emergency feed and fodder supplies
• Assist communal farmers with marketing channels for animals

4.1.6 Commercial farming sector

Commercial Agriculture is well organized with farmers associations, regional representative structures and Northern Cape Agriculture at provincial level. The different commodity organizations are part of the commercial farming sector. Assistance to this sector is in accordance to the Disaster Management Framework.

Organized agriculture already play an important role in drought planning and they are responsible for the following:

• Maintain and expand the reference farm scheme to ensure representatives from at least all quaternary catchments
• Motivate all farmers to support the reference farm scheme
• In collaboration with NCDoALRD, computerize the reference farm information system for easy analysis and as an early warning and drought monitor mechanism. The NCDoALRD should provide the necessary funding to develop and maintain an online facility for farmers to submit the necessary meteorological and on-farm data.
• Provide advise to government with drought declaration through the provincial and district drought task teams
• Provide support to government with administration of relief schemes. Data capturing regarding drought impacts remains a challenge and organized agriculture should assist NCDoALRD with the capturing and verifying process.

In order for the sector to be considered for drought relief and assistance, they should have:

• Adopt agricultural practices to climatic conditions with sustainable resources use in mind
• Apply drought prevention and -mitigation strategies
• Followed good agricultural production practices
• Utilized early warning in their planning

The farming sector is mainly divided in two agricultural systems namely irrigation farming, which is highly intensive and depends largely on water from the Orange and Vaal rivers and the extensive livestock farming sector, which consists of small-stock, large-stock and game farming. Both sectors should treat water as a scarce resource and should adhere to the following:

• Introduce technology that introduce the efficient use of water such as drip irrigation where possible
• Maintain own water articulation infrastructure to prevent unnecessary leakages and water wastages
• Adhere to allocated water quantities according to DWA allocations
• Adhere to the prescriptions of the National Water Act (Act 36 of 1998)

Extensive stock farmers should adhere to the following in order to be considered for drought relief and support:

• Updated and valid stock counts should be kept at all times
• A register of all stock including purchases, sales, progeny and mortalities should be kept for at least 12 months prior to a drought application
• Fences and water articulation systems, whether privately owned and erected or erected with government subsidy must be maintained and secured at all times
• Good agricultural, including grazing principles should be applied and adhered to. Overgrazing will lead to forfeiture of assistance.
• Farmers must adhere to the grazing capacity guidelines prescribed by the NCDoALRD
• Farmers must reduce animal numbers according to guidelines provided by NCDoALRD after drought early warnings issued by NCDoALRD. Current guideline is 30% reduction in animal numbers but this should be phased in according to veld conditions of individual farms.
• The purpose of drought relief schemes must consider the sustainable use of natural resources.
• The maximum number of livestock to be considered for governmental drought relief schemes is 200 LSU (DAFF Attachment). Drought relief and drought support is regarded as a safety net for farmers to maintain a minimum production capacity. Government recognized the limitations of drought support in that not all farmers will be able to recover fully to the same state as before from the impacts of drought.

4.1.7 REFERENCE FARMS
4.1.7.1 Objectives

The objective is to formalize and implement a system of reference farms based on practical experience and research over a long period of drought management. Reference farms, are those particular farms chosen in a catchment area, on the basis where a farmer is prepared to collect and supply data on rainfall, carrying capacity, veld condition and other scientific information according certain terms and conditions, in collaboration with the NCDoALRE&C. Data will be submitted on a regular basis via internet on a web based system. This data will be analyzed, processed and used as a source for drought early warning.

A service provider from a reliable research institution to be appointed who will be responsible for the capturing, processing and analyzing of the data and to
advise decision makers as an early warning message on deterioration of veld and
drought conditions and declaring of drought as disasters as part of the Disaster
Management Act, 2002.

Furthermore the, system of reference farms can contribute to an effective
determination of carrying capacity for the different catchment areas, and could
act as a simulate for farmers to farm on a sustainable basis and use as a risk
mitigation measure.

4.1.7.2 The characteristics of the Reference farm

4.1.7.2.1 Geographic selection

Reference farms must be as representative to a specific climate zone as possible.
One acknowledges the fact that rainfall is not always the same on all farms in a
specific region. In order to ensure proper provincial coverage the quaternary
catchments should be used as a region for sampling reference farms. That
implies therefore at least 200 reference farms for the Northern Cape. At least one
reference farm should be sampled from each quaternary catchment.
4.1.7.2 Profile of Reference farms

The natural resources on the reference farm must be representative of the specific catchment. The most notable natural resources are veld type, water supply, soil type, geographical features as well as farming system.

The farmer (owner or lessee) (called participant) must be willing and able to keep records and provide data on at least a weekly basis. The participant must apply good agricultural practices according to the norms and climate conditions of the specific region. In addition the participant must be connected or have access to internet in order to provide and upload data on a regular basis.

4.1.7.3 Responsibility of participants

Participants in the drought monitor and early warning project must:
• Supply daily meteorological data on at least a weekly basis. The possibility of automatic meteorological data capturing mechanisms should be discussed with SAWS.

• Supply an inventory of all animals and movement of animals in terms of progeny, sales and purchases on the farm i.e. sheep, cattle, horses, donkeys, ostriches and game (Values according to the present Meisner tables or as reviewed.)

• Adhere to the carrying capacity according to the norms of the NC DoALRD and DAFF over a twelve-month cycle. As a farmer who apply good agricultural practices he/she will under-graze some years and over-graze other years depending the condition of the veld and climate conditions. Therefore the carrying capacity will be exceeded some years etc. The baseline veld condition on a specific farm differs from others and not all farms have the same carrying capacity but good agricultural principles apply.

• Comply to good farming practice (veld management system) as approved by the NC DoALRD.

• Comply with the protocols provided by the service provider and the NCDoALRD.

Extension Officers and Soil Conservation Committees will pay a vital role in the role out of the scheme and overseeing measures.

4.1.7.4 Functioning

Participants will have to upload the prescribed information to the early warning research unit through a prescribed web based program. By default the system will automatically remind participants of any non-compliance. This could have a detrimental effect on those farms coupled to the particular reference farm, as they are also dependent on the results obtained through the scheme and it might jeopardize the outcome of the advice to the decision makers as far as financial assistance is concerned in case of required drought assistance.
4.1.8 Provincial Drought Mitigation Centre

- Research and propose the most relevant spatial and temporal drought monitor indicators
- Continually monitor spatial and temporal drought related indicators
  - Design and develop software for data submission, data analysis and reporting
    - Develop e-based data submission system from reference farms to research unit
    - Obtain inputs from other research stakeholders
    - Processing and analysis of data
    - Reporting to different stakeholders
  - Integration of existing drought related indicators
  - Analysis of all drought related indicators
  - Compile integrated report
- Advise to relevant stakeholders (NCDoALRD, PDMC, DWA, organized agriculture and others) regarding drought early warning and other related issues.
- Early warning research unit should provide the necessary early warning to the NCDoALRD and farmers in case of a pending drought based on the SPEI and feedback from reference farms. Once feedback from reference farms and an SPEI of -1.5 is evident, the NDVI and soil moisture content should be evaluated and ground-truthed within the affected catchment.
- Can be based as a unit within the Department but services can also be contracted to an organization with relevant experts and capacity
4.2 KPA 2: Drought Risk Assessment

Objective:

Establish a uniform approach to assessing and monitoring drought risks that will inform drought risk reduction and drought response management by provincial organs of state and other role players.

The first step in the development of a drought management plan is the drought risk assessment. Scientific drought risk assessment should be conducted at provincial level but also at micro level (District level at least). The following should be addressed in the drought risk assessment:

- Hazard analyses focus on the analyses of meteorological data such as rainfall, temperature, evapotranspiration, etc.
- Drought Risk Analysis includes the assessment of vulnerabilities to drought as follows:
  - Social vulnerability
  - Economic vulnerability
  - Environmental vulnerability
- Coping capacity includes the capacity of the different farming sectors to adapt, cope and manage the impacts of droughts
- Provincial drought risk assessment should be constructed at tertiary catchment level while the district drought risk assessment should be conducted at quaternary catchment level.

Drought risk assessment is not a once-off activity with the purpose to identify priorities and sensitive indicators; it is a continuous process that includes monitoring end evaluation of drought risk indicators. The Results of the NC drought Risk Assessment is shown in Document “NC drought Risk Assessment”

2 The absence of a scientifically based risk assessment is not an excuse for non-compliance to the development of drought management plans.
4.3 KPA 3: Drought Risk Reduction

Objective:

Ensure all drought management stakeholders develop and implement integrated drought risk management plans and risk reduction programmes in accordance with approved guidelines.

The focus of drought risk reduction is the prevention and mitigation of the devastating impacts of drought. This should be achieved mainly through the application of good agricultural practices in both the intensive irrigation sector as well as in the extensive livestock sector. Drought risk management is the responsibility of each individual landowner and farmer. The main role-players here are the farmers themselves, together with their supporting structures as well as the NCDoALRD and research institutions. Farmers should adapt to their local climatic conditions and ensure adequate adaptation and coping mechanisms. Resiliency should be enhanced through the timely application of risk reduction measures such as insurance, reserve feed and fodder banks and a grazing capacity suitable to the veld condition. Extension services play a critical role in the transfer of knowledge and during monitoring and evaluation.

The following should be addressed in the drought risk reduction plan:

- Early warning systems
- Data gathering, analysis and dissemination needed for planning
- Adaptation, mitigation and prevention strategies
- Extension programs
- Research programs

4.3.1 Early Warning and Monitoring

Drought is a slow onset disaster and early warning is possible through several well-developed indicators, which are monitored by the SAWS and should also be the responsibility of the Drought Mitigation Centre. The following indicators are important:
• Monitoring of indices such as % of normal, SPI and SPEI
• NDVI
• Soil moisture content
• Reference farms data send in data at regular basis.
• Data are processed with weekly reports
• SPI/SPEI are primary indicators
• Secondary indicators are NDVI and soil moisture content satellite images
• Report and ground-truthing at monitor farms. If monitor farm show critical condition then drought disaster declaration for quaternary catchment should be activated. Ground trothing and final demarcation is the responsibility of the District Drought Task Team.

Drought indicators serve as a methodology to quantity the onset and severity of dry conditions and droughts. Considering the different types of drought and the complexity of drought a single indicator cannot be used to determine when is a drought and/or when a drought should be declared a drought. The set of indicators easily monitored and available at present are Soil moisture, NDVI, Satellite vegetation index, ground water levels, stream flows, Dam levels percent of normal precipitation and the SPI or preferably the SPEI. The different categories of drought and the corresponding indicators is shown in Table 1 on next page.

Also refer to “Determinatıon of Drought Indicators” Reference C (DAFF, 2014).
<table>
<thead>
<tr>
<th>Cat</th>
<th>Description</th>
<th>Possible Impacts</th>
<th>Frequency</th>
<th>CPC Soil moisture module %</th>
<th>NDVI</th>
<th>Satellite vegetation health index</th>
<th>Ground water levels %</th>
<th>Weekly stream flow %</th>
<th>Dam levels %</th>
<th>Percent of normal precip</th>
<th>SPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>D0</td>
<td>Dry</td>
<td>Dry period: Short term dryness slowing plant growth of crops and pastures; fire risk above average; some lingering water deficiencies; pastures and crops not fully recovered</td>
<td>1/3 yr</td>
<td>21-30</td>
<td>36-45</td>
<td>21-30</td>
<td>80-100</td>
<td>&lt;75% for 30 days</td>
<td>-0.5 to -0.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D1</td>
<td>Moderate drought</td>
<td>Some damage to crops &amp; pastures: fire risk is high; Levels of streams, reservoirs or wells are low; Some water shortages are imminent and developing; voluntary water restrictions requested; Early warning</td>
<td>1/5 yr</td>
<td>11-20</td>
<td>26-35</td>
<td>11-20</td>
<td>60-80</td>
<td>&lt;70% for 30 days</td>
<td>-0.8 to -1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D2</td>
<td>Severe drought</td>
<td>Crop and pasture losses likely: Fire risk very high; Water shortages common: Water restrictions imposed: drought warning messages: Institutions to prepare for response mechanisms.</td>
<td>1/10 yr</td>
<td>6-10</td>
<td>16-25</td>
<td>6-10</td>
<td>40-60</td>
<td>&lt;65% for 180 days</td>
<td>-1.3 to -1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D3</td>
<td>Extreme drought</td>
<td>Major crop and pasture losses: Extreme fire danger: Widespread water shortages and restrictions compulsory: Extended duration with critical impact: Warning messages must be adhered to: disaster drought declaration: Institutions to implement active response actions.</td>
<td>1/20 yr</td>
<td>3-5</td>
<td>6-15</td>
<td>3-5</td>
<td>20-40</td>
<td>&lt;60% for 180 days</td>
<td>-1.6 to -1.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D4</td>
<td>Exceptional drought</td>
<td>Exceptional and widespread crop &amp; pasture losses: Exceptional high fire risk: shortages of water in reservoirs, streams and wells: creating water emergencies. Water restrictions compulsory: Warning messages must be adhered to: Active response mechanisms: Impacts critical to larger economy</td>
<td>1/50 yr</td>
<td>0-2</td>
<td>1-5</td>
<td>0-2</td>
<td>0-20</td>
<td>&lt;65% for 360 days</td>
<td>-2 or less</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.3.2 Data management

Data management and data sharing is key in the effective management of drought risk reduction and drought relief and support. All stakeholders are responsible for data capturing and data management according to their own mandates but data sharing must be controlled by means of inter-governmental and inter-organizational MOU’s. Drought early warning, drought risk reduction and drought relief management is only possible when all potential sources of data are considered and combined. Coordination and processing of data is the responsibility of the Drought Mitigation Centre, which is responsible for daily updates, processing and dissemination of results.

4.3.3 Adaptation mitigation and prevention strategies

- Macro level impact on adaptive capacity
- Culture, ethics, knowledge, perceptions
- Farm level adaptation
- Adjustment strategies
- Drought avoidance strategy
- Alternative livelihood activities (casual labour and informal trade)
- Food management strategies
- Sale of non-productive items and productive items
- Social networks
- Animal feeding strategies
- Drought insurance
- Coping strategies

4.3.4 Extension programs

Extension is the frontline for any drought mitigation and drought risk reduction program. The drought risk assessment highlighted the importance of extension programs especially amongst communal and small-scale farmers that cannot access the services of the private sector.
4.3.5 Research

The Research Unit of the NCDoALRD PROGRAM 5 is primarily responsible for prioritizing drought research needs and programs. Research projects can be undertaken within the Department or contracted to organizations with capacity to execute research projects.

4.4 KPA 4: Response and relief

Objective:

Ensure effective and appropriate drought response and relief by:

• implementing a uniform approach to the dissemination of early warnings,
• providing an economic safety net for the agricultural sector to avert or reduce the potential negative drought impact on the regional economy and prevent the outmigration of farmers from the agricultural sector,
• implementing immediate integrated and appropriate response and relief measures when significant drought occur or are threatening to occur,
• implementing differentiating indicator thresholds that consider the unique circumstances of the different agricultural systems.

Government has a responsibility to provide safety nets in the form of relief and recovery support after exogenous shocks such as disasters and particularly drought in the context of this plan. The Northern Cape is an arid area with low rainfall coupled with regular dry periods. The farming sector and communities should therefore adapt agricultural practices adopted to climatic conditions and should take pro-active measures themselves to mitigate the impacts of drought. Regular dry periods with a probability of more than 1 in 10 years or 12-month SPI > minus 1.5 should be dealt with by the farming sector themselves. The agricultural sector can apply for drought support once the 12-month SPI in a specific region reaches the value of -1.5 (severe drought) or when water
restrictions reaches the 50% benchmark. In the case of subsistence and communal farmers the 12-month SPI < minus 1.3 could already be regarded as a severe drought because of their limited resources, low coping capacity and degraded land.

Details of the process for drought declaration and specific guidelines are covered in the Reference A: Drought Contingency Plan3.

Governmental assistance schemes are not designed to replace drought losses; It is designed to enable farmers to continue farming and recover sufficiently to continue with food production despite the negative impacts of drought. In many cases the drought relief schemes are the only livelihood survival mechanism for subsistence and communal farmers; therefore the need for specific tailor-made schemes for these communities.

4.4.1 Drought declaration

The Disaster Management Act (Act 57 of 2002) provides for the declaration of disasters through national, provincial and local government. When a dry period developed into a drought and the farming sector, the NCDoALRD or municipalities highlighted the need for a drought declaration, the Provincial Interdepartmental Drought Committee (PDTT) should be activated and adhered to the following:

• Initiate efforts to assess the current and potential magnitude and severity of the drought
• Inform all relevant departments of the findings and potential impact
• Alert all disaster management role-players in the province who might be of assistance and affected

3 Drought declaration contingency plan should be quantifiable and comparable in time and space and based on international recognized indices and criteria.
• Ensure in collaboration with NCDoALRD and the PDMC through the structures of organized agriculture that affected farmers have reduced stock numbers in time

The involvement of advisory or extension services and local government in a province’s assessment is crucial so as to advise the DAFF and the NDMC on the scale and extent of the losses caused by drought. Provincial departments will then be informed about the financial assistance required to normalize the situation. Key determinants will be considered during the assessment, such as veld, livestock, fodder and crops, weather and climatic conditions, and water supply systems so as to ascertain whether the disaster was beyond the farmers’ control or not. Declaration of droughts should be in line to the document “Arrangement of Guideline “as Reference B (NDMC, 2014):

4.4.2 Drought indicators

The SPI or the SPEI should form the main meteorological indicators for dry periods and droughts. The lack of reliable meteorological data might impede on the usefulness of the said indicators and therefore the need for all farmers to keep at least rainfall data and provide the data to a provincial database. Calculation of the SPI is only possible with at least 30 years of historical rainfall data. The Department should therefore endeavour to obtain historical records from farmers and maintain the necessary data base. Weather data obtained and captured by the SAWS and Institute for water and climate must be made available to the NCDOARD.

NDVI is an important indicator to determine veld deterioration because of drought. One of the main challenges with the NDVI however, is the fact that it is difficult to distinguish between over-grazing and poor veld condition because of drought. Additional measures are therefore required to ensure that farmers who over-graze are not favoured for drought support in relation to farmers who apply good agricultural practices. The inputs of extension officer and the contribution of reference farms in each quaternary catchment should provide
the necessary monitoring mechanism. (This is addressed in detail in the drought contingency plan; Reference A)

For detailed guidelines on Drought indicators refer to Reference C “Drought Indicators (DAFF, 2014)

4.4.3 Drought Relief

Drought relief is the joint responsibility of the Department and the PDMC. The Department is the lead agent for drought relief and the extension officers will monitor the relief actions at grassroots level. That includes monitoring, record keeping and evaluation of the relief action. Drought relief should be in line to the document “Arrangement of guideline “ Reference xx (NDMC, 2014):

• Drought relief should follow the process as stipulated in the Drought Contingency plan (Reference A)
• The drought report should be completed according to the Template for drought report (Reference D)
• Guidelines for implementation of drought relief according to Template for Drought Assistance Plan (Reference E)

5 Drought Management Enablers

The enablers are in support of the key performance areas and similar to those prescribed in the National disaster management framework.

5.1 Enabler 1: Information management and communication

Objective:

Guide the development of a comprehensive information management and communication system and establish integrated communication links with all drought management role players.

Information and the analysis and dissemination of information are key elements in drought management. Information in most cases are based on data gathering
and analysis. All role-players should contribute to the process of data gathering and the following guidelines are applicable:

5.1.1 Weather related data

The SAWS is primarily responsible for weather related data and information and should make these available as needed by the Provincial Department of Agriculture, the PDMC, municipalities or the farming and private sector. NCDOARD should enter into an agreement with the SAWS to ensure their support to the drought management framework and plan.

The Agricultural Research Council also have valuable climate and weather related data and information. The Elundini report is a good example of drought related information and should be distributed to all role-players and farmers. Again the Provincial Department of Agriculture should ensure the continuation of the agreement with the ARC for the availability of data and information for the purpose of research and early warning.

The need for rainfall data in each catchment is imperative for future drought declarations and land-owners should participate in the provision of rainfall and other climate data. The reference farm system of the NC Agri is a good example of farmers participating in data gathering.

Modern-day drought early warnings are fairly accurate and are communicated well on most of the national media.

5.1.2 On-farm data

On-farm data are data such as animal numbers, farm sizes, grazing capacity and veld condition. The extension services and NC Agri should work jointly to gather, store and analyse the data. The monitor farm systems should be computerized in order to ensure up-to-date analysis. NC Agri can also assist to ensure that all quaternary catchments are represented by at least one monitor farm. Data obtained from the monitor farms should be updated regularly in order to ensure the up-to-date calculation of SPI’s.
5.1.3 Data storage and analysis

The NCDOARD is primarily responsible for drought related data gathering and analysis and should provide systems for data storage and analysis. Research institutions and Higher Education Institutions can assist with the analysis of data and the development of systems that automate data analysis.

Data regarding the monitor farms should be computerised and automised in order to have timely feedback.

Meteorological data from the SAWS and the ARC should be made available for research and early warning.

5.1.4 Information dissemination and communication

Extension service is primarily responsible for the dissemination of information and that should be coupled to a communication strategy. The private sector and organised agriculture should cooperate and provide own resources for increased communication and information dissemination.

5.2 Enabler 2: Education, training, public awareness and research

Objective:

Promote a culture of drought adaptation and drought risk avoidance among stakeholders by capacitating role players through integrated education, training and public awareness programmes that is informed by scientific research.

The extension service of the NCDOARD, PDMC and DDMC is primarily responsible for education, training and public awareness. Extension officers should be well trained and equipped to provide services to the farming community. Proper extension programming and planning is necessary in order to educate and train farmers. It is acknowledged that extension programs for commercial farmers differ from programs to emerging, small scale, subsistence and communal farmers. Programs with a focus on the specific needs of the different farming sectors should be designed and implemented.
5.2.1 Education and training to all farmers

The commercial farming sector in general use high technology and apply good agricultural practices, yet a large group of these farmers experience droughts regularly. The over-exploitation of the natural resource base is of concern and the NCDOARD together with organised agriculture should identify areas of over-grazing and land degradation and institute measures to stop the continued degradation of the land.

The private sector through agricultural businesses is currently the primary source of information dissemination to commercial farmers and they should also be sensitized about the importance of drought management as an integral part of the management system on all farms.

Special emphasis should be placed on support to communal farmers who currently over-exploit the natural resources. The land-owners (municipalities and the state) should collaborate with extension services to educate land-users and if necessary to enforce the application of good agricultural practices. Extension programs with an emphasis on drought risk reduction should be developed and implemented by the NCDOARD.

5.2.2 Research

A number of research gaps were identified as part of the drought risk assessment. Continued research should be coordinated and the NCDOARD and organised agriculture should mobilize funds and task research institutions such as the ARC, Universities, Water Research Council (WRC) and others to conduct drought related research with an emphasis on climate change, adaptation, mitigation, prevention and coping capacity.

Current research gaps are:

- Drought loss functions for the different agricultural systems in the NC
- Identification of vulnerability indicators at micro level
- Seasonal movement of meteorological patterns
- Over-stocking in the province
• Solutions for the sustainable management and utilization of communal land
• Threshold for disaster droughts and dry periods for different agricultural systems

5.3 **Enabler 3: Funding arrangements for drought management**

**Objective:**

*Establish mechanisms for the funding of drought risk reduction and drought response and relief in the NC Province.*

Enabler 3, funding is in support of all the KPA’s. Funding for each of the KPA’s are discussed separately:

5.3.1 **Funding for institutional arrangements**

Government Departments responsible for drought management should cover own costs while the NCDOALR and the PDMC is jointly responsible for the direct costs and per diems of non-governmental individuals contributing to the different drought task teams.

5.3.2 **Funding for drought risk assessment**

The PDMC is primarily responsible for the funding and development of an all-inclusive provincial disaster risk assessments (Act 57, 2002) while district municipalities have the responsibility for district disaster risk assessments. The fact that NCDOALRD completed agricultural related drought risk assessment does not exclude the PDMC from the responsibility of funding future updated assessments that includes all sectors.

5.3.3 **Funding for disaster risk reduction**

Drought risk reduction is best supported through the application of good agricultural practices by farmers. The primary role of extension services is the transfer of technology and knowledge that should empower farmers to apply
good agricultural practices. The NCDOALRD is therefore instrumental in the achievement of increased drought resiliency. Apart from the role of extension, specific targeted programs and projects also serve as mechanisms to increase awareness and resiliency against droughts. These projects are funded on a project-to-project basis through the Mitigation and Prevention fund from DAFF called the Conditional Grants scheme.

The PDMC is mandated and obliged by the disaster management act (Act 57, 2002) to implement and fund disaster risk reduction efforts. Drought being the most prominent disaster in the NC, the PDMC must also provide funding for drought risk reduction programs and projects through funding sources from within the province as well as from NDMC sources.

5.3.4 Funding for disaster relief and response

See Chapter 6, Disaster Management Act (Act 57 of 2002): Reference AB.

The Farming community must firstly be able to prove that they did everything within their own capacity to manage and cope with dry periods. Farmers should adapt to climate conditions and continuously work with the Department and other research institutions to implement new drought mitigation and avoidance strategies. Under extreme drought conditions Government will provide relief as a safety net.

Districts should first explore own reserves to support especially the communal farmers farming on municipal land. If municipalities have no funding, the Department must first utilize own emergency funding to support farmers and only when they can proof that they have no resources of their own, is the Department allowed to apply for funding from the disaster management structures at provincial and national level.

Funding models should adhere to the following principles (From National Disaster Management Framework, Reference AC)
• **Adequacy.** Both the Department the PDMC and municipalities should have adequate resources to perform their functions effectively. In relation to drought management, all organs of state should have access to sufficient funding to be able to discharge their legislative responsibilities.

• **Equity.** Funding mechanisms should ensure that legislation is implemented equitably across and municipalities affected agric systems. This would help to avoid interjurisdictional spillovers arising from uneven and inequitable implementation.

• **Predictability.** Any funding mechanism that includes intergovernmental transfers should ensure predictability by making allocations from national to provincial and local organs of state over the term of the Medium-term Expenditure Framework (MTEF). Any allocations to municipalities should be disclosed timeously so that municipalities are able to take cognisance of these allocations in their annual budgets.

• **Administrative efficiency.** The cost of administering the funding mechanisms should be kept to a minimum. Ideally, the funding mechanisms should not impose new reporting obligations on any organ of state. Rather, the reporting process should be integrated into the existing reporting cycle.

• **Incentive effects.** Funding mechanisms should be designed in such a way that they provide incentives for sound fiscal management and reduce the likelihood of inefficient fiscal practices. In this way, perverse incentives in the system may be minimized and the risk of moral hazard behaviour by recipients of the funds discouraged.

• **Autonomy.** The assignment of functions or the transfer of funds between spheres of government should not undermine the constitutionally mandated autonomy of provincial and municipal organs of state. The autonomy criterion should be viewed within the context of co-operative governance.

• **Risk pooling.** The cost of droughts can become so substantial that no single provincial and municipal organ of state is able to fund recovery efforts on its own. In such cases, funding mechanisms should make provision for post-disaster recovery costs to be shared across the widest
possible population rather than being a burden on the affected population.

- **Timely funding.** Contingency plans and funding mechanisms should consider the timely drought relief to farmers. Emergency funding for drought relief should be made available immediately during the drought and not months after the funds are required.

Funding models depend on the amount of funds available as well as national guidelines. See **Reference F: Funding guidelines for drought relief.** In addition to funding guidelines the following should also be considered:

- Selection of feed and fodder suppliers must be carefully selected.
- Tender processes for the supply of feed and fodder must be controlled and the interest of the beneficiaries must always be considered
- Markup and profits to middle man must be controlled
- Credit management through Coops must be responsible. Agric. Companies and the private sector should have pre-agreements with the Department with regards to drought relief schemes