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INTERDISCIPLINARY DROUGHT RISK ASSESSMENT FOR AGRICULTURE: THE CASE OF COMMUNAL FARMERS IN THE NORTHERN CAPE PROVINCE, SOUTH AFRICA.

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ABSTRACT

Interdisciplinary drought risk assessment provides the true reflection of drought risk by integrating hazard data with adaptation, vulnerability and coping capacity. Traditional methods for drought risk calculation based purely on meteorological extremes do not provide an accurate reflection of disaster drought. Communal farmers in the Northern Cape Province, South Africa, experience disaster droughts regularly; even normal dry periods are experienced as disaster droughts.

This research rejects the hypothesis of climate change as the reason for increased drought in the Northern Cape but rather highlight vulnerability and lack of coping capacity as the main sources of disaster droughts, especially amongst communal farmers in the Northern Cape.

1. INTRODUCTION

Everybody in agriculture acknowledges climatic extremes and the fact that they will experience future dry and wet periods. It is just a matter of when and how severe. The challenge is to prevent dry periods from developing into disaster droughts through adaptation, increased coping capacity and decreased vulnerability. Vulnerability and the resilience of the agricultural sector are key factors and any drought strategy should emphasize increased resilience against droughts amongst all role players in agriculture.

The national disaster management framework (NDMF) in South Africa is clear on the need for disaster risk assessments as one of the key performance areas for any disaster risk reduction strategy (drought in this case). Scientists acknowledge the fact that drought assessment cannot be done by looking at precipitation, evaporation and transpiration alone since these are variables used for the drought hazard assessment and not total drought risk. Adaptation, vulnerability and resilience linked to drought shocks are key to the assessment of drought risk (Wilhite, Easterling & Wood, 1987; Wisner, Blaikie, Cannon & Davis, 2004; Wilhite, Svoboda & Hayes, 2007, Jordaan, 2012). Climate change and future climate scenarios receive much attention lately, yet Gbetibouo and Ringler (2009) report on the vulnerability of the South African farming sector to climate change and they mention the lack of vulnerability assessments at regional level as one of the major gaps in climate risk assessments.

Communal and small-scale farmers in South Africa are particularly vulnerable to drought shocks and they experience normal dry periods as drought disasters. As part of a study to complete the drought risk assessment for the Northern Cape Province in South Africa, the high levels of vulnerability and low coping capacity amongst communal small-scale farmers were clearly exposed (Jordaan, Sakulski, Jordaan, 2011). Under usual climatic conditions, communal farmers experienced normal dry periods as disaster droughts.

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This paper highlights the importance of an interdisciplinary drought risk assessment that exposes the vulnerability and coping capacity of the different agricultural sectors. Reasons for high vulnerability and low coping capacity to drought amongst communal small-scale farmers are discussed and analyzed with some recommendations to address the problem.

2. STUDY AREA BACKGROUND

With 372 882 sq km land, the Northern Cape (NC) is the largest of the nine provinces in South Africa, taking up to 30.5% of South Africa's land with just more than 2% of the total population living in the province. The Northern Cape landscape is characterized by vast arid and semi-arid plains covered with grass in the Kalahari and low shrub land in most of the province. Most of the province is in a summer rainfall region with only a narrow strip along the west coast receiving winter rains. Annual mean precipitation for the province is 200mm with only 20mm per annum in the far west and up to 540mm in the east of the province. The weather conditions in the province are extreme with extreme cold and frost (<-10 deg C) during winter in the southern parts of the province and extreme heat during summer (>40 deg C) in the regions bordering Namibia (South Africa Info., 2011).

The main farming system in the Northern Cape is extensive commercial livestock farming with pockets of communal farmers concentrated in John Taole Gaetsewe (JTG), municipality, Riemvasmaak, Richtersveld, Mier en Leliefontein. In addition, communal farmers are present on most of the rural municipal land. The province has fertile agricultural land along the Orange River valley where high value products are produced utilizing irrigation water from the Orange River, the largest river in South Africa.

A map of the province showing the different regions is shown in Fig.1 below.

Fig 1: Northern Cape Province showing different regions

3. PROBLEM STATEMENT

In spite of the fact that drought risk is determined by vulnerability, adaptation and coping capacity to dry periods, these factors are not properly built into the current criteria for disaster drought declaration. Each province uses its own criteria and in many cases political influence determines the outcome of drought relief (de Bruin, 2010, Smit, 2010, Jordaan, 2012). The difference in vulnerability and coping capacity between commercial farmers and communal small-scale farmers is dramatic. It is therefore not peculiar that communal farmers experience droughts more regularly than commercial farmers. Communal farmers experience normal dry periods with Standard Precipitation Index (SPI) -0,5 to -1,5 as disaster drought while most commercial farmers would experience that as normal dry periods with disaster droughts only from SPI -1,5 (severe[13]) and -2 (extreme[14]) and below (de Bruin, 2010; Smit, 2010; Jordaan, 2012). De Bruin (2010) and Smit (2010) also reported on the regular requests from communal farmers for government support during dry periods and drought relief.

The drought risk assessment completed in this study highlighted the high risk to drought amongst communal small-scale and subsistence farmers; particularly the high vulnerability and low coping capacity levels. The research question therefore dealt with in this paper is why do they experience such regular droughts? The challenge here is to understand the reasons for increased vulnerability and lack of coping capacity amongst communal farmers and how government should address the problem.

[13] According to classification by Hayes, 1999
[14] According to classification by Hayes, 1999

4. RESEARCH OBJECTIVE

The main objective of the original research was to develop a methodology for drought risk assessment and to apply the risk assessment methodology to the Northern Cape Province. The methodology integrated drought hazard with social, economic and environmental vulnerability as well as coping capacity and adaptation. This paper only deals with vulnerability and lack of coping capacity amongst communal, subsistence and small-scale farmers and explore the reasons why communal, subsistence small-scale farmers experience more droughts compared to commercial farmers, in spite of similar meteorological conditions.

5. RESEARCH METHODOLOGY

A combination of techniques, both qualitative and quantitative was used to obtain primary data. In addition to structured questionnaires the Rapid Rural Appraisal (RRA) technique was used to obtain the necessary primary data through inputs from farmers, extension officers and other experts and the basic principles of action research were also applied since the research was part of a project to complete a disaster risk assessment for the NC province.
The main techniques used in this study include the following:

- Direct observation, familiarization and participation in activities
- Interviews with key informants, group interviews and workshops
- Structured questionnaires
- Mapping and diagramming
- Biographies, local histories and literature studies
- Ranking and scoring of data obtained through an appropriate questionnaire or group discussions
- Analysis of results
- Report writing.

Primary quantitative meteorological data was obtained from archives at the South African Weather Services (SAWS), Agricultural Research Council (ARC), Council for Scientific and Industrial Research (CSIR), Water Research Commission (WRC), National and Provincial Departments of Agriculture and individual farmers. To a large extend the WR90 meteorological data prepared by Schultze and others at the University of KwaZulu Natal were used to analyze drought hazard probability and severity for each of the tertiary catchments in the province.

Quantitative and qualitative farm level data was also obtained through structured questionnaires distributed to individual commercial farmers through the network of Northern Cape Agri. The information obtained from the questionnaires and farmers' association meetings were supplemented with individual farm visits and interviews with farmers and other experts. The level of literacy and lack of historical records amongst communal farmers limited the use of questionnaires and information was obtained from these farmers through group discussions and workshops.

6. FRAMEWORK FOR DROUGHT RISK

Different frameworks and equations for risk exist (Morimiya, 1992; UNDP, 2004; Wisner *et al.*, 2004), but the adjustment of Wisner *et al's.* (2004) equation proposed by Jordaan (2006) was used in this research.

$$R = \left(\frac{\boldsymbol{H}}{\boldsymbol{C_H}}\right) x \left[\frac{\sum(V_{econ}V_{env}V_{Soc})}{\sum(C_{econ}C_{env}C_{soc})}\right]$$

Where: R = Disaster Risk for disaster
H = Probability and of hazard j with a certain magnitude
C_H = Capacity or factors that impact on probability and impact or magnitude of hazard j
V_{econ} = Economic vulnerability
V_{env} = Environmental vulnerability
V_{soc} = Social vulnerability
C_{econ} = Capacity to deal with economic vulnerability
C_{env} = Capacity to mitigate and limit environmental vulnerability
C_{soc} = Capacity to mitigate and limit social vulnerability

Gbetibouo & Ringler (2009) highlighted the lack of consistency in the methodologies to calculate drought impacts as well as the lack of available data that can be used as vulnerability indicators while Jordaan (2012) also mentioned the identification and weighting of vulnerability indicators as amongst the main challenges in drought risk assessment. Vulnerability in this study was calculated as follows:

$$V = \sum_{i=1}^{3} w_i V_i$$
$$V = f(V^{env}, V^{soc}, V^{econ})$$

where: V^{env} = Environmental vulnerability to drought hazard
V^{soc} = Social vulnerability to drought hazard
V^{econ} = Economic vulnerability to drought hazard
w_i = Weight of vulnerability indicator *i*.

and, weighted factor for V^{env} = 0.3
weighted factor for V^{soc} = 0.2
weighted factor for V^{econ} = 0.5

Details for the calculation of vulnerability and coping capacity are discussed in Jordaan (2012). This paper only deals with factors influencing the vulnerability and coping capacity of communal and small-scale farmers.

7. ADAPTATION AND COPING STRATEGIES TO DROUGHT

Nelson, Adger & Brown (2007) define adaptation as a process of deliberate change in anticipation of external changes or stresses. They see adaptation as a core feature of socio-ecological systems that built on the resilience of communities within those systems. Burton, Huq, Lim, Pilifosova, & Schipper, (2002) sees adaptation as the ability of social and environmental systems to adjust to change and shocks in order to cope with the consequences of change and shocks while Stringer, Dyer, Reed, Dougill, Twyman, & Mkwambisi, (2009) agrees with the widespread understanding of the role of adaptation as a process of deliberate change to build resilience and overcome the negative impacts of shocks and change Sewell, Kates & Philips (1968) call it adjustments and consider it a strategy that requires more time than coping. The longer-term strategy is adaptation, and this involves significant changes in

lifestyles, livelihoods and farming practices (Sewell *et al.*, 1968; Myburg, 1994; Vogel, 1995; O'Farrel *et al*, 2009).

Adaptation takes place at the macro, meso and micro level with the macro level adaptation in the domain of policy changes and implementation. Burten, Soussan and Hammil (2003), Smit and Wandell (2006), Stringer *et al.* (2009) and Lotze-Campen and Schellnhuber (2009) all agree that the conventional thinking of adaptation at micro level is more reactive while policy driven adaptation is better planned and proactive with the focus on risk reduction. Stringer *et al.* (2009) argue that it is not always the case, and that the complexity of adaptation at different levels should be understood, for example adaptation may reduce immediate risk, yet it can increase risk in the longer term if not appropriately planned and implemented.

The capacity to avoid, cope, adjust or adapt is a significant factor in characterizing vulnerability and very important in the context of drought risk reduction. Adaptive capacity (adaptability) at micro level is similar or closely related to other commonly used concepts such as coping capacity, management capacity, stability, robustness, flexibility, and resilience (Smit & Wandel, 2006). The Intergovernmental Panel on Climate Change (IPCC) (2001) describes adaptive capacity as "*the potential or ability of a system, region, or community to adjust to the effects or impacts of climate change (including climate variability and extremes). The capacity to adapt is context-specific and varies from country to country, from community to community, among social groups and individuals, and over time*" (IPCC 2001; Smit & Wandel, 2006). McCarthy, Canziani, Leary, Dokken & White (2001) consider adaptive capacity as "*a function of wealth, technology, education, information, skills, infrastructure, access to resources, and stability and management capabilities*". Brooks (2003) argues that the adaptive capacity of a system or society reflects its ability to modify its characteristics or behaviour to cope with existing or anticipated external stresses and changes in external conditions.

The link between government, governance and adaptive policies at national (macro) level and the adaptive capacity of farmers at micro level are of critical importance. Farm level adaptive capacity is unlikely to be sufficient in poor regions and under-developed economies without sufficient markets and resources (Lotze-Campen & Schellnhuber, 2009). O'Brien *et al.* (2004) and Eakin & Lemos (2006) find that globalization and the removal of agricultural subsidies and increased import competition reduce the adaptive capacity of farmers to climate shocks, especially in developing countries. Therefore there is a need for national and international policies that consider and support adaptation in the agricultural sector at local level (Rosenzweig & Tubiello, 2007; Lotze-Campen & Schnellnhuber, 2009). Belliveau, Bradshaw, Smit, Reid, & Sawyer, (2006); and Easterling, & Mendelsohn, (2000) recommend the reform of agricultural policies in developed countries to provide for better options for the poor to increase their adaptive capacity or resilience. They recommend a shift of financial resources away from direct farming income support towards agricultural education, research and technological development in order to assure increased and more efficient outputs under changing market and climate conditions. Lotze-Campen & Schellnhuber (2009) add improved policies that guide land use changes, regulation of migration patterns, and financial and material support for alternative livelihood options to the set of policies that can increase resilience while Easterling *et al.* (2007) argue for the establishment of accessible markets and financial services as preconditions for adaptation under climatic shocks.

Adger (2009) suggest four meta-domains that limit the adaptation potential of individuals and communities. He challenges the view that exogenous forces outside the control of the

individual determine adaptive capacity rather than values, perceptions, processes and power structures within society. Ethics (how and what we value), knowledge (how and what we know), risk (how and what we perceive) and culture (how and why we live) seems to be instrumental in limiting the adaptive capacity of people.

Ethics is a critical factor in the manifestation of adaptive strategies for different groups. What may be interpreted as a successful adaptation strategy by one group might be viewed as a total failure by another group as a result of different priorities and values held within society. Secondly, knowledge about the impacts of drought is also cited as a reason for delayed adaptation strategies. Adger (2009) argues that greater foresight not necessarily facilitates adaptation but that instead, robust decision-making circumvents the need for precise knowledge. Thirdly, perceptions of risk held by society are ultimately key to their adaptation decisions. Risk perception can act as a limiting factor if society does not believe the risk is great enough to justify action. Fourthly, the undervaluing of places and cultures may limit the options for adaptation (Adger 2009). Adger (2009) came to the conclusion that the ability to adapt was determined in part by the availability of technology and the capacity for learning but fundamentally by the ethics of the treatment of vulnerable people and places within societal decision-making structures; an important observation when designing adaptation strategies with communal subsistence farmers and commercial farmers with different world-views.

Burton and Lim (2005) and Rosenzweig & Tubiello (2007) mention that adaptation in agriculture is the norm rather than the exception, and that farmers in the past demonstrated sufficient adaptive capacity to cope with extreme weather events on short-, medium- and long-term time scales. Important, however, to note is that the adaptive capacity of farmers are determined by (i) education or human capital, (ii) wealth, (iii) material resources, (iv) societal entitlements, (v) information, (vi) technology, (vii) infrastructure and (viii) resources (Belliveau, 2006; Easterling *et al.*, 2007; Adgar *et al*, 2009).
For centuries drought became one of the main challenges for livestock farmers in Africa (Le Houerou, 1996). Livestock farmers responded differently through time. With land available in abundance, farmers used avoidance strategies by adopting a nomadic system where they moved from drought-stricken areas to areas with good supply of feed and fodder. Increased pressure on land forced farmers to respond in different ways. Coping with drought is considered a short-term response to feed and fodder shortages (Vogel, 1995; O'Farrel, Anderson, Milton & Dean, et *al.,* 2009). Eriksen, Brown & Kelly (2005) describe coping mechanisms as the actions and activities that take place within existing structures and systems; examples are when farmers introduce on-farm diversification such as diversification of feed and fodder sources or alternative livestock types.

O'Farrel *et al.* (2009) argue that how farmers respond to drought is a function of several variables related to the severity, frequency and duration of droughts. In addition, farming practices and the farming system determine the type of response mechanisms, for example nomadic and transhumant pastoralists can apply evading strategies while ranchers and crop farmers have to adopt an endurance strategy (Le Houerou, 1996; O'Farrel *et al.,* 2009).

Adjustment strategies differ from coping mechanisms in the sense that they are more permanent, and adjustments need to be initiated prior to droughts (Sewell *et al.,* 1968). In a sense, adjustment can be viewed also as adaptation but the literature proposes adaptation as a permanent and long-term strategy that affected livelihoods and lifestyles (Sewell *et al.,* 1968; Myburg, 1994; Vogel, 1995; O'Farrel *et al,* 2009). Adjustment strategies include strategies

such as the change of (i) livestock type, (ii) change in grazing strategies, (iii) farm level diversification, (iv) economic diversification, (v) insurance, (vi) building of fodder banks, (vii) permanent reduction of grazing capacity, (viii) water reticulation, (ix) planting of drought resistant crops, and (x) budgeting and financial planning for droughts (Scoones, 1992; Myburgh, 1994; Vogel, 1995; Le Houerou, 1996; Hudson, 2002).

The change of livestock type, for example is one of the most popular strategies applied by commercial farmers in South Africa; For example; merino and dorper sheep in the Karoo and mutton merino in the Eastern Cape and eastern Free State, whereas communal farmers mainly farm with cattle due to the cultural significance of cattle.

8. RESULTS

The communal farmers in the province are in a near permanent state of "*drought*" due to factors typical of communal farming in all parts of the country and even in the world (Hoffman *et al.*, 1999; Brushweller & Gabathuler, 2006; Dercon, 2007; Sahling, 2011; Smit, 2010; Jordaan, Sakulski & Jordaan, 2011). Communal farmers experience normal dry periods as droughts, and require external support during each dry period. The Department of Agriculture and district municipalities reported that they received requests for drought relief from communal farmers nearly every second year. The results of the research expose the vulnerability to drought and the lack of adaptation and coping capacity amongst the communal farmers in the Northern Cape.

8.1 Drought as a Hazard

Based on available historical meteorological data from 1920 for the Northern Cape no evidence of climate change or more droughts could be detected for the province. Analyses of the mean trend in precipitation for all tertiary catchments shows actually an increase in mean annual precipitation of 0,51mm with standard deviation 0.49 and coefficient of variance 0.96. All catchments show a positive trend with mean p-value 0.45 (Standard deviation 0,31 and coefficient of variance 0,69). The trend though, is statistically not significant due to large variations reflected in the p-values. Also interesting to note is the mean exceedence probability in the NC for severe droughts (PI<-1,5) is 0,11 and exceedence probability for extreme droughts (SPI<-2) is 0,05 (Jordaan, Sakulski & Jordaan, 2011). In conclusion; severe droughts (SPI<-1.5) are experienced 1 in eleven years while communal farmers experience these at least 4 in eleven years (de Bruin, 2010; Smit, 2010; Sahling, 2010)). Fact is that farmers cannot blame less rain for the perception of more droughts and this paper specifically focuses on the non-meteorological reasons for droughts amongst communal small-scale farmers in the NC province.

8.2 Adaptation, coping and vulnerability

Communal farmers are concentrated in large areas such as JTG District Municipality, Kgalagadi north of Askham, Richtersveld, Steinkopf, Pella, Leliefontein and other State land as well as on municipal land surrounding most towns. Areas of communal and State land in the NC are illustrated with the dark patches shown in Fig 2 below.

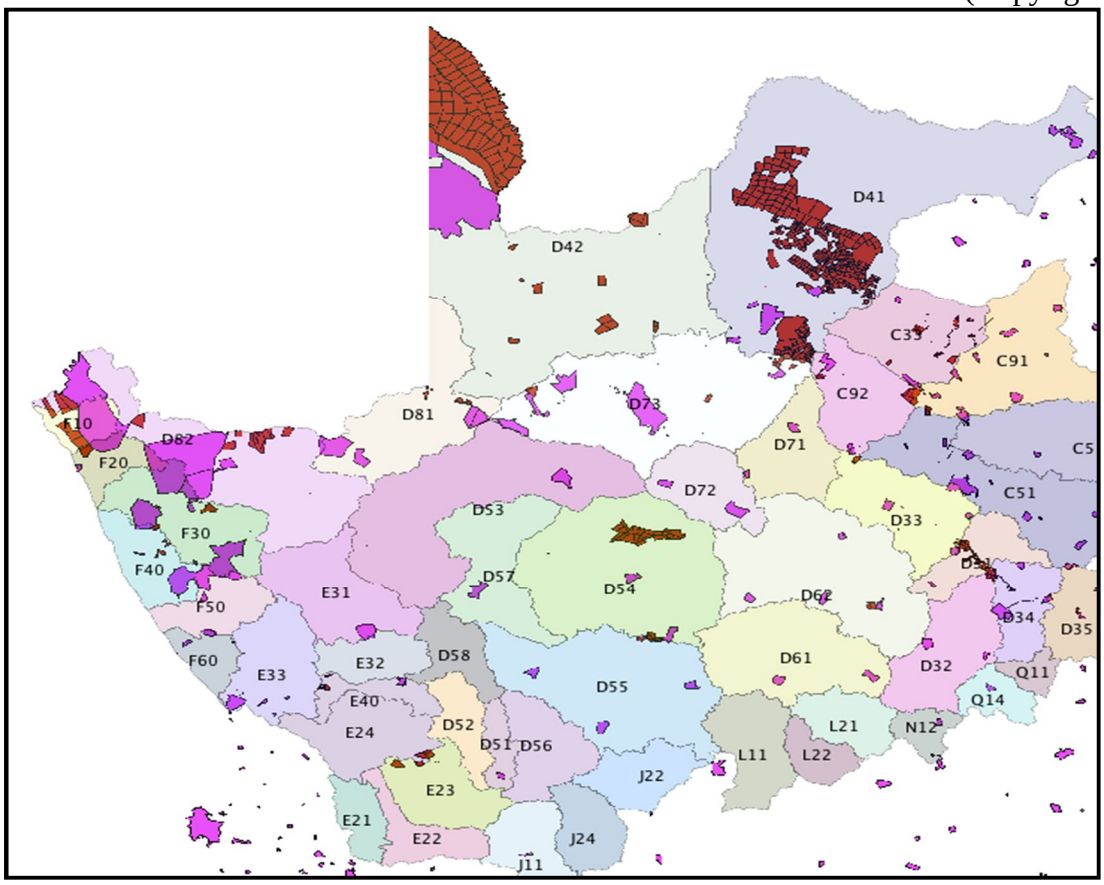

Fig 2. Communal land in the NC Province

Communal farmers in the NC share the same world-wide problems which originate from limited access to land. It is a well-known fact that communal land in South Africa and most of the developing world is over-stocked and over-grazed because of competition amongst stock-owners for land. At the core the challenges of communal farming is the lack of well-defined property right systems, lack of proper land management principles, over-stocking and over-grazing and poor infrastructure. (Chenimbiri, 1999; Fafchamps, 1999; Baker & Hoffman, 2006; Dercon, 2007; O'Farrel *et al.*, 2009; Jordaan, Sakulski & Jordaan, 2011; Jordaan, 2012). These factors were all clearly evidenced on communal land in the NC province.

Without exception, all communal farmer groups interviewed during the research mentioned the lack of land ownership as one of the main problems of over-stocking and wrong agricultural practices. The Richtersveld farmers for example mention it as the root cause of all their problems. The fact is that too many people depend on available land for livelihoods and the attitude of farmers are that they must use what is available, since if they do not utilize the land, somebody else will. This argument concurs with what Tietenberg (2003) wrote about ill-defined property right systems.

The challenges that increase drought risk for communal farmers are similar in all the communal farming communities visited. These are as follows:

- No proper control over land management. The land-owner (municipality or State) does not enforce rules and regulations for land management. In most cases farmers

acknowledge the presence of either a commonage management plan or a land management plan, but they agree that it is not enforced.

- People not dependent on livestock for a livelihood also utilize the land, which puts an additional burden on the available land. In this regard communal farmers mentioned that people such as business people, teachers, police and other government employees gain access to land through political connections and influence and they feel it is unfair considering the lack of land available. They argue that such people should not be allowed to keep animals on municipal land and recommend that they should lease land on the commercial market. Most land management plans indeed stipulate that allocation of grazing rights on commonages should be biased toward the poor and those without alternative income, but it is not enforced properly, as required.
- Maintenance of infrastructure such as fences, boreholes, pumps and water articulation is a major problem. The stock-owners expect the land-owner to maintain infrastructure, but the land-owners (municipalities in most cases) accuse the stock-owners of not paying rent for land; so they end up in a catch 22 situation with increased land degradation as the result. The poor maintenance of infrastructure causes animals to walk longer distances to water. Grazing is then concentrated around water points with increased over-grazing and total land degradation near water points. Also as a result of poor infrastructure, animals cannot utilize available grazing far away from water-points, which increases their risk to dry conditions. In the Richtersveld, for example certain farmers equipped boreholes with engines and pumps from own funds and they provide diesel and maintenance to those pumps themselves. Problem is that other farmers use the same water from time to time, and that creates internal conflict.
- The poor fences and lack of camping systems did not allow for proper veld management. The result is that certain areas, especially those near villages and water points, are grazed right through the year; with devastating effects on the grazing, resulting in serious land degradation and *"man-made"* droughts.
- Veld management is impossible on most communal land since stock-owners do not work together to provide for the necessary period of rest when needed. Examples were found where farmers start grazing the veld 2 weeks after burning, therefore seriously damaging the re-growth capacity of the grass. The farmers' explanation when confronted during the research was: *"Yes, we know it is wrong but others will use the veld if we don't graze it, and this is all we have, we need fodder for our animals"*.
- According to the animal health officials and the extension officers in those areas, over-stocking is also the result of traditional beliefs regarding animal numbers and wealth in addition to the lack of land ownership and ill-defined property rights. Most farmers are more concerned about the quantity reflected in animal numbers than on quality.
- Stock-owners on communal land do not have any reserve feed and fodder and they need to start feeding at an early stage during dry periods due to the poor veld condition. The lack of reserve feed and fodder banks for communal farmers increases their vulnerability. They experience drought more regularly due to the already poor condition of the veld, and need to start with drought feeding long before the commercial farming sector, which is better prepared for droughts.
- Feed and fodder are normally very expensive for communal and small-scale farmers since they do not have economies of scale and can only buy small quantities from local sellers who already add their own profit. In addition, transport cost for communal farmers are much higher since they buy small quantities and have to transport feed and fodder in small quantities on their LDVs. If one compares transport cost in quantities of 1 ton with 24 ton quantities normally transported by commercial farmers, one

realizes the disadvantages of small-scale and communal farmers in terms of final feed and fodder expenditure. As an example; during October 2010 the Richtersveld farmers paid R60 per bale of Lucerne at Springbok plus an additional R10 per bale transport to their farms. During the same time Lucerne was available at less than R40 per bale in Upington and commercial farmers could order Lucerne at less than R50 per bale delivered in Springbok.

- The products of communal farmers are more price-sensitive than those of commercial farmers simply because of the lack of access to competitive markets. Most communal farmers do not have the transport and means to sell their animals at main auctions where national supply and demand determine prices. As a result of that, communal and small-scale farmers depend, to a large extent, on individual buyers who offer them less than the market price because there is little competition between the buyers in communal areas. A common phenomenon is the "*tuck shop auctions*[15]" held on a regular basis at pre-arranged places. Buyers normally have local "*agents*" who look for animals and potential sellers and arrange a date and place for the buyer together with all the potential sellers in the region to meet. During this meeting (*tuck shop auction*) the individual sellers and the buyer[16] will negotiate prices for the animals offered for sale. If they do not agree on the price the seller will simply take his/her animal back home but the supply increases during dry periods; the buyers are well aware of the predicament of communal farmers during droughts with the result that in most cases, they buy animals at deflated prices.
- In addition to the named market distortions, the condition of animals is normally poor during droughts and farmers get even lower prices for stock in a poor condition. Communal farmers do not have reserves to feed animals during dry periods and they start selling their stock when their condition has already deteriorated. A common occurrence is that communal farmers sell their stock at a too late stage when the condition is already poor and supply exceeds demand.
- Access to credit is another stumbling block for communal farmers since they do not qualify for credit and have to sell animals once their cash flow is under stress. In most cases they do not have collateral because of the lack of title deeds to the land, and they cannot provide any security to banks or cooperatives, and are therefore excluded from additional capital resources. The only exceptions are the part time communal farmers with other business interests such as shop and taxi owners and people that earn salaries. The result is that the ones with access to credit sometimes buy animals at cheap prices from the poorer farmers, and end up richer after exogenous shocks such as drought. This concurs with what FEWS (1999) found in other African and Asian countries.
- In most cases contamination of water-points during drought is a problem on communal land. Contaminated water-points during dry periods, for example cause numerous animal diseases during droughts. Personal inspections to water-points during the November 2010 drought in Riemvasmaak exposed the seriousness of the problem. Few remaining drinking places existed, and they were all very muddy and contaminated. Sufficient water is available during normal years, but animals concentrate on the few remaining water points during dry periods.

Some general constraints that increase vulnerability mentioned by communal farmers, extension officers and livestock health officials are the following:

[15] A new description for small auctions with only one buyer in communal areas. The author heard the description for the first time amongst farmers at Loopeng.
[16] In most cases only one buyer

- Poor communication between land-owners (Municipalities and State) and farmers. In most cases the lack of proper communication results in a stalemate between the two parties where farmers end up paying no rent and the land-owner refuses to maintain infrastructure.
- Distances to major markets are a huge problem since most communal stock-owners do not have own transport.
- The lack of economies of scale increases unit prices for inputs and has a negative impact on profit. Small-scale farmers mentioned, for example that they could not purchase medicines for animals since the quantities are too large.
- Past drought support and relief projects from the Department of Agriculture in terms of subsidies for fodder purchases were of great value.
- The time between drought application and support is too long. In most cases they receive relief too late after they had to sell animals or animals are already in a bad condition when relief is granted.
- Over-grazing is also the result of the many donkeys and horses on communal land. They are sometimes not included in the stock counts.

Considering all the above, it is clear that the coping capacity of communal farmers are much lower than those of the well-established commercial farmer. That increases the vulnerability of these farmers to drought and ultimately their drought risk. Drought risk in communal areas is therefore higher not only because of over-grazing; they are also extremely vulnerable with low capacity, and that ultimately increases their risk profile to drought.

9. CONCLUSIONS AND RECOMMENDATIONS

The research shows that climate change is not to be blamed for the perception of an increase in droughts in the NC as mentioned by Van Niekerk, Tempelhoff, Faling, Thompson, Jordaan, Coetsee, & Maartens, (2009). Other factors seem to be at the root of droughts in the NC, notably the lack of adaptation, low levels of coping capacity and high vulnerability, especially amongst communal farmers. The main recommendation derived from this study is that policies dealing with drought risk reduction should focus on adaptation to current climatic conditions, building of coping capacity for extreme shocks and decreased vulnerability amongst communal farmers, rather than climate change issues so popularly promoted nowadays.
Some of the specific issues to be addressed are the following:

- Extension officers are key during the application process for drought disaster declaration. They are the ones who inspect the farms and write the recommendations for disaster drought declaration. It is therefore advisable that they should consider the vulnerability of different groups. Disaster droughts for communal farmers are not necessarily drought for commercial farmers. Exceedence probability for severe droughts is one in eleven years while communal farmers might need government intervention more regularly.
- The problems related to communal land should be addressed as a matter of urgency. The *"tragedy of the commons"* should not be accepted as a given. Strict measurement should be enforced on both the land-owners and land users. This includes all factors such as infrastructure maintenance, management and access to land.
- Communal farmers should be assisted in a special way, but their support should be coupled to certain preconditions designed to prevent a continuation of the current

problems. The Department of Agriculture should acknowledge the fact that they might experience normal dry periods as droughts. Relief and support plans should be designed to prevent the dependency syndrome where farmers expect from government to assist them during every dry period. The extension officers should play an important role in the support of these farmers, specifically regarding improved management principles.

- Imperfect market systems for small-scale and communal farmers should be addressed. Dry conditions specifically increase small farmers' vulnerability in relation to markets.
- Extension officers and livestock health officers should be sensitized about the factors affecting vulnerability and coping capacity of farmers and they should be trained to address these.

Finally, government should be sensitized about (i) the importance of well-defined property right systems coupled with proper land and resource planning, and (ii) management of available land while (iii) building resilience through education and training by the extension services. (iv) Markets and (v) access to credit is equally important and (vi) climate change is not to blame for current drought challenges in the NC.

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