WHEAT GROWING AND CHANGING FARMING SYSTEMS IN SOUTH AFRICAN DRYLAND MARGINS: THE CASE OF THE SNEEUBERG, SOUTH AFRICA

WHEAT GROWING IN THE SNEEUBERG, SOUTH AFRICA

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ABSTRACT

The contribution of stock keeping to land degradation in the Karoo has been extensively studied, but other causes have been rarely examined. The paper uses a combination of key informant interviews and a review of published and unpublished documentary sources to describe the history of wheat growing in the Sneeuberg area of the Karoo since European settlement, until the 1970s when annual crop cultivation collapsed. Early cultivation was primarily for subsistence purposes, though the development of infrastructure and growth in markets in the 19th century encouraged commercial crop production. Some farmers continued growing wheat partly to sustain the tradition into the mid 20th century, though by that time,

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most growers relied on the wheat as a winter stock feed. Several factors were found to have contributed to the collapse, with land degradation only rarely playing a part in contemporary decisions to stop farming. Far more important were the comparative advantages of other stock feeds such as lucerne, changes in state regulations governing crops and prices, and the perceptions of farmers regarding changes in rainfall patterns.

KEYWORDS: South Africa, the Karoo, land degradation, wheat growing, climate change

INTRODUCTION

Land degradation is an important problem affecting agricultural and other lands around the world (Miao *et al.*, 2015; Newbold *et al.*, 2015; Panagos *et al.*, 2014; Vieira *et al.*, 2015), with the potential to significantly negatively impact agricultural productivity and food security; impacts likely to be exacerbated by climate change (Huang *et al.*, 2016; Pimentel & Burgess, 2013). While land degradation and farming systems have always been intimately linked, the drivers of change and direction of causality are not always clear. One such example is in the Sneeuberg mountains of the eastern Karoo in South Africa and the surrounding plains. Widespread land degradation in this area is exemplified at its most extreme in the development of badlands and gullies (Boardman *et al.*, 2015; Foster *et al.*, 2007; Foster *et al.*, 2012; Mighall *et al.*, 2012). Degradation of the shrub and grassland cover has resulted in the development of bare ground, increased runoff and erosion, and is most notable on footslopes and in drained vleis in valley bottoms. Gullies (dongas) developed as the result of increased runoff from the slopes and in turn contributed to the

draining of vleis (Boardman *et al.*, 2003), causing problems as they do elsewhere in the world (Frankl *et al.*, 2014; Martínez-Murillo *et al.*, 2013).

In the Karoo, the relationship between stock farming land uses and land degradation has been extensively studied (Hoffman *et al.*, 1999; Neville *et al.*, 1994; O'Connor & Roux, 1995; Roche, 2008; Roux *et al.*, 1981), where the primary cause of degradation appears to be overstocking since European settlement, particularly of sheep. Stocking rates were unsustainably high, particularly from 1860 to 1960, though rates have fallen dramatically since then (Boardman *et al.*, 2010). The development of wagon tracks through the Sneeuberg passes also contributed to incision by runoff and therefore to gully development (Boardman, 2014).

However, degradation also occurs in the valley bottoms, lands that were historically cultivated (Keay-Bright, 2006). While it is known that most farmer
s ceased cultivating cereals decades ago, little attention has been given to the role of cultivation in land degradation in the region to date, and it is not clear whether the now-obvious degradation was the cause. The purpose of this paper is therefore to investigate the history of cereal cultivation in the Sneeuberg mountains and surrounding plains, examining human impacts on natural environments, but more specifically in order to determine, what, if any, role land degradation played in the change in local farming systems and the cessation of cultivation.

MATERIALS AND METHODS

This paper examines historical farming practices on the mountain farms in the Sneeuberg range (Figure 1), and the farming areas across the Graaff-Reinet and Middelburg magisterial districts, including mountain and plains farms located between the towns of Graaff-Reinet, Middelburg and Aberdeen. Kompassberg

Mountain (2502 m) is the centre of the region considered 'mountain farms' in this study; also covering the upper catchment and headwaters of the Klein Seekoei River, which flows through the Seekoei into the Orange River.

Rainfall has a distinct peak in late summer (February and March) (Sugden, 1989) and is approximately 300 mm p.a. on the plains, and more than 400 mm p.a. in the mountains (Foster *et al.*, 2012). Convectional thunderstorms are common in summer, though they may not deliver much rainfall, whilst in winter snowfalls occur in the upper mountains and valley headwaters. Precipitation has considerable spatial and inter-annual variability, and a marked degree of multi-decadal variability, with alternating near-decadal wet and dry spells (Boardman *et al.*, 2003).

Diurnal and seasonal temperatures also show large fluctuations, with summer maxima of approximately 30°C and winter minima of less than -10°C being recorded (Schultz, 1980). The Karoo is subject to a relatively high incidence of persistent wind, increasing desiccation and with important consequences for vegetation types and their productivity. These factors combine to mean water availability is of overriding importance to primary and secondary productivity, and to human occupation in the Karoo (Siegfried, 1999).

Particular attention is given in this study to wheat cultivation, which was driven largely by the need for winter stock feed, though harvests were also used in the home, particularly in the first half of the 1900s, continuing the tradition of own use that began with early European settlement of the region. While small areas of oats, barley and maize were grown they were perceived as less important because they were grown solely as stock feed.

The history of cultivation in the Sneeuberg and surrounds were investigated using a combination of documentary and interview material. Documentary sources included peer-reviewed literature and official government reports (e.g. agricultural censuses, annual reports of parastatals, farmers' handbooks) and agricultural journals. Locally produced memoirs and histories were important archival sources, as were unpublished farm diaries (covering various farms for periods between the mid 19th and the mid 20th centuries), and local newspaper archives (covering the late 1800s until the 1990s) (see Appendix S1).

Much of the locally produced documentary evidence was written contemporaneously, typically with a focus on the activities of white, commercial farmers in the region, with the Sneeuberg area of interest here, covering a relatively smaller number of farms and farmers. Government reports and local archives were the main sources for the description of farming systems and farm developments in the 18th, 19th and early 20th centuries. However, these sources were largely silent on the collapse of wheat growing locally, thus interviews became particularly important in understanding this change in farming systems.

Semi-structured and key informant interviews were undertaken in two field visits in October and November 2013 and in November and December 2014. 21 interviews were conducted, and involved 23 interviewees, with some interviewees being interviewed multiple times (see Appendix S2). Interviewees were selected using a snow-ball sample, on the basis of their wheat farming experience in the Sneeuberg and surrounds, or because of their professional experience as agricultural extension agents or agricultural researchers. Documentary sources were examined for evidence that may corroborate, complement or contradict the material provided in interviews. No contemporary or current sources were found that contradicted the

information given in the interviews, but where conflicting or inconsistent material was found, it is noted below.

RESULTS

Farmers and crops in the Sneeuberg

The Sneeuberg area was settled by white farmers in search of grazing relatively early in the colonial period, (Myburgh, 1979; Penn, 2005; Whitlock, nd). Following an influx in the early 1770s (Penn, 2005), some farms were subsequently abandoned for several decades after the 1770s, as a result of San raids on livestock and threats to farmers' lives (Dooling, 2009; Penn, 1995; Penn, 2005). Once resettled, the economic fortunes of the area were tied to the growth (and busts) of primary commodities and the discovery of diamonds at Kimberley and gold in the Transvaal (Henning, 1975; Minnaar, 1987). Farm establishment and enterprise success were also affected by climatic factors, particularly drought, and the 1896 rinderpest epidemic, which destroyed the majority of livestock herds (Henning, 1975; Roche, 2008).

Most early stock farmers were versatile and responded to changing market demands and environmental conditions, initially dominated by beef cattle, but later by sheep and goats (the latter initially for meat, but shifting over time toward wool and mohair production) and ostriches (Archer, 2000; Beinart, 2007; Henning, 1975). By the 1850s, the Graaff Reinet district was producing 20% of wool exports from the Cape Colony (Nunn, 2008).

While livestock were dominant, farmers also kept dairy cattle, had orchards and vineyards and, where water permitted also kept home- and market-gardens. Wheat was cultivated both for home consumption and winter stock-feed, and oats and

sorghum were grown for fodder. Diversified farm production developed initially for home consumption, because of the distance of markets – it was not until the latter half of the 1800s that local markets developed for agricultural production.

Despite the views of some early travellers that the Sneeuberg region was not suitable for cultivation or agriculture (Skead, 2007), cereals were being cultivated throughout the 18th and 19th centuries. The small amount of wheat traded at the Graff-Reinet market in the mid-19th century suggests that much of the wheat produced was for home consumption, in contrast with the apparently commercial production of oathay, barley and potatoes (Henning, 1975). By the 1870s, vleis (wetlands) were understood to be a source of the stock disease liver fluke, and were therefore avoided at certain periods (Beinart, 2007), which may have increased the attractiveness of draining and cultivating them (Skead, 2007).

Cereal production was highly variable – though most grain crops were irrigated, they still relied on spring rains, which could only be depended on one year in eight (Ministry of Agriculture, 1919). In the mid-1800s, dam building began to provide a buffer against drought (Foster & Rowntree, 2012) and the uncertain rains, which enabled fodder and other crops to be produced with a greater level of certainty.

During the 20th century, livestock production continued to dominate farming systems, and farmers continued to shift to stock production in response to market forces (Hoffman & Rohde, 2011), within the constraints imposed by ecological and climatic factors (Siegfried, 1999). Meanwhile, cereal production underwent dramatic changes – virtually all cultivation activities on farm declined in both land area (see Figure 2) and labour intensity, and technological developments, government

policies and ecological factors each played an important role in cultivation decisions.

Wheat production in the 20th century

There were two motivations for wheat growing by the 20th century. For some farmers, wheat-growing and self-sufficiency more generally remained culturally important: 'my grandfather allowed stock to die outside of fenced wheat. It was a cultural thing, the need to grow wheat … it was the done thing to have their own wheat supply' (van Lingen & van Lingen, 2013). 'Growing up, we didn't think of buying anything out of a shop related to wheat' (Short, 2013b). 'Wherever there was enough water, anything to produce food was produced' (Goedhals, 2013).

Commercial considerations were driven by the need for livestock grazing over the winter, and the benefit of generating cash income from the subsequent harvest: 'wheat could be viable, and it was a very nice cash income – and farmers need cash.' (Goedhals, 2013). 'The wheat that was sold was a terrific cash crop; and though hail and frost could damage it, overall it was a success' (Lückhoff, 2013). Farmers also grew commercial wheat opportunistically, rather than regularly, to earn income to develop other aspects of the farm. For example, 'in 1946 there was a huge drought, and then a lot of rain in August and a lot of wheat was planted. It saved their bacon because they had all been understocked because of the war' (Biggs, 2013).

In the early 20th century most wheat was still irrigated (Anon, 1929; Ministry of Agriculture, 1919), and farmers would irrigate as much land as they had water for. Where insufficient runoff was available for irrigation, involuntary fallows were

enforced. However, rainfall remained critical to the timing of sowing in both irrigated and dryland systems.

On the mountain farms by the 1950s, most wheat was rain fed, even on farms where irrigation had once been the norm. Irrigation remained necessary on the plains farms, as average rainfall was too low in these areas to grow dryland wheat. Where irrigation was used, it was virtually the only input into wheat growing; fertilisers were only exceptionally used.

The area planted to wheat varied considerably over time (Figure 2), in some cases, farmers planted the same lands every year, while other farmers cultivated new or larger lands in years that appeared promising. However, while the need for winter grazing was the main driver of wheat cultivation, water availability was key: 'We would plant wheat if we had extra water, above that which was needed for the lucerne' (Goedhals, 2013).

In 1938, the Wheat Industry Control Board (WICB) was established in South Africa, and all wheat sold from that time had legally to be sold to the Board (WICB, 1939). Figure 3 shows the wheat purchases made by the Board from the Karoo and 'Area E', and demonstrates the variability in sales.

The total sales of 'Area E' averaged 10 per cent of the Karoo sales between 1966 and 1981, after which, no sales were recorded. The insignificance of 'Area E' wheat production in national terms can be determined from its small contribution to Karoo wheat sales, which in turn are relatively unimportant in terms of national production. The Karoo area (as defined here) produced on average only 8% of the sales for the whole of the Cape Province between 1938/39 and 1988/89, ranging

from as little as 3%, to a one-off maximum of 17%. Wheat sales in the Cape Province were, in turn, approximately half of national sales (Author calculations). These figures emphasise both the marginality and variability of wheat growing in this region.

Available yield data illustrate the generally low productivity and high variability of wheat production in the district. For the period 1911 to 1993, yields for the Graaff-Reinet district varied from as low as 0.06 tons ha-1 to 2.08 tons ha-1, with an average of 0.7 tons ha-1. However, many farmers were unable to harvest a crop every year – only 38% of land sown with wheat was actually reaped in Graaff-Reinet district (42% in Middelburg) – often due to crop failure resulting from a lack of rain (author calculations from Department of Agriculture, various).

Despite their reference to somewhat different geographical areas, Figures 2 and 3 demonstrate both the year to year production variability and the changes in wheat production in and around the Sneeuberg over the 20th century – the increase in the early- to mid-1900s and the subsequent cessation of production by the 1980s.

Technological changes

Early cultivation, harvesting and water leading (irrigation) were extremely labour intensive. Ploughing, cultivating and sowing were done using teams of oxen or mules, requiring three labourers to work a team of 14-16 oxen (Kingwill, 1984). Seed was sown and grain was harvested by hand (van Lingen, 2006), and once cut, significant labour requirements remained to tie and stack the wheat sheaves, transport (and re-stack) the sheaves and then thresh them. Perhaps surprisingly, labourers using sickles to harvest wheat are remembered as late as 1956, with harvesters cycling to farms each day to cut the wheat (Loock, 2014).

There were two main phases of mechanisation during the 20th century. The first occurred in the 1920s and 1930s, when tractors and harvesters were adopted in the region, though the effectiveness of the early machines was questionable (van Lingen, 2006). However, this mechanisation was slowed by rationing and shortages of fuel, tyres and vehicles during Second World War. The second phase was spurred by the combination of good harvests in the late 1940s and early 1950s, and the wool boom of the mid-1950s.

Farmers who owned machinery also often worked as contractors, sometimes only for neighbours, sometimes with more substantial contracting businesses operating across several districts (Biggs, 2013; Sheard & Sheard, 2013). The high cost of farm machinery meant that many farmers relied on these contractors, originally for threshing and later, following the invention of combine harvesters, also for harvesting.

In contrast to expectations, despite the increasing use of machinery, it appears there was no substantial and widespread increase in the lands planted in the Sneeuberg region following widespread mechanisation, though naturally on individual farms such increases could occur (van Lingen & van Lingen, 2013). Increases were constrained, particularly on mountain farms, by the land that could be planted, which was typically restricted to valley bottoms, vleis and in some cases on mountain plateaux. In some extreme locations, such as on plateaux fields where the mountain-sides were too steep to get machinery to the top (Goedhals, 2013; Loock, 2014; Lückhoff, 2013), a lack of labour following mechanisation may have forced the end of wheat growing.

Policy and regulations

Government regulations to stimulate wheat production in the Cape Colony were made as early as 1826, and in the early 1930s, regulations again banned imports of wheat, flour and/or meal (Stanwix, 2012). These stimulatory regulations were viewed as necessary because domestic production was often insufficient to meet national requirements, a problem compounded during both world wars by inadequate imports because of shipping interruptions (Ministry of Agriculture, 1919).

During the 1930s and 1940s the WICB took control of the wheat supply chain (including both imports and exports) and implemented subsidies along the chain. Their initial purpose was to stabilise wheat prices for farmers, ensure (white) urban consumers had access to cheap bread and to improve efficiency and coordination along the supply chain. The most severe restrictions were relaxed after international markets and shipping returned to normal after World War II (WICB, 1946).

Subsidies to producers were paid on a production cost plus 'fair margin' basis; calculated from the average cost of production incurred by farmers in the main wheat growing areas in the south west Cape. Prices were sometimes increased relatively more than production costs in order to encourage production, such as those in 1942/43 targeting marginal areas (WICB, 1943). By the 1950s, these incentives appeared to be working, with 10 years of record or close to record national crops in the years between 1951 and 1974 (WICB, various years). Despite the recommendation of the WICB to end bread subsidies in 1953, they were not fully deregulated until 1991; following shortly after wheat price deregulation in 1989 (WICB, 1953; WICB, 1991).

DISCUSSION: THE COLLAPSE OF WHEAT FARMING

The decline in area planted to wheat in the Sneeuberg region and in surrounding plains farms started in the early 1970s and was complete by the early 1980s. Four factors were strongly influential – a significant increase in the costs associated with wheat production, technological changes, the comparative advantage of lucerne as a stock feed and ecological factors.

Economic climate

The wool boom of the 1950s, combined with relative profitability of cereal production at the time, enabled investments in productivity improvements and the adoption of new labour-saving machinery, as discussed above. However, during the 1970s, despite high commodity prices, South African farmers were facing a combination of rising input costs, high farm debt, high inflation, high interest rates, and a depreciating Rand (Conradie *et al.*, 2013; Stanwix, 2012).

By the late 1970s, WICB prices were increasing at rates less than inflation. For marginal producers like those in the Karoo, this meant declining revenues no longer covered increasing production costs. The consolidation of farm enterprises that took place across South Africa at that time was a demonstration of the need to deal with squeezed margins, improve efficiency and profitability if farmers were to stay in business (Stanwix, 2012; van Lingen & van Lingen, 2013).

Technological changes

Farmers in the district sold their grain primarily to the roller mills in Graaff-Reinet (there were no silos in Middelburg). National plans to accept only bulk grain deliveries at storage units (rather than bagged grain) were initiated by the WICB as

early as 1953 (WICB, 1953), but it was not until the 1970s that the roller mills in Graaff-Reinet started accepting only bulk deliveries.

Thus, at the same time as margins were being squeezed by cost increases and revenue declines, farmers also faced the need to change the harvesting machinery and transport used to deliver their saleable wheat. Those farmers already struggling with poor returns from wheat growing were unable or unwilling to make these necessary investments: 'I stopped growing wheat when the roller mills changed from accepting bagged wheat to bulk wheat; it affected everyone in the area (Goedhals, 2013).

The reliance of most farmers on harvest contractors also appears to have played a cumulative and circular role. By the 1970s, a number of the contract harvesters in the Sneeuberg region had stopped operating because they could not make a profit, because farmers had stopped growing wheat or because they themselves had stopped growing wheat (Goedhals, 2013; Sheard & Sheard, 2013; van Lingen & van Lingen, 2013). The lack of contract harvesters meant that farmers faced a choice of whether to purchase the necessary machinery for themselves or to stop growing wheat because it could not be harvested. Many farmers who grew too little wheat to justify the purchase of such machinery therefore switched to lucerne cultivation for livestock feed (Kingwill & Kingwill, 2013).

Comparative disadvantage

In order to survive the difficult economic conditions of the 1970s, farmers were required to improve their efficiency and increase the profitability of stock-keeping, which led to an emphasis on lucerne as the primary source of stock feed.

The relative disadvantage of cereal production compared to lucerne in large parts of the Karoo had been officially recognised by a 1919 inquiry into wheat growing in South Africa, which noted that if more valuable uses could be found for water, then the patches of wheat grown in the Karoo would disappear, and the country's production would 'decline with profit' (Ministry of Agriculture, 1919). However, farmers continued to grow wheat for many more decades, despite the unanimous agreement amongst interviewed farmers and extension agents that lucerne was then (and remains) the most profitable and reliable source of stock feed in the region (see also de Kock, 1978).

Ecological factors

Drought, frost, rain (and floods), hail and pests (mostly locusts) and disease (largely rust) played important roles in the variability of harvests from wheat in the region. Considerable analysis of the impact of most of these factors, particularly drought, has been undertaken for stock-keeping in the region (Dean & Milton, 1999; Keay-Bright & Boardman, 2007). However, with respect to cereal farming, numerous farmers observed anecdotally that changes in rainfall intensity meant moisture was not available to the crop at critical times, which ended the viability of wheat growing in the region (Kingwill & Kingwill, 2013; Sheard & Sheard, 2013).

Rainfall data has not yet been analysed to determine whether drought years coincide with 'agricultural drought' years, or to establish their impacts on cultivation. However, between 1960 and 2010 average rainfall intensity in districts neighbouring Graaff-Reinet increased (Conradie *et al.*, 2009; Keay-Bright, 2006). That is, there were fewer rain days, but with a higher rainfall. Additionally, rainfall seasonality – while continuing to fluctuate from year to year – appears to have moved from January to earlier in the summer (du Toit, pers. comm.). It is possible

that this rainfall earlier in the season would damage standing wheat (waiting to be harvested), further reducing potential returns.

Farmers also described a noticeable reduction in run-off, negatively impacting on the availability of irrigation water: 'seepage water has decreased dramatically; the farm dam could last up to 18 months with seepage water until the 1960s, but by the 1990s, this had reduced to only a year, and now it's only 10 months' (Lückhoff, 2013). These changes to run-off were associated with observed changes in rainfall, to dam building (probably in the 1920s) which affected how far water ran after rain, and to more recent revegetation and regeneration of the veld (Goedhals, 2013; Kingwill & Kingwill, 2013; Murray & Murray, 2013; Short, 2013a; van Lingen & van Lingen, 2013).

The land degradation caused by cultivation, while not driving the collapse of wheat growing, is now recognised by farmers as having 'mined the soil' (van Lingen & van Lingen, 2013), with 'years of wheat growing depleted the soils, and the loss of organic matter and compaction turned it to concrete' (McNaughton, 2013). Most problems were identified as resulting from water erosion: 'wheat farming destroyed the land everywhere; it washed away if there were heavy rains' (Sheard & Sheard, 2013), noting further that 'signs of erosion are still evident … though the dongas are [now] dormant, as they have been reclaimed by grass' (Kingwill & Kingwill, 2013). This erosion contemporaneously impacted negatively on wheat growing: 'as the soils degraded, ploughing would be less effective, because the soil couldn't hold moisture' (van Lingen & van Lingen, 2013).

Despite anecdotal reports of 'dust up to the windowsills' in neighbouring districts of Aberdeen and Pearston (McNaughton, 2013; van Lingen & van Lingen, 2013; van

Lingen, 2006), wind erosion was rarely viewed as a problem in the Sneeuberg and surrounds. Just one farmer reportedly gave up wheat growing in part because of the severe wind erosion his farm was subject to, because of its location on a high plateau. In the main, land degradation appears not to have been an important driver of the cessation of wheat farming activities in the Sneeuberg region, though the abandonment of cultivated areas led to degradation of land that can still be seen (Keay-Bright & Boardman, 2007).

CONCLUSION

Farms in the study area remain diverse, producing sheep and goats for wool and meat, cattle and ostriches. These enterprises remain heavily dependent on cultivated irrigated pastures, but the land area of these are very small and virtually all of it is lucerne. Following the historical pattern, farm businesses also continue to respond to changes in opportunities and economic returns, as demonstrated by the increasing introduction of game on to farms. This diversification is based at least partly on the belief that mixed land uses will diminish the impacts of grazing by one or only a few herbivore species.

Historically, rainfall and water availability were critical to wheat growing potential on both plains and mountain farms in the Sneeuberg region. Farmers' decision-making about whether to grow wheat in the Sneeuberg region (and the Karoo more widely) was always mostly heavily influenced by the local availability of water. The high grain prices of the 1960s and 1970s may have maintained wheat growing in such a marginal area for longer than would have been the case in their absence. However, declining financial conditions and the observed changes in rainfall patterns and intensity appear to have played significant roles in the cessation of cereal cropping.

While these changes in rainfall patterns have not been systematically analysed with respect to impacts on cultivation in the region, such evidence as is available confirms farmers' perceptions of the reduction in wheat farming viability through its effects on the timing of the rainfall during the growing season and the greater intensity of rainfall events. Thus, while there is considerable, and still visible, evidence of land degradation resulting from cultivation, in contrast to the initial hypothesis that this degradation led to the cessation of wheat growing, this seems not to have been the case in this region.

This research demonstrates the factors contributing to the collapse of wheat growing in a relatively small area of the Karoo in South Africa. However the research has an importance beyond this small area, as the major wheat-growing areas of South Africa are vulnerable to similar changes in physical and economic conditions. The story may also be repeatable in other countries where wheat is grown under similar, semi-arid conditions; a possibility which requires further investigation.

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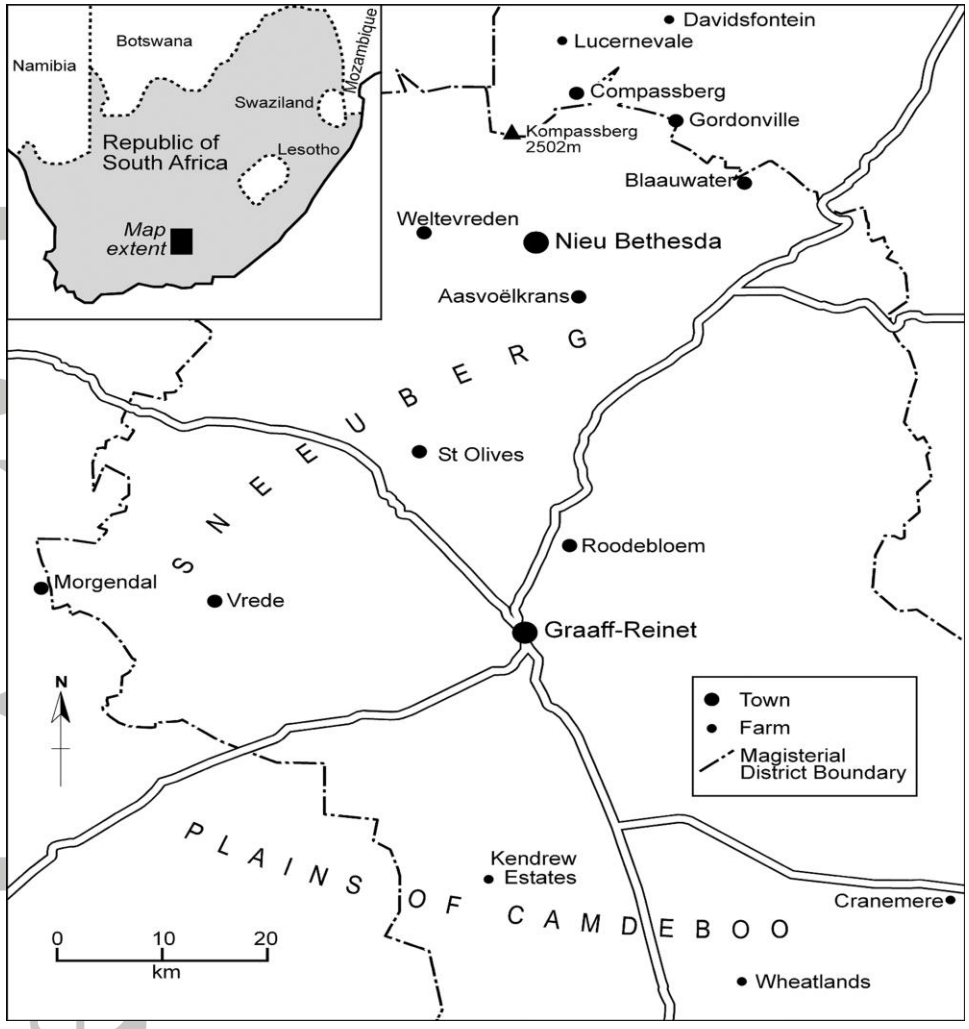

Figure 1 Graaff-Reinet district and surrounds, Eastern Cape, South Africa

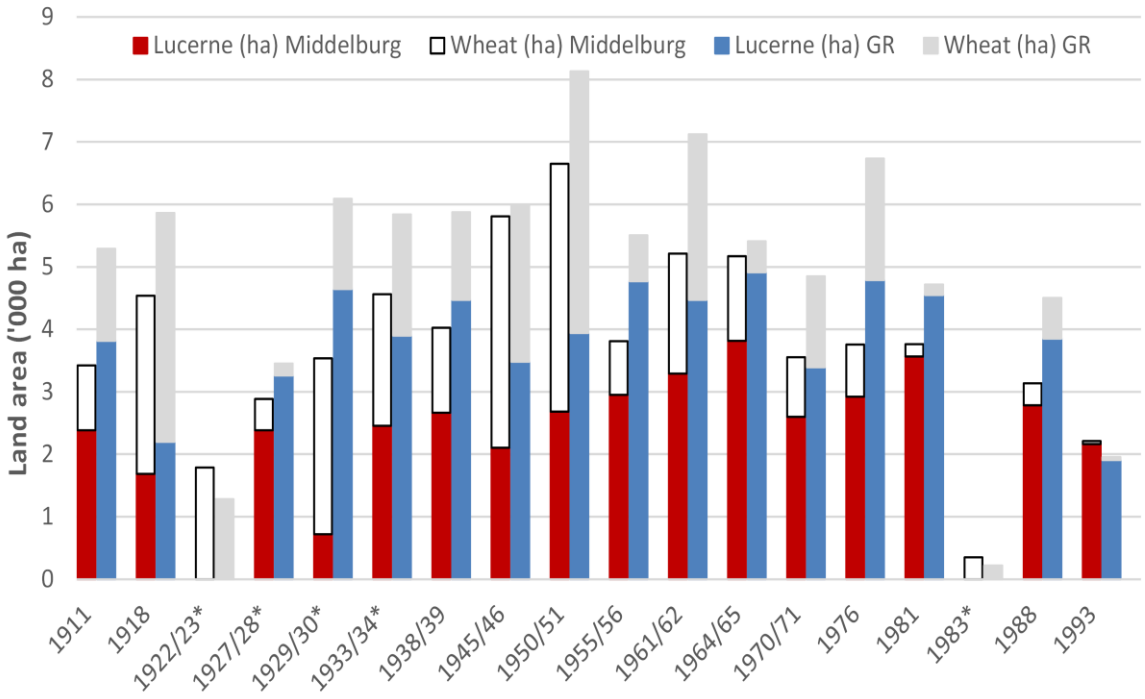

Figure 2 Area of wheat and lucerne cultivation, Graaff-Reinet (GR) and Middelburg (Cape) magisterial districts

Source: Department of Agriculture census data (1911 to 1993).

* 1922/23 and 1983 no data for lucerne plantings; 1927/28 , 1929/30 and 1933/34 data for wheat plantings is area reaped, no data available for area planted.

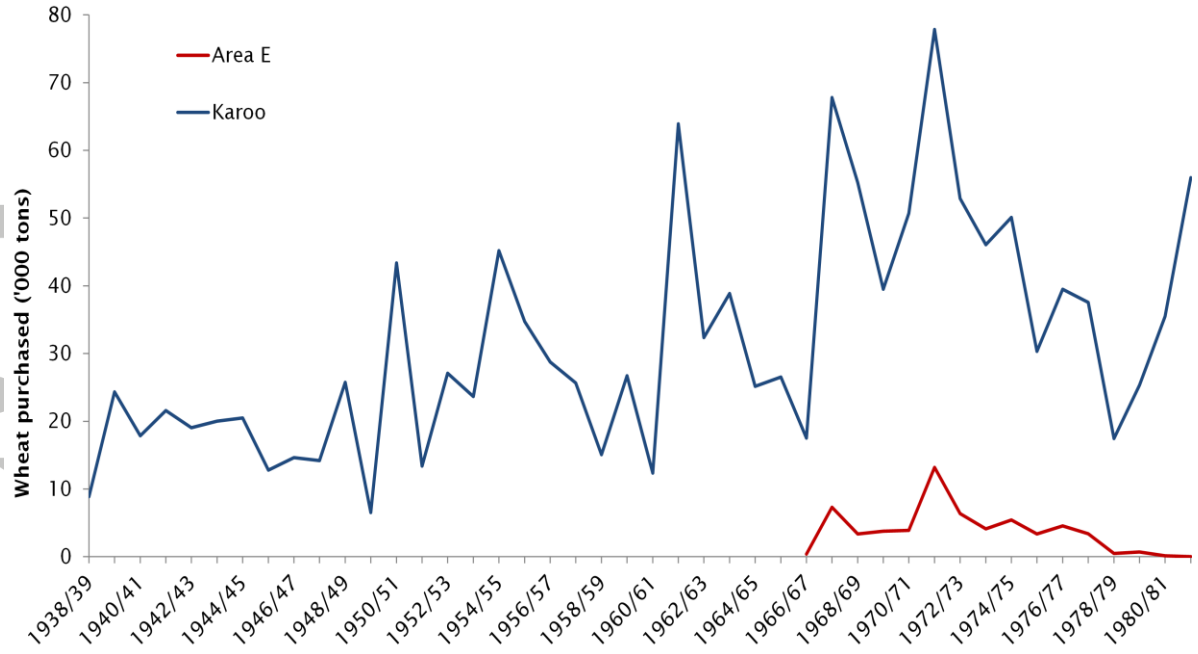

Figure 3 Wheat Industry Control Board annual purchases 1938/39 to 1981/82 (’000 metric tons), Karoo and ‘Area E’*

Source: WICB annual reports (1938/39 to 1981/82).

* According to Schedule 1 (b), the Karoo covered an area including Aberdeen, Bathurst, Barkly West, Beaufort West, Bedford, Bristow, Calvinia, Carnarvon, Clanwilliam, Colesberg, Cradock, De Aar, Fraserburg, Graaff-Reinet, Hanover, Hay, Herbert, Hopetown, Kimberley, Ladismith, Laingsburg, Maraisburg, Middelburg, Murraysburg, Pearston, Philipstown, Prieska, Prince Albert, Richmond, Somerset East, Steynsburg, Steytlerville, Sutherland, Venterstad, Victoria West, Williston, Willowmore. The Karoo data was disaggregated further from 1966 to 1981, with ‘Area E’ centring on the farmlands around Graaff-Reinet, Middelburg, Craddock and Victoria East.