Assessing the potential of Holistic Management in the rural village of Mceula in the Zulukama region, Eastern Cape

by

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Declaration

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Abstract

South Africa is comprised of approximately 80% rangelands, much of which is considered degraded. Rangeland degradation is substantially worse in the former homelands and where people are most reliant on the natural resource base for survival. Holistic Management has been proposed as an alternative that could potentially reverse rangeland degradation occurring on both commercial and communal rangelands. Because it, controversially, proposes increasing stocking rates, it has been viewed with suspicion by many scientists and farmers. Although success with Holistic Management has been documented, both internationally and locally, on commercial farms, it has yet to be evaluated in the former homelands of South Africa. This study evaluated the first pilot project attempting to introduce Holistic Management in the communal village of Mceula in the Ciskei.

A case study analysis using semi-structured interviews was used to evaluate the implementation process of Holistic Management and the effect the programme had on the rangeland, livestock and livelihoods of the communal farmers involved. Interviews were conducted with those responsible for the implementation of the project and with communal livestock farmers. A reflexive thematic analysis was then used to identify themes in the interviews and an inductive analysis was used to analyse them. Results showed that there was unanimous agreement that the Holistic Management project was a success. The more immediate and tangible effects of Holistic Management were evident in the improvement of the veld, improvement in livestock survival and an increase in incomes derived from the sale of wool. More intangible effects were evident in the paradigm shift that occurred when farmers began to view grass as an essential part of their livelihood. Equally important was the capacity building that occurred which gave the farmers the tools to manage both their livestock and veld. Further themes were identified, although not articulated in the interviews, and deductive analysis was used to link these to established literature. First, the importance of co-production, second, the assimilation of traditional knowledge into the management framework and third, the ability to

manage communal lands in order to prevent tragedy of the commons from occurring.

In summary, Holistic Management was successfully implemented in Mceula and although rangeland restoration was not achieved due to an ongoing drought, the veld had improved enough to increase livestock survival and farmers' incomes. While the Holistic Management system was very effective technically, the method of implementation should not be overlooked and this provided the foundation for the success of the project. Due to the success in Mceula, other villages have requested the Holistic Management training and the project has expanded organically into the surrounding villages.

Keywords:

Holistic Management, rangeland degradation, former homelands, Ciskei, co-production

Opsomming

Suid-Afrika bestaan uit ongeveer 80% veld, waarvan ’n groot deel gedegradeer is. Veld-degradasie is aansienlik ernstiger in die voormalige tuislande en waar mense die meeste afhanklik is van die natuurlike hulpbronbasis vir oorlewing. Holistiese bestuur is voorgestel as ’n alternatief wat moontlik veld-degradasie, wat op beide kommersiële en gemeenskapsvelde voorkom, kan aanspreek. Omdat dit die verhoging van veehoudingkoerse voorstel, wat ’n omstrede onderwerp is, word dit deur baie wetenskaplikes en boere met agterdog bejeën. Alhoewel die sukses van holistiese bestuur al beide internasionaal en plaaslik gedokumenteer is, is dit nog nie in die voormalige tuislande geëvalueer nie. Hierdie studie het die eerste proefprojek geëvalueer in ’n poging om holistiese bestuur in die gemeenskapsdorpie Mceula in die Ciskei te implementeer.

’n Gevallestudie-analise wat gebruik gemaak het van semi-gestruktureerde onderhoude was gebruik om die implementeringsproses van holistiese bestuur en die uitwerking wat die program op die veld, vee, en lewensbestaan van die betrokke gemeenskapsboere gehad het, te evalueer. Onderhoude is gevoer met diegene verantwoordelik vir die implementering van die projek, asook met gemeenskapsveeboere. Refleksiewe tematiese analise is gebruik om temas te identifiseer en induktiewe analise is gebruik om hulle te ontleed. Die resultate het getoon dat daar eenparige ooreenstemming was dat die holistiese bestuurprojek ’n sukses was. Die meer direkte en tasbare uitwerkings op holistiese bestuur was duidelik in die verbetering van die veld, die vee se oorlewingskoers, en die toename in die inkomste vanuit wolverkope. Meer ontasbare uitwerkings was duidelik in die paradigmaskuif wat plaasgevind het toe boere begin het om gras as ’n noodsaaklike deel van hul lewensbestaan te beskou. Ewe belangrik was die kapasiteitsbou wat plaasgevind het wat die boere die vernuf gegee het om beide hul vee en die veld te bestuur. Verdere temas is geïdentifiseer, alhoewel hulle nie in die onderhoude genoem is nie, en deduktiewe analise is gebruik om hierdie temas te koppel aan die bestaande literatuur. Hierdie temas was, eerstens, die belangrikheid van mede-produksie; tweedens, die integrering van tradisionele kennis in die bestuursraamwerk; en

derdens, die vermoë om gemeenskapslande te bestuur ten einde die sogenaamde tragedie van die gemeenskaplike (“tragedy of the commons”) te voorkom.

Holistiese bestuur was dus suksesvol geïmplementeer in Mceula, en alhoewel veldherstelling nie behaal is nie as gevolg van die voortdurende droogte, het die veld genoegsaam verbeter om die vee se oorlewing en die boere se inkomste te verbeter. Terwyl die holistiese bestuurstelsel tegnies baie doeltreffend was, behoort die metode van implementering nie oor die hoof gesien te word nie, aangesien dit die fondasie vir die sukses van die projek was. As gevolg van die sukses in Mceula, het ander dorpies die holistiese bestuuropleiding aangevra, en die projek het dus organies na die omliggende dorpe uitgebrei.

Sleutelwoorde:

Holistiese bestuur, velddegradasie, voormalige tuislande, Ciskei, medeproduksie

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List of Acronyms and Abbreviations

ACHM	African Centre for Holistic Management
BAD	Bantu Administration and Development (Department)
CBO	Community-Based Organisation
CCP	Central Cattle Pattern
CE	Common Era
CG	Continuous Grazing
CO_2	Carbon Dioxide
GDP	Gross Domestic Product
ha	Hectare
HC	Holistic Context
HFP	Holistic Financial Plan
HLP	Holistic Land Plan
HM	Holistic Management
HPG	Holistic Planned Grazing
IPCC	Intergovernmental Panel on Climate Change
LSU	Large Stock Unit
MI1 to MI7	Mceula Interviews 1 to 7
N.D.	No date
NGO	Non-Governmental Organisation

NPO	Non-Profit Organisation
OLF	Olive Leaf Foundation
RG	Rotational Grazing
SDO	Sustainable Development Organisation
UNCCD	United Nations Convention to Combat Desertification
USA	United States of America
VOC	Dutch East India Company

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Chapter 1: Introduction

1.1. Introduction

Rangeland degradation is a global phenomenon. Although difficult to evaluate, it is estimated that approximately 80% of global rangelands are at least moderately degraded, while 10-20% are severely degraded (McKell 1990; Zerga 2015). Meadows and Hoffman (2003) suggest that even this disturbing figure is misleading and is probably worse than reported as people in the field generally underestimate the extent of rangeland degradation. In addition, commentators tend to ignore the knock-on effects rangeland degradation has on other ecosystems. In South Africa, rangelands play a vital role in agriculture and constitute about 80% of the entire country. Of this, approximately 70% cannot be used for crop cultivation and can only be utilised by livestock and game (Meissner et al. 2013). The integrity of rangeland ecosystems is therefore of paramount importance to livestock agriculture in South African agriculture and the people who depend on it. This study will focus on rangeland degradation in the former homelands of the Ciskei, how it affects the livelihoods of the people directly dependant on them and explore a novel grazing system that may help regenerate these important ecosystems.

The former homelands of South Africa are almost exclusively located within rangeland ecosystems and together constitute 14% of the country's surface area (Palmer & Ainslie 2006). Surprisingly this disproportionately small area of land contains almost half of the country's cattle (41% to 50% depending on the source) yet contributes very little to the revenue generated by livestock in the formal economy (Palmer & Ainslie 2006; Meissner et al. 2013). The vast majority of livestock generated revenue comes from commercial production and amounted to almost 50% of the total agricultural gross domestic product (GDP) between 2005 and 2010 (Meissner et al. 2013). Despite the low contribution of livestock in the former homelands to the formal economy, they still play a very important part in daily life where they are used for selling and meat consumption; wealth, status and savings; social activities and draught power (Stroebel et al. 2011). These varied uses all contribute in some way to the

overall livelihoods and food security of small-scale livestock farmers and their families, yet livestock production is economically underutilised and could undoubtedly play a bigger role in poverty alleviation in the former homeland. While there are multiple reasons for this, the degradation of the rangelands is a major limiting factor in expanding the growth of livestock production. Communal grazing areas of the former homelands are significantly more degraded than their commercial counterparts (Meadows and Hoffman 2003; Moyo et al. 2008) and this is usually attributed to the large numbers of livestock on communal grazing lands (Moyo et al. 2008; Meissner et al. 2013). Various attempts have been made to replicate commercial grazing methods within the former homelands as well as reduce livestock numbers in order to halt or reverse the rangeland degradation currently occurring, but these have met with very little success (Ngqulana 2017). As rangeland degradation and climate change accelerate and continue to reduce productivity, the future of communal livestock farmers is becoming ever more precarious.

Controversially, a novel grazing system called Holistic Management (HM) has proposed increasing livestock numbers as part of the process towards reversing rangeland degradation (Hawkins 2016). This novel form of grazing management has never been tried in the homelands, but exceptional results on commercial farms practicing HM both globally and locally have been achieved (De Villiers 2013). A pilot project based in Mceula village, in the grasslands of the Eastern Cape, has started implementing HM principles and preliminary results suggest that this new paradigm may succeed where others have failed. Some research groups, primarily based at Fort Hare University, have started conducting research at the pilot site in Mceula, but these studies are more technical and focus on rangeland and ecosystem changes. This study will be a less technical and more socially orientated review which will determine if HM is an appropriate grazing methodology that can help restore the degraded rangelands of the former homelands.

Figure 1: Maps of Mceula (Google Earth 2017)

1.2. Research problem and objectives

1.2.1. Problem statement

Inappropriate grazing management has resulted in severely degraded rangelands which depletes the natural resource base and has negative effects on livestock farmers and the community as a whole (Meadows & Hoffman 2002). The excessive number of livestock along with the continuous grazing

strategy employed is usually cited as the main cause for the degradation (Moyo et al. 2018). Attempts have been made to replace continuous grazing with commercial rotational grazing systems, but these have largely been inappropriate and unsuccessful (Rootman et al. 2015). HM may be able to successfully replace the old paradigm and reverse rangeland degradation. The practise of HM has been growing internationally for a number of years and has been adopted by a few commercial farms in South Africa (De Villiers 2013). Although gaining momentum locally, it has however rarely been documented in the former homelands. A pilot project in Mceula is currently underway to assess the potential of HM as a grazing system in the former homeland of the Ciskei.

1.2.2. Research goal and objectives

Research goal:

The goal of this research is to assess whether the rangeland management system of Holistic Management is able to improve livestock production while simultaneously being able to reverse the rangeland degradation occurring in the former homelands of the Ciskei.

- **Objective 1:** To review the literature regarding the history of the homelands and Mceula, to understand and appreciate the complexity of influences that formed the homelands, why that history is still relevant and how development needs to be sensitive to the past.
- **Objective 2:** to review the literature about conventional grazing in order to understand why these paradigms may not be applicable in the former homelands and whether they are responsible for rangeland degradation.
- **Objective 3:** To review the literature about HM, to determine if this newer grazing strategy could help restore the degraded rangelands of the former homelands.
- **Objective 4:** Through exploring the case study, to assess whether HM is an appropriate grazing strategy in the communal grazing spaces of

the former homelands in Mceula village of the Ciskei, and to determine if the pilot project was successful in delivering the rangeland restoration HM promises.

HM is based on the premise that rangelands evolved in concert with large herds of migratory herbivores (Hawkins 2016). By managing all the livestock as a single migrating herd, it attempts to restore the ecological systems that have slowly been eroded by inappropriate grazing management. To do this, HM practises involve consolidating multiple, small herds into a single herd, concentrating them onto small areas of land (in numbers that usually far exceed government recommended carrying capacities) and moving them very frequently (Savory & Butterfield 1999). Although successes have been reported, this practise flies against convention and many criticise the science behind HM (Nordborg 2016).

The introduction of HM in Mceula was initiated by the Olive Leaf Foundation (OLF). The OLF is a sustainable development organisation (SDO) which has worked in the Ciskei for a few years and focusses on community mobilisation. The idea of introducing HM arose from the collaboration between the OLF and a local commercial farmer practising HM-based grazing (to be discussed in more detail in chapter 5). Unlike many ill-conceived development initiatives in the former homelands, which soon fizzle out without achieving their long-term goals (Parliamentary Monitoring Group 2011; Ndou 212), this pilot project has been successful, and the OLF has already divested itself from the community without compromising the gains made over the last few years. What's more, the project has organically expanded, with neighbouring communities actively seeking and asking for similar initiatives to be started in their villages. To date there are a total of nine sites that are in the process of adopting or have already adopted HM as a grazing strategy. In a sector where successes are few and far between, documenting the initiation and expansion of this project is critical in understanding and hopefully replicating its success.

1.2.3. Importance of research problem

Rangeland degradation in the former homelands is severe and affects the livelihoods of many livestock farmers (Hoffman & Todd 2000; Matsika 2007). If it continues unabated, there is a risk that the ecosystems will collapse, affecting the lives of all those who depend on them both directly and indirectly. This research will help determine if HM is a viable method through which rangelands of the former homelands can be restored and, in the process, help rejuvenate local agricultural and economic development. There is a growing movement towards ecologically based agricultural practises (Terra Genesis International N.D.) and although HM has been successfully implemented in commercial farms globally, and to a lesser extent locally, it has rarely been documented in the former homelands of South Africa.

The dominant grazing paradigm currently practised attributes rangeland degradation to overstocking and under resting within the communal grazing areas of the former homelands (Moyo et al. 2018). Because HM advocates increasing stocking rates, it is viewed with distrust and many fear that it will accelerate the degradation of environments already on the brink of collapse (Briske et al. 2014, Bezuidenhout 2016). Because these are diametrically opposed views, it is important to understand the cause of rangeland degradation and start implementing appropriate grazing strategies as soon as possible to help improve the natural resource base upon which the people of the former homelands depend.

As poverty becomes more entrenched in the former homelands, conditions for residents get worse. Government driven local economic development has fallen far short of peoples' expectations and there is a growing realisation that this is unlikely to materialise in the near future (Bank & Minkey 2005). Unfortunately, the majority of those in the former homelands do not have the luxury of waiting for the promise of economic growth that may or may not come (Mears 2005).

If HM is a strategy though which rangelands are restored, it will help increase the natural resource base through which incomes can be generated. The introduction of HM in Mceula was done as a grassroots initiative and seems to

have been successfully adopted by the Mceula community. The project was so successful that neighbouring communities have requested their own programmes and currently training has started at three other sites. In a space where rural development projects frequently fail, the success of this pilot inspires hope. Knowing why this project was successful will be important if the proposed restorative properties of HM can be introduced to other areas, thereby effecting wider rangeland restoration and consequently poverty alleviation.

1.3. Methodology

1.3.1. Overview

The literature review is an important first step and provides the foundation for the research project (Baker 2000). “A literature review seeks to uncover the sources relevant to a topic under study and, thus, makes a vital contribution to the relevance and rigour of research” (Vom Brocke et al. 2009). This study therefore starts with a literature review and is then followed by a case study. Yin (1994) suggests a case study design to be most useful when, “A how or why question is being asked about a contemporary set of events over which the investigator has little or no control”. Stake (1995) identifies three types of cases studies, intrinsic cases, instrumental case studies and multiple or collective cases, but acknowledges that the lines between these may be blurred.

Intrinsic cases	Undertaken primarily to gain insight into the particularities of a single situation, rather than to gain insight into other cases or generic issues.
Instrumental case studies	Uses the case as a means of understanding a broader issue or allowing generalisations to be challenged.
Multiple or collective cases	Are undertaken jointly to explore a general phenomenon.

Table 1: Stake’s classification of case studies (Bryman et al. 2014)

Initially it was assumed that this study would constitute an intrinsic case, but in retrospect it became evident that this study combined aspects of intrinsic and instrumental case studies. Semi-structured interviews are commonly used in case studies and allowed a detailed, in-depth, subjective analysis of the project (Bryman et al. 2014). Secondary data were collated from various other sources.

1.3.2. Literature review

The literature review will attempt to bring understanding of the big concepts embedded in the study. Firstly, actions are informed by pre-conceived notions of history (Hay 2015). Unfortunately, our perception of history often differs from actual historical occurrences. These false perceptions can result in policies and laws that are ill-conceived and inappropriate. Thus, a firm understanding of the history of the Eastern Cape region is essential before an evaluation and recommendation of the grazing system can be undertaken. It may be that the failure of implementation of commercial grazing in the former homelands also correlates to a failure in understanding the complex past of the homelands.

Secondly, HM needs to be understood in theory as well as practise. Understanding the theory and first principles behind HM is imperative, as the project involved adapting a programme aimed at commercial livestock production to communal livestock farming in the Ciskei, two vastly different contexts.

Thirdly, this novel system requires a new form of management. Because common property is used, the concept of the ‘tragedy of the commons’ is a very real concern (Dietz et al. 2003). How this is managed will be an important aspect of the long-term longevity of the HM project and sustainability of the communal grazing areas.

1.3.3. Case study

The research consists of a case-study of the implementation of HM in Mceula village, in the former Ciskei, and the effect this has had on the livestock farmers involved. Background data on the history of the area and the history of the implementation of HM in Mceula were obtained from secondary sources, as well as from semi-structured interviews.

Primary data were collected from attending a 6-day training course on HM in May 2017, a scoping visit in February 2018 and a series of semi-structured interviews in July 2019 conducted with various role-players in the project. The OLF provided the details of people involved in HM in Mceula and who could impart insight into the implementation process of the pilot project. Ayanda Mrwebi, one of the champions of HM in Mceula, helped identify and secure interviews with small-holder farmers in Mceula. All interviews took place at the personal residence of each interviewee, except for Cape Wools which was done telephonically. One interview was secured with an employee of Cape Wools at the time the project was being implemented. Neil Evens was interviewed, a commercial farmer who practises HM, helped establish a Savory Hub and assisted in some of the training for the project. Two interviews where done with the OLF employees responsible for the implementation of the project. Three interviews were secured from livestock farmers of Mceula. Although more were scheduled, a local funeral and last-minute cancellations from livestock farmers resulted in a smaller pool of respondents than originally expected. The individuals targeted for interviews were all closely linked to the project and even though only three livestock farmers were interviewed, all three are active participants in managing the Mceula herd. Interviews are referenced as MI 1 to MI 7 in the body of the thesis as some participants requested to remain anonymous. Copies of the interview schedules are attached as Annexure D, E and F.

From these data a reflexive thematic analysis, as defined by Braun and Clarke (2006), is used to extract the various themes common within the interviews. The advantage of this type of analysis is that it can be used in both large and

small datasets, coding can be done either with the help of coding software or manually and resultant themes can be analysed in a variety of ways (Braun & Clarke 2006). A 6-step approach is used to distil relevant themes from the raw data.

1) Familiarisation with the data
2) Coding
3) Generating initial themes
4) Reviewing themes
5) Defining and naming themes
6) Writing up

With themes identified, data can be analysed using an inductive or deductive approach. An inductive approach is typically used when qualitative data has been generated and has three main purposes (Thomas 2003):

1) To condense raw text data into a brief, summary format.
2) To establish a link between the research objectives and the findings derived from the raw data.
3) To develop of model or theory derived from the raw data.

A deductive approach is usually used when quantitative data is being analysed and uses well established theories to explain the patterns present in the raw data set (Mouton 2001). This however does not preclude a deductive approach with a qualitative data set or an inductive approach with a quantitative data set (Fereday & Muir-Cochrane 2006).

In this study, because qualitative data were generated through semi-structured interviews, an inductive approach was taken to try and explain the effect implementing HM has had on the livestock farmers and the rangeland in the communal grazing lands of Mceula (Bryman et al. 2014). As interviews progressed, it became evident that a deductive analysis would be also be necessary to analyse some of the bigger themes present in the case-study that

were uncovered by the literature review but not articulated by the respondents. In chapter 5, the various interviews were woven together to form a coherent narrative of the implementation process. In chapter 6, interviews were used to highlight individual experiences regarding the project. The thesis will also try to determine whether HM is an appropriate system in the former homelands and if it should be promoted in other communal grazing lands. Grey literature collated by the OLF documenting livestock numbers and wool yields will also be analysed to assist in evaluating the effect of HM in Mceula. Technical data from a secondary, unpublished study by Mudyiwa (2019) evaluating the response of the veld under different grazing regimes within the Mceula area will help quantify the changes experienced under HM.

1.4. Ethical implications

The study obtained ethics approval from the Research Ethical Committee: Humanities of Stellenbosch University. Interviews were done after informed consent was obtained from each participant and they were allowed to retract statements at any point during the study. Some interviewees requested to remain anonymous, while others permitted their names to be used. The study was scored as being low risk, due to the nature of people interviewed and the establishment of HM occurring years before interviews were conducted. Although implementing HM was not political in nature, it is embedded in a political landscape. Undertones of political tension occasionally came up in informal discussions but these were omitted for two reasons: firstly, due to the sensitive and subjective nature of the topic in interviews and secondly, because the HM project artfully dodged major political interference, it was a minor factor in this specific context.

Interviews where recorded by hand on interview sheets and the resultant data kept at my personal residence. Raw data will only be accessible to myself and my supervisor. Electronic data was stored on my personal laptop, that is not connected to a shared network and only accessible to me. Back-up data is stored on a portable storage device also in my possession.

1.5. Conclusion

Rangeland degradation has far reaching consequences to all the people of South Africa. To the local farmers, the degradation affects their ability to support themselves and their families through livestock agriculture. To many this is not only a financial issue but is intimately tied to cultural practises as well. With cattle forming a key component of Xhosa culture, the loss of cattle is a loss of identity (Poland et al. 2003; Sikhweni & Hassan 2013). The gradual loss of local economic activities results in fewer opportunities in the rural areas, and many migrate to urban centres, lured by the promise of jobs (Baiphethi & Jacobs 2009). Shrinking rural economies result in less financial input from governments to the detriment of those living in the rural spaces of the former homelands. On the other hand, the sheer volume of people that leave in order to seek better opportunities overwhelms the already strained resources of urban centres, where many are forced to live in slums (Arku 2009). Restoring the rangelands may not be the only solution to this complex problem, but it is a vital one if the homelands are to be productive to the people who live there.

1.6. Chapter outline

Chapter 1 of this study gives an overview of the study, the research problem, research questions and objectives, as well as the research methodologies and methods employed.

Chapter 2 provides a broad overview of the unique history that has shaped the Ciskei. This history continues to influence the people, the landscape and any form of development that is attempted. It documents the ensuing conflict at the confluence of the Khoe, San, Bantu and Dutch migration in the 18th century, the subjugation of the Xhosa empire by the British, the forced relocation of black South Africans into reserves under the Apartheid government, the formation of the Ciskei and its subsequent dissolution.

Chapter 3 discusses the consequences of rangeland degradation and the international attempt to combat desertification. It then explores South Africa's policy and legislation in place to protect the country's valuable rangelands. Grazing in the communal areas of the former homelands is then analysed, together with Hardin's (1968) concept of 'the tragedy of the commons'. This is compared to commercial grazing practises which is based on the outdated model of plants succession. The newer 'state and transition' model is then introduced to conclude the chapter

Chapter 4 explores the history and ecological principles underpinning HM and then unpacks the four pillars that make up HM practise. HM management is heavily criticised in established rangeland science circles and these critiques are analysed.

Chapter 5 is an introduction of how the HM project was formulated and then introduced into the village of Mceula. It also documents how the programme, which was designed for commercial livestock farms, was adapted to the communal farming context of this rural village.

Chapter 6 is a discussion of the case study and attempts to find common themes amongst the various participants in the project. It also aims to determine the impact HM had on the livestock farmers of Mceula.

Chapter 7 concludes the study by returning to the research questions and answering them. Recommendations are then made for the potential of HM in the former homelands of South Africa. Finally, limitations of the study are discussed.

Chapter 2: Background and history of case study area

2.1. Introduction

This chapter seeks to unpack the complex history of the Ciskei that has shaped the people and the land, from the conflict of the Khoe, San, Bantu and Dutch in the 18th century to post-apartheid South Africa. This provides an important starting point in beginning to understand the people who occupy the former homelands of the Ciskei.

2.2. History

2.2.1. The importance of history

In her PhD dissertation, Hay (2015) suggests that incomplete and misunderstood histories affect how we understand the present and in turn influence the choices we make. For example, in Limpopo, the perception of administrators that the land was originally occupied by a heterogenous tribe that inhabited the land since time immemorial, has dramatically influenced land reform policy and is partially to blame for the failure of policy to meet intended goals (Hay 2015). If the deep history of South Africa was better understood, there may be more appreciation and sensitivity to the social and cultural fluidity that shaped the development of humanity in the area and more appropriate policy could be applied (McCusker & Carr 2006).

Because faulty histories result in faulty realities (Hay 2015), we must first attempt to document the cumulative processes that resulted in the formation and subsequent disintegration of the Ciskei before we look at the effect grazing has on the landscape. Mears (2005:83) has suggested that, ‘’Population settlement was more the result of political events than spontaneous growth. In this area, the past is the principle determinant of present economic, social, physical and institutional structures and conditions’’. Only then can we be sensitive to the Ciskei in its entirety and we may then find that while continuous grazing practises contribute to rangeland degradation, the causality is complex

rather than linear. Previous attempts to change from continuous grazing to rotational grazing in the past have largely been ineffective; a more holistic approach, that is sensitive to the people who are affected, may be more appropriate (Moyo et al. 2008; Rootman et al. 2015).

2.2.2. Prehistory

The history of the Ciskei does not start with the Ciskei. It is rather the consequence of events which occurred over millennia. However, a convenient point of departure is the inhabitants of the Southern tip of Africa prior to the Bantu and Dutch migration. There is much that still needs to be understood about the exact nature of the first peoples of South Africa, but it seems the ancestors to the San hunter-gatherers entered Southern Africa between 14 000 and 20 000 years ago (Giliomee & Mbenga 2007; Meyer 2012). Some suggest that the Khoe where a separate people who migrated south and introduced sheep into South Africa roughly 2000 years ago (Mitchell 2005; Crowe 2016). Some use genetic evidence to demonstrate a common lineage between the Khoe and San, suggesting the Khoe were San who acquired sheep and adopted a pastoralist lifestyle (Soodyall et al. 2008). It is likely, however, that instead of one homogenous group, the Khoe-San comprised multiple independent peoples (Sadr 2003).

The Dutch East India Company (VOC) established an outpost for ships en route to the far east in 1652 and over the next 70 years expanded to form a colony (La Croix 2018).

> *Competition among the Khoikhoi, the San, and Dutch settlers for access to land, water and livestock led to 150 years of violent conflict and population decline. After losing access to grazing lands, many Khoikhoi also lost their livestock and became attached to Dutch farm households, working as laborers, shepherds, and herders. Some Khoikhoi and San groups were pushed beyond the expanding boundaries of the Dutch settlement, where they faced competition with other Khoi and San*

> *groups and Bantu peoples who were already occupying and using these lands. Many Khoikhoi perished from diseases* [namely smallpox] *introduced into South Africa by colonists and crews and soldiers from ships stopping in Cape Town (La Croix 2018:1).*

Superior weapons and horses gave the Dutch a tactical advantage and allowed settlers to hold prime grazing land and water resources, making it increasingly difficult for the Khoe-San to survive in the Cape Peninsula (Guelke & Shell 1992). By the time the British seized control of the Cape Colony in 1806, the remaining Khoe-San were either working for Europeans or had migrated inland (Stapleton 1993).

Note: The term Khoe-San is a blanket term to encompass the genetically and linguistically related pastoral Khoe and the hunter-gatherer San. Various spellings are used in the above text due to the various preferences of cited authors, but the terms Khoe, Khoekhoe, Khoekhoen, Khoikhoi or Khoi all refer to the same ethnic group.

2.2.3. The Bantu and Nguni migration

On the opposite end of Southern Africa, along the eastern coast, the first wave of the Bantu migration (originating in Cameroon around 1 000BCE), entered present day Mozambique around 250CE, diffused into KwaZulu-Natal by 400CE and reached the Southern Eastern Cape by 1 000CE (Mitchell 2005). Archaeological evidence suggests these communities were agriculturalists who used iron tools to cultivate cereals, pulses and cucurbits and introduced cattle to South Africa (Whitelaw 1993). Also noteworthy is the importance cattle played in these early societies, as demonstrated by the central place the cattle byre occupied, termed the Central Cattle Pattern (CCP) by Kuper (1980).

> *The CCP remains a powerful model in Southern African archaeology, relating worldview, settlement layout and social organization through shared beliefs about patrilineality, a preference for using cattle as bridewealth, male hereditary leadership and the role of ancestors. This pattern is restricted ethnographically to Eastern Bantu-speakers and may*

> *be recognized archaeologically from centrally located cattle pens associated with high-status burials, storage pits, a men's assembly area and evidence of iron-forging (Mitchell 2005:223).*

Due to difference in the pottery record between first and second millennium archaeological sites, coupled with linguistic patterns, some archaeologists suggest that a second bantu migration occurred which originated in Tanzania and culminated in the Nguni and Sotho-Tswana cultures that moved south and west through South Africa (Huffman & Herbet 1994; Hammond-Tooke 2004). The CCP persisted and remained an integral part of the Nguni culture which includes the Zulu, Xhosa, Ndebele and Swazi people. According to royal Xhosa genealogy, the Xhosa mother kingdom was founded in the mid-15th century in the current Eastern Cape Province, somewhere in the Transkei (Stapleton 1993).

The Xhosa were originally part of a single, hereditary chiefdom and practised pastoral feudalism where the chief owned up to eighty seven percent of all cattle and lent them out to sub-chiefs on an increase sharing basis (Hall 1987). Only the aristocracy could own cattle and used the royal cattle to build up their own personal herd. The middle-class commoners could not own cattle but had access to their products like milk, butter and meat while the very lowest social class did not have access to cattle products and were entirely dependent on agricultural production (Stapleton 1993).

Because commoners mainly relied on agriculture for sustenance, during periods of drought commoners' crops would fail while the aristocracy's cattle would survive. This was a form of drought insurance for the community as a whole but was heavily biased across social lines. In severe droughts, this was exacerbated and the chief would recall his cattle from his sub-chiefs. If sub-chiefs had built up their own herd to a sustainable level, the threat of withdrawal of royal cattle became less significant and disputes, particularly during times of stress and resource scarcity, could cause the sub-chief to take his family, supporters and cattle to establish his own chiefdom. The occurrence of these successions corelate well with recorded periods of drought in South Africa (Hammond-Tooke 1965). Because the Zulu nation occupied the north, these

successions occurred in a south-westerly direction into Khoe-San territory. As the Xhosa kingdom expanded, large numbers of Khoe-San were assimilated, with some chiefdoms being predominantly Khoe-San under Xhosa chiefs and others predominantly Xhosa under Khoe-San chiefs (Stapleton 1993). It is during this period that clicks were amalgamated into the Xhosa language and it is now estimated that approximately 15% of Xhosa words are Khoekhoe in origin (Eberhard et al. 2019). The expansion of the Xhosa kingdom was dependent on the development of private herds and frontier land upon which to graze them and by the late 18th century this process had transformed Xhosa society from one homogenous chiefdom into many independent ones.

2.2.4. European conflict and the Xhosa frontier wars

Menzies (2002) claims that the first foreigner to 'discover' South Africa was Chinese Admiral Zeng He in 1421. However, the traditional view attributes this to Bartholomeus Dias who rounded the Cape in 1488 while seeking a trading route to the Far East. He sailed as far north as the Bushman's river where he placed a padrao, a sandstone pillar carved into the shape of a cross and used to mark explored territory, a replica of which stands in the same spot today (Raper 1988). In 1497, Vasco de Gama was the first person to complete the journey from Portugal to India via the southern tip of South Africa, thereby securing a commercial monopoly on these trading routes for Portugal for several decades (SAHO 2011). The area saw a number of smaller contacts with Europeans until 1652, when Jan van Riebeek landed and established a Dutch colony and refilling station in present day Cape Town. The Cape Colony grew with the Dutch territory encroaching increasingly onto Khoe-San occupied lands. Conflict between the Dutch and the Khoe-San escalated and the Khoe-San were forced further and further inland. Dutch occupied territory continued to expand until they met resistance from the Xhosa on the eastern coast (Stapleton 1993).

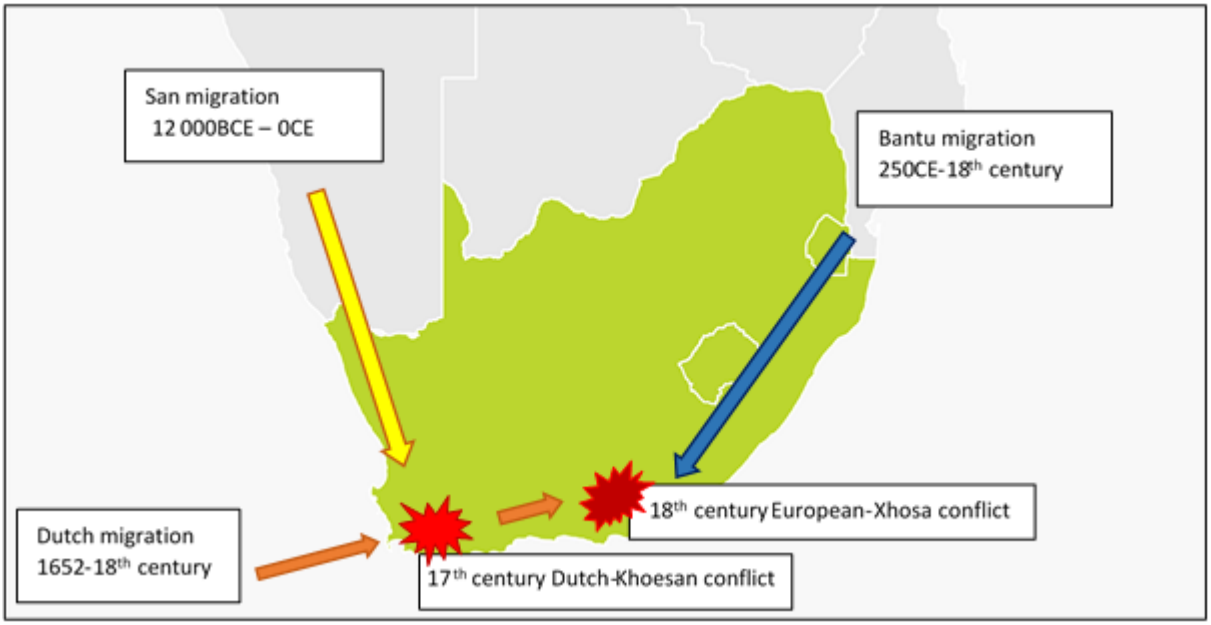

Figure 2: Khoe-San, Bantu and Dutch conflict (drafted by author)

> *In the late eighteenth century, the Xhosa vanguard of a gradual south-westward expansion of Bantu-speakers, encountered eastward moving Dutch settlers at the Fish River. Having previously faced only pastoral Khoisan groups the Afrikaners were halted by the much more numerous Xhosa (Stapleton 1993:87).*

Over the next century, from 1779 to 1879 a total of nine separate wars were fought and signify the longest example of African military resistance to European domination (Stapleton 1993). The first three wars were fought between the Xhosa and the Dutch and by the end of the third war the Xhosa were well established on the western side of the Bushman's River. After 1806 when the British seized control of the Cape Colony, an increasing military presence pushed the Xhosa east over the Fish River and an official colonial border was established in 1812 (Stapleton 1993). Controversially, Maclennan (1986) claims the British army began raiding across the colony's eastern border and brought back slaves to work on white farms in the 1820s. Since the slave trade had been banned in 1807, Cobbing (1988) claims officials covered up these illegal operations by claiming that those captured were destitute Mfengu fleeing the devastation of the Mfecane (Zulu expansion).

The conflict between the Xhosa and British was not always clear cut and affiliations depended on the rivalry between the Xhosa chiefs at the time. During the sixth frontier war, between 1834-1835, the Ngqika, Ndlambe and Gcaleka fought against the British while Gqunukhwebe and Ntinde chose to collaborate (Stapleton 1993). The Xhosa raided over the Fish River but were driven back over the Fish, past the Keiskamma river and British troops followed them across the river, seized cattle and burnt crops. According to Stapleton (1993), the subsequent famine crippled the Xhosa and forced the chiefs to accept colonial rule. A formal border of the Fish River was then established with the Stockenstrom treaty, recognising Xhosa sovereignty west of the Fish River (Stapleton 1993). According to Webster (1991), thousands of Xhosa collaborators and captives were forced into labour reserves during the war, once again bypassing international anti-slavery laws, while the Mfengu were settled along the Fish River to act as a buffer between the Xhosa and British, but many were also sent south to supply the Cape Colony with labour.

Droughts in the early 1840s put additional pressure on the Xhosa people and precipitated raids across the river, which the Xhosa aristocracy found difficult to control. In 1844 the Stockenstrom treaty was dissolved by Sir Peregrine Maitland, who permitted armed settlers to cross the river in search of stolen livestock (Stapleton 1993). In an impressive diplomatic display, Sandile, the new Ngqika king, raised a pan-Xhosa alliance of seven of the nine major chiefdoms including the Gqunukhwebe, Dange, Ndlambe. Mbalu, Ntinde and Gcaleka and launched an attack in 1846 (MacMillan 1963). Changing tactics, using more guns and attacking vulnerable British supply trains, the Xhosa pushed across the river and entered the Cape Colony. By June 1846, supplies from the colonial countryside were running low and the Xhosa pulled back across the river. The British forces, on the brink of starvation, were forced to retreat to the mouth of the Fish River where they were resupplied by sea (Stapleton 1993). Herein lies the reason for the inevitable defeat of the Xhosa nation.

The Xhosa did not have a standing army and, in addition to warfare, warriors were also responsible for harvesting crops and raising cattle. The general

population would therefore starve if the Xhosa men did not return every few months. The British army on the other hand had a professional, standing army, which was maintained by continuous supply lines either by wagon or ship from the ports and farms in the Cape, safely away from the conflict (Guy 1979).

In September 1846, a replenished colonial army, began advancing into Xhosa territory, disrupting harvests and raiding cattle. By mid-1847, severe food shortages compelled all but two Xhosa chiefs to surrender. Later in the same year, facing starvation, Sandile of the Ngqika and Phato of the Gqunukhwebe were also forced to admit defeat (Stapleton 1993). When the war ended at the end of 1847, the colonial border was advanced to the Keiskamma River by Sir Harry Smith, the new governor, and all lands between the Keiskamma and Kei River were claimed as British Kaffraria (Lester 1998). New forts and towns, like the one at Whittlesea, were established to garrison troops and maintain control over the territory and some of these would later develop into prosperous European communities like Queenstown, King William's Town and East London. Xhosa chiefs retained their royal positions only in name, and white commissioners superseded them in authority. Xhosa chiefs were not allowed to confiscate cattle or accept payment of bridal wealth in the form of cattle which further eroded their ability to rule and govern their people (Peires 1989).

Civil unrest was brought to the fore as the chiefs and aristocracy were now subject to commissioners and unable to control their subjects through traditional methods (Stapleton 1993). Furthermore, the drought of 1850 brought hunger to the masses while the aristocracy, which had failed to protect their people, where less badly affected as they consolidated their cattle herds. This loss of royal legitimacy encouraged the Xhosa commoners to seek solace in their religious leaders and the prophet Mlanjeni rocketed to public popularity with his calls to root out witchcraft and slaughter all yellow cattle, which he claimed would overthrow the British and restore Xhosa power (Peires 1989). The Xhosa aristocracy had two opinions, either do nothing and lose further legitimacy in the eyes of their people or seize the opportunity for a renewed revolt against British rule.

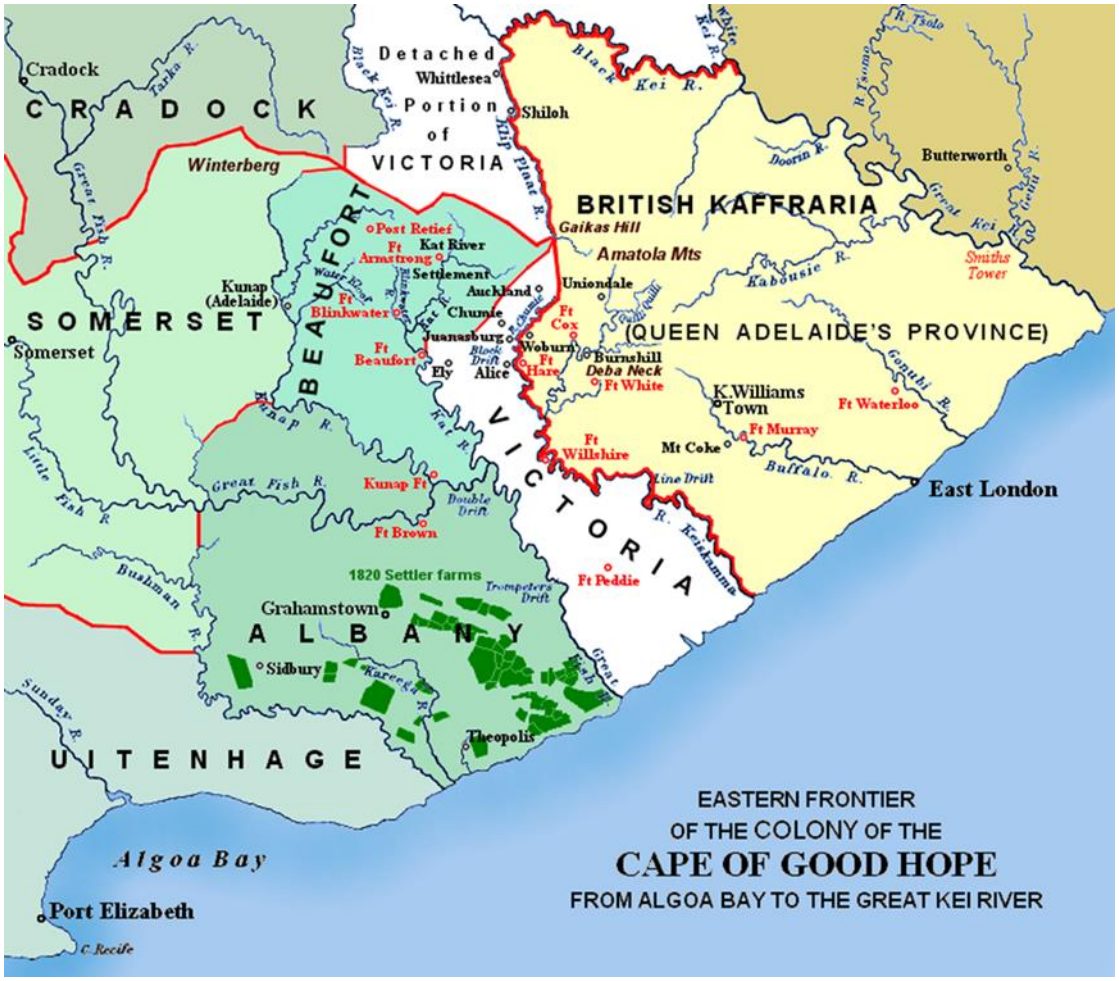

Figure 3: Map of British Kaffraria (Source: Wikipedia 2007)

Sandile of the Ngqika chose the latter, harnessed the popularity of Mlanjeni and regained the popular support of the people. Sandile tried to persuade other chiefs join him, but while the Ngqika had a stronghold in the Amatola mountains, many other chiefs, like Phato of the Gqunukhwebe, were more exposed and declined their support due to their vulnerable location, fearing reprisal from the British (Milton 1983). Hearing about Sandile's call to arms, the governor, Harry Smith summoned all the Xhosa chiefs to a meeting. When all but Sandile attended, Smith deployed the British army into the Amatola mountains in search of Sandile on Christmas Eve in 1850 (Stapleton 1993). Within a day the Ngqika drove out the British and began raiding nearby colonial settlements (Harington 1980). Unlike previous wars, the 'War of Mlanjeni' (1850-1853) was about securing Xhosa territory and did not involve large scale invasion into British

occupied lands. Although a few small Xhosa chiefdoms supported the Ngqika, the majority of them remained passive in the war (Stapleton 1993). The eighth frontier war, however, did lend impetus to other rebellions like the Khoi-San of the Kat River and the Thembu, who attacked the town of Whittlesea 12 times before they were routed by the British army (Milton 1983). Although minor, these pockets of unrest spread the British forces, which were then unable to disrupt Sandile's food supply in the Amatolas and allowed the Ngqika to fight their longest war against the whites (Stapleton 1993).

In early 1852, the British army seized 30 000 cattle from the neutral Gcaleka to feed their hungry army (Stapleton 1993). With this substantial food reserve, Smith launched multiple units into the Amatolas, burning fields in order to disrupt Sandile's food supply (Harrington 1980). With escalating expenses for this costly campaign, the Colonial Office relieved Harry Smith of his duties and appointed George Cathcart in April 1852. Cathcart changed tactics and built forts between Grahamstown and King Williams Town and within 6 months, mounted patrols had hunted down and subdued all remaining 'insurgents' (Stapleton 1993). Another raid across the Kei provided the British army with 10 000 more cattle from the Gcaleka. Continued scorched earth campaigns and raids in the Amatolas decimated the Ngqika food base causing the people to abandon the aristocracy and flee the violence. Unable to continue the resistance, the Ngqika aristocracy were forced to surrender in March 1853 and received a pardon in exchange for agreeing to leave the Amatolas (Stapleton 1993).

In the wake of the war, George Cathcart dramatically reorganised land distribution in the newly annexed territory of British Kaffraria. As a reward for collaboration, Cathcart awarded the Gqunukhwebe and Ndlambe the entire southern half of the territory, they would later pay dearly for this. The Ngqika were moved to an open tract of land on the western bank of the Kei River, within view of their previous home in the Amatolas. Cathcart placed military posts, settler farmers and Mfengu groups in the Amatolas and forbid the Xhosa from entering (Stapleton 1993). Mceula was formed by one of these Mfengu groups and initially consisted of 80 families (Nkansa-Dwamena 1998).

In 1853 contagious bovine pleuropneumonia or lungsickness, was brought to the Cape by European ships. Within a year it had spread to the eastern frontier of the Cape Colony and by 1856 when the epidemic had subsided, well over a hundred thousand Xhosa-owned cattle had died and Chief Phato of the Gqunukhwebe lost ninety-six percent of his personal herd (Stapleton 1993).

> *Not only did this disaster cause severe hunger within the Xhosa population but it also undermined the chiefs' ability to rule. Drought had been a regular feature of the African environment. It struck at commoners. Epizootics swept the continent much less frequently. They undermined the pastoral aristocracy. Many commoners must have looked upon the lungsickness as divine retribution upon the chiefs. Such a drastic reduction in the quantity of cattle meant that the aristocracy's system of controlling their society through pastoral patronage became virtually ineffective (Stapleton 1993:96).*

As with all CCP cultures, cattle permeated all aspects of life. It was the pivot around which the entire society revolved. More than just a food source, it represented power and status (Poland et al. 2003). The Nguni "greatly exaggerate the dichotomy between men and cattle on the one hand and women and agriculture on the other … In addition, because cattle are a volatile form of wealth, Nguni society institutionalised raiding and retaliation" (Huffman 2004:82). The Nguni therefore kraaled their cattle centrally within the homesteads to protect these valuable economic and social entities. In addition, the homesteads were typically located in a middle zone, to allow for easy access to upland sourveld in the summer and lowland grazing of sweetveld in the winter (Hall & Mack 1983). Over and above political and economic importance, cattle played a significant role in social and spiritual aspects of everyday life (Kuper 1980). They represented life and death and helped bridge the gap to allow communion with the ancestors (Poland et al. 2003). They also brought families together through the practise of lobola. How intimately cattle were entwined in the society can be seen by how cattle were poetically named. Each animal had a unique identity characterised by their hide markings and personality and were named as such. The wide variety of body shapes, horn

styles and hide colours gave rise to a naming nomenclature which was both adhered to whist still allowing a degree of poetic licence to capture the spirit of the individual animal (Poland et al. 2003). This is in stark contrast to Western practises were cattle are treated as commodities, given a number and only considered useful in terms of the profit they can generate (Pollan 2006). The loss of cattle to the Xhosa people was more than just an economic loss, more significantly it represented a loss to the backbone of their culture.

By 1856, almost 80 years of conflict which included cattle raids and scorched earth campaigns, severe droughts and a major cattle epidemic, the Xhosa's entire agricultural base and economy had been dramatically reduced and threatened the very core of Xhosa society. The lack of control over resources, ceded to the British Colony, effectively castrated the Xhosa royalty and they were forced to give up judicial authority and accept annual government stipends (Stapleton 1993). Xhosa commoners began working as wage labourers for Europeans and were able to buy food from white merchants (Meintjies 1971). The Xhosa way of life was changing, unfortunately it would only get worse.

In June 1856, a Gcaleka girl called Nongqawuse experienced visions where strange figures told her to "tell that the whole community will rise from the dead; and that all cattle now living must be slaughtered, for they have been reared by contaminated hands […]. There should be no cultivation" (Peires 1989:79). This prophecy was reinforced by a similar one by the Ndlambe girl, Nonkosi and soon swept through the entire Xhosa nation. Convinced in the validity of the prophecy and the salvation it offered, the Xhosa began killing cattle and destroying their fields (Peires 1989). By the end of the cattle-killing movement in February 1857, the Xhosa has slaughtered almost 400 000 of their own cattle and destroyed most of their crops (Stapleton 1993). The consequences were terrible and by December 1858 the population of the area had been reduced by 70%. The Xhosa population were reduced from 104 000 to 37 000. About 40 000 Xhosa had starved to death while another 30 000 fled to the Cape Colony, destitute and in search of work on European farms. This was the final blow that crippled the Xhosa nation. In the wake of the disaster, however, the

white population of British Kaffraria swelled from 949 to 5 388 (Stapleton 1993:97).

Understanding why an entire nation would destroy its primary source of sustenance is somewhat confusing and commentators have offered various explanations for the devastation including, a European plot to destabilise the Xhosa nation, a Xhosa plot to incite war, pagan reaction to European invasion and a natural progression of social and religious Darwinism (Offenburger 2009). Peires (1989) provided the most thorough review of the event and suggests that it was a complex mixture of Xhosa and Christian theology that provided the impetus for the slaughter. Additionally, Stapleton (1993) convincingly suggests that the cattle-killing of 1856 was essentially a populist revolt against a weakened Xhosa aristocracy which had failed to protect the nation. He argues that there was a higher incidence of cattle-killings in areas where the ruling class had lost their legitimacy either due to neutrality or collaboration with the British (Stapleton 1993). There is credence to these claims as the movement started with the Gcaleka, which had initially lost 30 000 and then a further 10 000 cattle to the British army during the 'War of Mlanjeni' and still remained neutral. The Gcaleka were also hit hard by the lungsickness epidemic, further eroding the authority of the chiefs. The Ngqika, in the Amatolas, were better protected from the lungsickness epidemic and their participation in the last war had increased their popular legitimacy (Stapleton 1993). Interestingly, Feni, a Ngqika sub-chief, initially resisted the call to join the slaughter but when his herd succumbed to lungsickness, his authority was compromised due to low cattle numbers and he was pressurised to sanction the prophetic slaughter in the very last days of the movement (Stapleton 1993). The Ngqika chiefs on the whole, however, did not experience the devastation the lungsickness epidemic brought and because they retained popular support from the commoners, were not taken in by the frenzy of Nongqawuse's prophecy. The Ngqika aristocrats, therefore, 'remained lords of a pastoral feudal economy and, in 1878, led their people into the ninth and last frontier war' (Stapleton 1993:98). The last frontier war lasted a year and was really a local dispute which escalated and eventually led to the British annexation of the last independent Xhosa territory,

Gcalekaland (Stapleton 1993). With total British occupation, the land was distributed to settler farmers, commoners were packed into small reserves and forced to rely on migrant labour to support themselves and their families, while Xhosa rulers became paid officials of the government. The Xhosa, originally a people whose entire economy and society revolved around cattle, lost not only their independence but a major part of their identity. So started the westernisation of the Xhosa nation.

2.2.5. Formation of the Eastern Cape

The dominant political atmosphere was changing, from the Xhosa attempt to maintain autonomy and their way of life to British expansion and the need to administer the new territory (Mears 2005). How British rule influenced small rural villages of the Ciskei, like Mceula, can be appreciated by following the political developments that shaped Queenstown, a major urban hub; Whittlesea, a small administrative town and Sada, a major township on the outskirts of Whittlesea.

Although the frontier wars had not yet ended when the Moravian Church established a mission station in Shiloh in 1824, the area west of the Keiskamma river was stable enough to allow the beginnings of European settlement (Greaves 1987). Because the mission attracted some interest from the nearby Hlubi and Thembu, a colonial administrative outpost was established. In 1847, a magistrate was posted at the Shiloh mission, while Whittlesea was proclaimed a town in 1849 (Greaves 1987) and a military force was garrisoned there in 1850 to protect settlers from Xhosa harassment during the ‘War of Mlanjeni’ (Stapleton 1993).

Mceula was formed when 80 Mfengu families were settled on a collection of rocky slopes 17km north-west of Whittlesea (Nkansa-Dwamena 1998). At 1 367m, Mceula has the highest altitude within the Hewu district. Because Hewu falls under the rain shadow of the Amatola mountains, low rainfall and rocky terrain limit the availability of surface water, aquifers and springs. These

same conditions also result in limited soil development and as a result soils are shallow and poorly structured. The poor soil quality limits rooting of plants, provides poor water storage capacity and is prone to erosion (Nkansa-Dwamena 1998). Thus, there is little potential for commercial cropping and extensive livestock production is the only form of agriculture that can be practised in Mceula (Venn 1988).

The land was granted to the families of Mceula by the colonial government under quitrent tenure (Nkanswa-Dwamena 1998). Interestingly enough, Mceula is one of the few villages in the area where villagers still have their title deeds. This has had important implications in the implementation of HM. The quitrent tenure system generally involved dividing the available area into a grid, usually 0.5ha for residential sites and 1.5 to 4ha for arable sites (Wotshela 2014). Only men were allowed restricted ownership of residential and arable sites, but not grazing land, which was considered commonage (Moyo et al. 2008). These plots of land were administered by the government, placed into the hands of male heads of the family and were only transferable within the family to the oldest son. The implications of this were profound as the complex inheritance previously practised by the African cattle-based society was incompatible with this new form of land tenure and the system entrenched a patriarchal and inflexible system of land occupation (Wotshela 2014).

The first white farm settlements were established on the Komani River in the early 1850s and were well located in relation to major arterial routes. Queenstown grew rapidly out of this settlement and was proclaimed a colonial settlement in 1853 and a municipality in 1879 (the year the final frontier war ended) (Mears 2005). In 1880, a railroad linking Queenstown to East London contributed further to its rapid growth (Greaves 1987). With the collapse of the traditional Xhosa economy, many dispossessed Xhosa sought employment in Queenstown during the industrial boom and were housed in rudimentary homes in Esikidini, south of the river. Another black residential area called Mlungisi, also sprang up but was burdened by the major influx of people, no investment in infrastructure and limited municipal finances and the area quickly degraded into slums (Greaves 1987).

By 1910, Queenstown had become a major regional centre of industry and commerce. Unfortunately, the poor conditions in Esikidini and Mlungisi and the limited municipal finances made the slums easier to ignore than rectify. Whittlesea, now a minor administrative centre, also suffered from neglect and contained only a “handful of residences, a garrison, a magistrate’s office and a trading store” (Mears 2005:91). The rural land surrounding Whittlesea, including Mceula, comprised traditional black farmers and white settlers engaged predominantly in livestock production.

In 1910, the separate British colonies of the Cape, Natal, Transvaal and Orange Free State were amalgamated and formed the Union of South Africa which created a new wave of industrialisation and urbanisation. This did not occur evenly and resulted in concentrated economic development in urban centres and the inner periphery, but economic decline in the outer periphery, particularly in the rural reserves (Greaves 1987).

The informally demarcated tribal lands were officially incorporated into black reserves through the Natives Land Act of 1913 (Wotshela 2004). Realising the 7% of land initially reserved for black South Africans was hopelessly inadequate, the state set up the Beaumont Commission which advised increasing the size of the reserves to 14% and identified land for incorporation into the reserves (Lang 1999). The process was slow due to limited funding and opposition from white farmers, even after promulgation of the Native Trust and Land Act of 1936 (Mears 2005).

Overpopulation within the reserves coupled with removal of the indigenous agricultural economy caused local agricultural yields to fall (De Wet 1989). Because quitrent land was only inheritable by the eldest son, access to land became a problem and resulted in illegal subdivision. In addition, because houses were far from commonage, many established informal settlements on commonage closer to their cattle (Wotshela 2014). High cattle numbers in small areas without grazing management resulted in rangeland degradation. Because the quitrent tenure system was starting to break down, betterment schemes which were first instituted in the late 1930s superseded quitrent tenure and were an attempt by the state to arrest the decline within the reserves

through top-down policies implemented by ‘experts’ but these only served to reinforce colonial dichotomies between the ‘developed’ white and the ‘underdeveloped’ black populations (Seneque 1982; Bank & Minkly 2005; Gwaravanda 2017).

The Tomlinson Commission imposed Betterment Planning, which faced two main challenges, first to preserve agricultural production in the homelands and second, accommodating large numbers of landless households. These were mutually exclusive ideals and De Wet (1989) states that the change in agricultural practise due to betterment planning resulted in a reduction in yields and simultaneously had damaging ecological consequences. betterment planning included practises like cattle-culling, erection of fencing for rotational grazing and forced relocation of people. As Hajdu (2005:240) points out:

> *For a family, moving from an old homestead site not only meant abandoning a site of emotional and usually religious significance (graves were often close to the homesteads), it was also associated with significant costs for rebuilding houses, erecting new fences, ploughing and manuring new gardens and so on. Furthermore, social networks within the village degraded as a result of Betterment, as people sometimes found themselves removed from friends, relatives and neighbours, and resettled in villages with strangers*

It resulted in the forced removal of many black people, ripped the social fabric of the homelands and caused further environmental degradation (Hadju 2005). Government officials were far removed from the struggles of black South Africans in the reserves and policy was inappropriate for the socio-economic conditions in the reserves. Because they did not address the underlying complex social, political or economic drivers, agricultural decline continued with land degradation and food insecurity becoming increasingly common. Thus, while betterment was intended to improve agriculture and natural resource use, it had the opposite effect.

While peripheral centres like Whittlesea and the black reserves were in decline, urbanisation and industrialisation were taking off in the urban cores. By 1948,

Queenstown had become the dominant regional settlement. Labour demands were high, and the combination of significantly higher urban wages combined with poor rural economic opportunities resulted in high levels of labour migration (Mears 2005). The townships housing this influx of humanity expanded, but with very little infrastructural investment, they remained overcrowded slums (Murray 1987). The urban migration resulted in chronic labour shortages on white farms and farmers resorted to increased levels of mechanisation in order to cope. This however, exacerbated agricultural labour shortages as labour demands were relatively high during harvesting season but low the rest of the year (Mears 2005).

> *The Ciskei and Transkei reserves were overcrowded, while the resource base and production were declining. The subsistence agricultural economy was increasingly supported by remittances earned by migrant workers in the industrial cores. The rural villagisation strategy of the betterment schemes had led to the development of a large number of small villages. Moreover, these villages had a low level of services and facilities and even fewer job opportunities. Social conditions were poor and infrastructure was limited to a few boreholes. Development in these villages was limited by their size and scattered situation in the outer periphery' (Mears 2005:93).*

The rapid pace of industrialisation and high levels of black labour migration resulted in conflict between agriculture and industry and this became increasingly politicised (Greaves 1987). In 1946, Jan Smuts appointed the Native Laws Commission, also known as the Fagan Commission, to investigate changes in South Africa's segregation policy (Mears 2005). Smuts, originally an advocate of racial segregation, supported the findings of the commission which stated that total segregation was impossible and advised relaxing influx control of the black population. By doing this, the flow of labour would increase, and a stable urban population of African workers could be established, thereby creating a reliable work force for business and increasing the consumer base while reducing migrant labour (Suzman & Fagan 1952). Unfortunately, when Smuts lost the national election in 1948 the National Party came into power and

strengthened segregation policies. Thus, “the policy of separate development was formalised, and this ideological spatio-economical model prevailed over economic realities” (Mears 2005:94). The Nationalist government very quickly formalised a series of laws that would enforce and entrench segregation and “the black reserves, which had changed relatively little between 1913 to 1950, were transformed into a Bantustan system” (Mears 2005:94).

The high labour demands of industry were concentrated in areas of development which were predominantly white, yet the apartheid laws prevented black people from living there. The need for black labour, while simultaneously enforcing segregation, resulted in the extreme levels of control employed by the Nationalist government (Evans 2012). Forced removals were instituted in both white urban and white rural areas, with black people relocated into the already overpopulated and under-resourced reserves. Increasing the population pressure on the already stressed environment of the Bantustans, the unemployed and unemployable were forced into the reserves where economic opportunities were extremely limited (Mears 2005).

2.2.6. Formation of the Ciskei

In 1956 local governance with limited powers was established in the Ciskei and comprised the Zulukama, and the three smaller tribal authorities of Shiloh, Mdadlana and Ndlovukazi, while Shiloh became a community authority under the magistrate of Whittlesea (Mears 2005). The chiefs became salaried officials of government with jurisdiction in the Bantustans. Black people were denied rights everywhere except in the Bantustans where legislation was gradually moving towards self-governance (Platzky & Walker 1985). Technically, independence would be achieved in 1981, but in reality, this would not and could not occur. The Bantustans were overpopulated, under-resourced and lacked an economic base from which to facilitate development and were therefore still heavily dependent on the apartheid government (Evans 2014).

In response to the Natives Trust and Land Act of 1936, Wotshela (2004:317) states:

> *The policy was aimed at consolidating, as far as possible, contiguous areas of land occupied largely by African people. From the 1960s onwards, it gradually gained momentum, prompting a few writers to identify this period as the time when the role of the reserves changed from that of serving as home for rural migrants engaged in the formal economic sector of South Africa to that of facilitating social control and finding space for 'surplus people'.*

Between 1960 and 1982, over 3.5 million people, across South Africa, were directly affected by the government's relocation strategy. (Surplus People Project 1983a). People were relocated to informal settlements with very little planning or infrastructure and extremely limited economic opportunities. They were usually located far from sources of employment, provided small plots of land for the family, had no provision for grazing livestock, accommodation was sometimes provided in temporary tented structures, there were no shops, schools, or clinics and minimal provision for fuel, water and sanitation (Evans 2014). It is difficult to understand the scale and effect that these laws had on the people they oppressed. The relocation process disrupted families and community structures that were already reeling from the destruction of their agrarian, cattle-based society. Men, who were important lynchpins in Xhosa culture, were forced to leave their homes in search of employment, often spending months away from their families and left large voids which had to have had a profound and dramatic effect on their children and society at large. It is no wonder that the "Frontier historiography continues to be dominated by the story of these dispossessions, since they have shaped landholding and socio-economic stratification in South Africa to the present day" (Wotshela 2014:729).

Understanding the constraints of the Bantustans and why they could not achieve independence is important if the Eastern Cape of today is to overcome the hurdles of the past. The formation and trajectory of Sada, a major informal rural settlement near Whittlesea is an important lens through which to view the

effect of mass relocations and the erosive effect this had on the ability of the Ciskei to self-govern.

Sada was established in 1963 on land originally owned by the Shiloh Moravian Mission. The first people to be relocated were those evicted from the location in Whittlesea, which was now a small administrative centre for the surrounding white farmers (Evans 2014). This was succeeded by further forced relocations of people from surrounding white farms and other towns in the vicinity and by 1966 there were at least 2 700 people living in Sada. By the early 1970s this had swelled to 14 000 and continued to increase up until 1980 when it reached an estimated maximum of 40 000 people. Half of those resettled came from urban areas and the other half from rural environs (Surplus People Project 1983b).

The limited infrastructure could not cope with the massive influx of people and conditions in this new township were terrible. Sada was far from major urban hubs, while the lack of transport and legislation limiting urban migration constrained economic opportunities. The state was the single biggest employer in Sada, employing residents in the building and upkeep of the township. Men built houses, roads, dug latrines and water furrows for R16.50 per month (approximately R1 430 in today's terms when accounting for inflation) while women planted trees and grass around the township and cleaned streets for R4 or R5 a month (about R400). To save money, the state docked food rations and rent directly from the wages of those they employed and a woman earning R4 would typically take 85c home per month. This also meant that those women who were previously exempt from paying for rations and rent, also had their wages docked. If the family was unable to make rent, children were encouraged to leave school and take up wage labour to meet the short-fall (Evans 2014).

Women were effectively trapped in the townships through a combination of dependence on state employment for food rations and rent but unable to accumulate capital due to the deductions that applied, influx control legislation and highly gendered wage differentials (Evans 2012). Lack of adequate land due to overpopulation meant that there was very little space that could be cultivated for subsistence and to augment diets, resulting in an almost complete

dependence on wages and rations for food. Men were forced to leave and seek employment in industry resulting in the disintegration of the nuclear family unit, but in order to maintain the migrant labour system there had to be an incentive for men to return. This system was intentionally designed and Du Rant, Director of Bantu Labour stated, “the ties with the homelands must be maintained and the best way of doing this is to keep the women in the homelands” (Du Randt 1969, cited in Evans 2014:33).

Sada lacked an established traditional authority, which allowed state structures to oversee daily operations under the Department of Bantu Administration and Development (BAD) (Wotshela 2004). The township was administered locally by the township superintendent and the superintendent of public works. Surrounded by widespread poverty and desperation, the ability to allocate rations, employment and housing resulted in these officials having significant and almost absolute power and ‘the course of local ‘justice’ was thus both arbitrary and autocratic’ (Evans 2014:28). This power dynamic coupled with widespread poverty and desperation resulted in a culture of patronage which was well established by the time BAD handed over administration to the Ciskei Tribal Authorities in 1971 (Evans 2014). In the new administration tribal lands were divided into zones, to which a headman was appointed. The headman sat on an intermediary committee which had power over house allocations and evictions, pensions and employment contracts. The lack of resources meant the populous was now completely dependent on the Ciskei Tribal Authority for everything. Additionally, because chiefly salaries were paid according to the number of followers, aspirant chiefs claimed ‘ancestral’ land to achieve territory and a base of patronage. Thus, aspirant chiefs jostled for control over state resources to secure their influence. But the lack of a historical Tribal Authority meant that the legitimacy of the process was highly questionable (Evans 2014).

When the Transkei was granted independence in 1976, the Ciskeian districts of Herschel and Gren Grey were placed under the administration of the new Transkeian Republic. Many residents of these districts remained loyal to the Ciskei and opted to relocate into Ciskei proper (Wotshela 2004). Although it is officially reported that 28 000 people were relocated, Green and Hirsch (1983),

suggest that the actual number far exceeded this. Many were resettled near Sada in rudimentary conditions, with very few economic opportunities and entered a system that either fostered dependency or forced people to leave in search of work. Additionally, the extra people strained the inadequate infrastructure even further and limited the already scarce land available for agriculture.

2.2.7. Independence and dissolution of the Ciskei

In 1981, the republic of Ciskei was formed but independence was nominal as it was immediately recognised that the Ciskei was unable to generate sufficient capital to sustain development (Evans 2014). Throughout this time, it was subject to and "dependant on the provision of non-agrarian resources from the central state, [thus] the Ciskei authorities' hegemonic project was thin and precarious" (Evans 2014:39).

While economic growth occurred in urban areas like Queenstown, the natural process of urbanisation was restricted by influx controls and the migrant labour systems, in the rural periphery of Whittlesea. Furthermore, the high unemployment in the Eastern Cape made migration to major urban centres like Cape Town more appealing. The pull was so great that by 1988 almost 8% of the 463 000 black people in the Cape Town Metropole came from the Ciskei while 52% came from the Transkei (Mears 1991).

In 1994, the Ciskei was reincorporated back into South Africa and was amalgamated, along with the Transkei, into the Eastern Cape Province. During this time there was a major focus on redressing the imbalances and injustices of the past, specifically through local economic development (Mears 2005). This however would be more difficult than initially expected as is evident by the lack of economic development that has occurred since democracy (Bank and Minkley 2005). The frontier wars that eradicated the CCP culture of the Xhosa and the subsequent systematic subjugation of the people over the last 200 years created a highly complex national social dynamic that has resisted economic development. Or rather economic development has not been

sensitive to the complex dynamic that has shaped the societies of the former homelands.

2.3. Current state of affairs

Currently the rural areas in the Eastern Cape Province are in a desperate state and sorely in need of development. The dawn of democracy brought with it hope that conditions for the majority of South Africans would improve. Unfortunately, this has not happened and as the years have passed and conditions have deteriorated, hope too has faded. It is "in the former homelands, where the bulk of the poverty in the region is concentrated and where the greatest challenges for rural development exist" (Bank & Minkley 2005:3) that rural development in most needed. But what kind of development is needed and how should it be implemented? According to Mawere (2017:117) this is not a simple answer, nor a simple task:

> *Development is a complex phenomenon with many facets yet economic development is often identified with the whole notion of development. In addition, scientific and technological developments are also understood as identical to development itself. The fallacious reasoning involved often sidelines moral and religious development, among other important dimensions, in conceptualising development…All key facets of development are intertwined and overemphasis of one dimension at the expense of others results in problems.*

Hay (2015) suggests that inappropriate conceptions of history affect behaviour and thus affect national policy aimed at development. Bryceson (2002), however, suggests that globally a significant contribution to poverty in the rural spaces is the transition away from an agrarian economy. De-agrarianisation within the homelands reduced the emphasis on local agricultural production which resulted in a gradual loss of farming skills and indigenous knowledge (Pereira et al. 2014). Additionally, forced removals and resettlement of people in the homelands during apartheid resulted in overpopulation, restricted access

to land and limited opportunities for cultivation and livestock production (Evans 2014).

Large numbers of cattle, owned by multiple people, were crammed into smaller, restricted spaces and resulted in a highly concentrated continuous grazing system which is often blamed for the widespread degradation of the rangelands (Moyo et al. 2008). This degradation has had significant effects on the grasslands of the former homelands as erosion prone, denuded soils wash away during heavy rains and reduce the retention of water while bush encroachment not only decreases the availability of grazing lands but can also signify progression towards desertification (Forbes & Trollope 1991). The result is a reduction in the natural resource base which in turn limits the potential of growth for the local economy and poverty alleviation.

Additionally, Shackleton and Shackleton (2004) demonstrate the value natural resources play in rural communities and the contribution they make to livelihoods, from medicines to fuel to emergency food sources during times of scarcity. The natural resource base is therefore vital to the livelihoods of people in the former homelands.

Continuous grazing on communal lands is seen as the cause of rangeland degradation in the former homelands and a major limiting factor to agricultural expansion. Attempts have been made to introduce the commercial practise of rotational grazing in an attempt to reduce rangeland degradation, but these have been met with limited success (Rootman et al. 2015).

In the following chapter, the effect of continuous and rotational grazing will be explored in detail

2.4. Conclusion

It is important to understand the historical processes that resulted in the socio-economic structure of the former homelands if interventions are to be implemented to arrest the environmental degradation currently occurring. Much work has been done to try and understand the drivers that influence livelihoods

and land-use change and how they affect rural development in the former homelands but McCusker and Carr (2006) suggest that this emphasis is misplaced and that traditional conceptions tend to view livelihoods and land-use changes as endpoints which fall short of explaining why alteration in livelihoods and land-use occurs. McCusker and Carr (2006:801) suggest rather that the separate (but related) issue of livelihoods and land-use change are different manifestations of the "complex relations of meaning and materiality that manifest themselves in these patterns". In other words (and echoing Hay 2015), it is people's context (history and perceived history), that affects how people view their place in the world and how they navigate and respond to the complex stimuli that assail them.

One of the more damaging aspects of apartheid is the effect it had on the psyche of the black population. McCusker and Carr (2006) suggest that "bantustanization" forced black farmers into overcrowded conditions on marginalised lands. The resulting low agricultural output reinforced the white held notion that black farmers where ineffective farmers, and this idea took hold not only amongst white farmers and the state, but in the minds of many blacks as well.

> *Today the forms of racialized knowledge produced by apartheid relations of power are still vividly evident when speaking to black smallhold[er] farmers who often still seek "white" or "scientific" expertise. Granted, in the generations since dispossession many rural blacks have been completely deskilled in agrarian production, but for people who still maintain small plots of land to survive, the apartheid program was successful at convincing many that blacks were, if not incapable, at least less capable than whites of farming productively (McCusker & Carr 2006:796).*

Thus, McCusker and Carr (2006) suggest that this remnant of apartheid and its shaping of the Bantustans affected and continues to affect the psyche and behaviour of its residents, including the more mobile migrant labour force. It is easy to lose sight of this subconscious scar, amongst the many local factors that affect the movement and behaviour of people as they attempt to live their

daily lives. Daily struggles like attempting to put food on the table or send children to school must be done while negotiating local political currents, amidst broader regional and national politics which takes place in a seemingly distant global context where economic recessions or climate change are less immediate concerns. It is not to say that the current drivers of livelihoods and land-use change are not valid, rather that it is important to be sensitive to the underlying processes and the diverse beliefs that drive the decisions people make.

McCusker and Carr (2009), suggest a major flaw in development practises is focusing on local and regional drivers of livelihoods and land-use changes, but ignoring the processes that inform the decisions people make. They suggest co-production as a method of incorporating local contexts into development. Thus, individual histories can be incorporated into development, allowing a more nuanced approach to rural development and allowing an avenue for local issues to surface. “Co-production is therefore a foundation for arguments supporting a locally-sensitized form of development. Further, it is a counter-narrative to the ideas of economic rationality and universality that guide much development planning and practise today” (McCusker & Carr 2009:578). The role of co-production as an important aspect of the implementation of Holistic Management will be discussed further in chapter 6.

In chapter 3 we will look at how the “system” of continuous grazing in the Ciskei is a leading factor in the rangeland degradation of the homelands and we will demonstrate how the reliance on the continuous grazing practise cannot be changed without also examining the inextricable link between continuous grazing and the social fabric of life in the homelands. If what McCusker and Carr suggest is correct, then it is important to examine the complex system that leads to rangeland degradation and not just the use of continuous grazing practises as the two cannot be unlinked.

Chapter 3: Rangeland degradation and the influence of grazing

3.1. Introduction

This chapter seeks to understand the global importance of rangelands degradation and the effect this has on rural communal villages. International and national policy is then discussed to determine the level of protection the rangelands, particularly in the former homelands, are afforded. Current grazing practise, namely continuous grazing, in the communal areas is then analysed, together with Hardin's (1968) concept of 'the tragedy of the commons' and why this combination is a major cause of degradation that influences local economic development. Continuous grazing is then compared to rotational grazing practises which are often cited as a solution for the degradation caused by continuous grazing. The theoretical basis of rotational grazing is then assessed and the newer 'state and transition' model is introduced to conclude the chapter

3.2. Global rangeland degradation

Grazing accounts for the largest global land use, comprising approximately 25% of the earth's terrestrial surface (Liebig et al., 2006), making it a critical resource for maintaining environmental integrity and as a source of livelihoods, particularly for rural communities (Asner et al., 2004). Despite its importance, it is estimated that approximately 80% of rangelands globally are degraded to some extent, with 10-20% of these being heavily degraded (McKell 1990; Zerga 2015). However, this may be misleading as Meadows and Hoffman (2003) suggest that the figure is higher because researchers in the field tend to underestimate the extent of rangeland degradation and ignore the knock-on effect this has on other ecosystems.

The United Nations (UN) identified Africa as the continent facing the largest challenges in desertification and land degradation where two-thirds of the land is already degraded to some degree, affecting 65% of the population. In

addition, 'the biggest impact of desertification is on agriculture, affecting the continent's food production and food security (UNCCD 2008). Due to this global concern regarding land degradation, the United Nations Convention to Combat Desertification (UNCCD) arose out of the United Nations Earth Summit held in Rio de Janeiro in 1992 (Hoffman & Ashwell 2001). The UNCCD provides a framework to help countries address the spread of land degradation and desertification and the effect it has on poverty. In 1995, South Africa signed the convention and in 1997 it was ratified, making it legally binding for South Africa to produce a National Action Programme for addressing desertification. The Department of Environmental Affairs and Tourism were responsible for the process and completed the National Action Programme in 2004 (DEA 2011).

3.3. South African policy concerning rangeland degradation

In addition to the commitment to the UNCCD, South Africa has a number of national policies that effect land degradation. These policies can effectively be placed into two broad categories; the protection of natural landscapes and the expansion of agriculture to promote economic growth.

Rangelands in South Africa comprise approximately 80% of the country (SAEON 2008). The rangelands are the most heavily utilised landscapes and are used for commercial and smallholder livestock production, conservation and tourism (DEA 2011). Furthermore, the expansion of commercial and smallholder crop agriculture over the last century has occurred in the rangelands and this is also where further expansion is likely to occur (DEA 2015). Within the natural landscapes, a number of national parks and conservation spaces have been designated as 'Protected Areas' and there are 16 national policies that promote active conservation of ecosystems and biodiversity (see annexure A). While the bulk of legislation is aimed at the protection of natural resources within designated protected areas, only two policies have set specific targets relating to the improvement of degraded natural landscapes. Because there is very limited information on degraded areas requiring urgent rehabilitation and reclamation, these rehabilitation

policies remain very broad and do not specify targeted interventions, rendering them ineffective (DEA 2015). Only 7% (or 85 400km^2) of the terrestrial surface area of South Africa is classified as 'Protected Areas'. (DEA 2011). Unfortunately, while the use, regulation and conservation of rangelands and woodlands within 'Protected Areas' are well described in policy, they are not well-defined outside these protected spaces, leaving 'unprotected areas' vulnerable to degradation and desertification (DEA 2015).

There are 17 national policies (see annexure B) that promote the expansion of agriculture in South Africa (DEA 2015). The most prominent of these policies are the New Growth Path (DED 2011), the National Development Plan (NPC 2013) and the Medium-Term Strategic Framework (DPME 2014). They aim to increase economic growth, stimulate rural development, improve food security and create jobs. Due to the broad nature of these policies, the type of agriculture is not specified, and promotion of conservation principles is lacking. The expansion of industrial agriculture into unprotected rangelands will therefore hasten rangeland degradation (DEA 2015). According to the DEA (2015:105) "Only one of the Acts reviewed, the Conservation of Agricultural Resources Act (1983), attempts to introduce cultivation techniques that may reduce soil turnover (through conservation tillage) and the associated release of existing soil carbon stocks into the atmosphere. It is however not regularly referenced in strategic plans promoting agricultural expansion, and thus has limited visibility". The Department of Agriculture, Forestry and Fisheries has been working on a new bill since before 2015 called the Preservation and Development of Agricultural Land Framework Bill and Draft Policy but as of 2016, while the latest draft has been completed, for some reason the bill and policy have not been finalised (DAFF 2016b).

A number of polices are aimed at the expansion of areas under cultivation, while a significant body of policies aim to manage the impact on the natural environment and protect natural resources. These conflicting land-use objectives limit the strides South Africa has made in addressing desertification and fulfilling its obligation to UNCCD. The expansion of agriculture and protection of the environment are not necessarily mutually exclusive ideals.

Improving the collaboration between governmental departments may facilitate the ability to simultaneously expand agricultural production and address desertification, but according to Faveretto et al. (2018) “while there is potential for the delivery of triple wins, data shows that siloed approaches hinder effective implementation”. While desertification is a national priority, due to the lack of integration of UNCCD principles across all policy spheres that affect terrestrial degradation, stopping and reversing desertification remains elusive.

3.4. Causes of rangeland degradation in the former homelands

Photo 1: Rangeland degradation (erosion) in Transkei (Magan 2019a)

The rangelands in the former homelands are severely degraded, yet the inhabitants of these areas are very reliant on the dwindling natural resource base for their livelihoods and their survival (Stroebel et al. 2011). The degradation is frequently attributed to the high numbers of livestock kept on the

land and the continuous grazing practised (Moyo et al. 2008; Meissner et al. 2013). Meadows and Hoffman (2003) suggest that ‘’land degradation is underpinned by poverty and its structural roots in colonial and apartheid political planning’’. Furthermore, many villages in the former homelands are situated in marginal lands that are particularly prone to degradation (Hoffman et al. 1999). The degradation experienced in the homelands is therefore a combination of social and livestock production factors.

3.4.1. Social factors

3.4.1.1. Effect of villagization on degradation

In the late 1930s, in response to land degradation in the homelands, the government instituted ‘betterment’ programmes, which sought to “combat erosion, conserve the environment and improve production in the black reserves” by reserving land according to use (De Wet 1987:85). Forced relocations of people between the 1950s and 1980s resulted in many refugees who were placed politically, with some areas receiving many displaced people while others received very few, and this resulted in wide fluctuations in population density over relatively small distances (Bennett & Barrett 2007). People historically scattered across the rural county side were forced into more densely populated villages. Many times, these were hastily constructed affairs with very little infrastructure, poor resources and far from economic opportunities (Mears 2010). This forced “villagisation” often resulting in the loss of homes, loss of livestock, property damage and fencing-off of grazing and arable land. Not only were people moved to locations with limited infrastructure, the households and lands they had cultivated were destroyed. Access was granted to new arable and grazing land, but this was often much smaller than what they previously had, less suitable for cultivation and placed further away from their homes reducing ease of access (De Wet 1995). ‘Betterment planning’ occurred unevenly, with some areas retaining much of the infrastructure initially placed, while in others this was virtually non-existent (Seneque 1982; Bennett & Barrett 2007). Generally, ‘betterment’ grazing practises, based on rotational

grazing, revolved around the erection of fences and splitting grazing into four separate areas. One camp would be rested for an entire year, while the other three would be grazed on a rotational basis. All the livestock in the village were only permitted to graze in the designated camp (Forbes & Trollope 1991).

When betterment planning came to an end, so too did the support for the grazing programmes. When the government stopped maintaining fences, the fences fell into disrepair. Some communities tore down fences as they represented the oppressive regime, some stole fencing for personal use while others were simply unable to afford the expense that fence maintenance entailed (Hey & Beinart 2017). Either way, with no fencing to exclude livestock from certain areas, grazing transitioned from government enforced rotation to continuous grazing (Moyo et al. 2008).

Due to the uneven population densities, different 'betterment' schemes, variation in natural habitat, and each site's unique history, land use and management today are complicated and nuanced and cannot be assumed to be homogenous. Yet 'betterment' remains universally a poorly constructed project, instituted in a top-down manner with no attempt made to understand the social context of the area and was doomed to failure. Contrary to its intended purpose, it hastened environmental degradation rather than arresting or reversing it (Mears 2010).

> *In the commercial areas, land degradation happened despite the land use policies that were in place ... In the communal areas, land degradation happened in large part because of the land use policies that were enforced on an unwilling population. The land allocation history of this country ensured that large numbers of land users were crowded into areas where, for example, soil erodibility was often high and the topography conducive to land degradation. The land use policies in this area compounded this problem by alienating communal area land users from their land and from any commitment to its conservation. At the same time, these policies, while based on the best technical principles then available, were incompletely implemented and actually ended up*

perpetuating households' dependence on unsustainably small arable land holdings (Hoffman et al. *1999:185).*

3.4.1.2. Effect of poverty on degradation

There are socio-economic barriers that hamper the ability for people in the former homelands from interacting with the formal economy. Neves (PLAAS 2017) suggests that three main structural contexts have prevented economic development in the former homelands since democracy. Firstly, entrenched migrant labour and declining opportunities for local employment result in the exodus of able-bodied men and women with the consequent breakdown of family units. Secondly, de-agrarianisation has negatively affected food security and economic opportunities and concurrently significantly increased dependency on wage employment and welfare grants. Additionally, "the two types of economic activity [migrant labour and subsistence agriculture] have become intertwined, with rural production dependent on the cash inputs of labour migrants, and the migrant labour system being "subsidised" by the fact that migrants had a rural base to fall back on for social security and in hard times" (McAllister 1992:204). Thirdly, administrative and institutional weaknesses together with contestation of power between the state and tribal authorities have prevented clear, coherent goals on stimulating development.

While these factors have limited local economic development, formal employment, remittances and social grants have been a valuable lifeline in maintaining rural livelihoods. Yet, Hajdu (2005) demonstrates that while employment and social grants only contribute to household income, natural resources contribute to food, energy and monetary needs. Giannecchini et al. (2007) suggest natural resources have a greater potential to improve livelihoods, particularly in a declining national economy. It is therefore disconcerting that the natural resources of the former homelands are severely degraded. While it is tempting to think that preservation of the natural resource base will solve the problem, Ainslie (1999) warns that such a view is naïve for three main reasons. Firstly, the vast majority of people within the former homelands are not primarily dependent on the natural resources of the land,

but rather on wages, remittances and social grants. This is seen in the decline of subsistence agriculture, partially due to the high risk and low return for a relatively large amount of work. Secondly, the local-level institutions meant to manage the natural resource base are often in disarray. Finally, because the livelihoods of many residents are dependent on a fluidity that enables them to move between different livelihood strategies, formal codes to protect the environment would impose a rigidity that would run contrary to their interests.

3.4.1.3. Effect of culture on keeping of livestock

While the differences between villages are important to understand, so too are their similarities, particularly when it comes to the keeping of livestock. Within Nguni cultures the ownership of livestock, particularly cattle, is considered prestigious and part of their cultural identity (Poland et al 2003). Beyond prestige, livestock also serve as a source of income generation, a form of insurance, bridal wealth and are used for personal consumption (Sikhweni & Hassan 2013). It is these diverse uses and multiple revenue streams that make them valuable, particularly in light of the limited economic opportunities within the former homelands. Thus, many households have their own personal herds, usually consisting of a mixture of cattle, sheep and goats with some farmers also owning poultry, horses and pigs (Mapekula et al. 2009).

Despite the fact that the former homelands (14% of South Africa's surface area) contains almost half of the country's livestock, very little of this finds its way into the formal economy (Palmer & Ainslie 2006; Meissner et al. 2013). One of the reasons is that many small-scale communal farmers find it difficult to sell their livestock into commercial value chains. The most common avenues into the formal economy are selling adult animals to abattoirs (usually through speculators) (Bester et al. N.D.) selling calves to feedlots or wool to wool merchants. However, livestock in the former homelands are not specifically produced for these commercial systems and many times do not fetch suitable prices when sold into the value-chain (Mmbengwa 2015). Rather than specifically producing livestock for commercial sale, according to Mmbengwa

(2015:179) “the communal family farm does not represent capitalist production but a simple commodity production. Thus, the nature and character of communal farming has very little to do with profit making but rather food security. Efforts to transform this system to profit making has been found to be difficult”.

These complex amalgamations of structural layout of villages with shared grazing, multiple households that own their own personal herd, barriers to market entry, declining economic opportunity and dependence on social grants have shaped the current state of livestock production in the former homelands. Namely, continuous grazing of poor-quality livestock on degraded rangelands.

3.4.2. Effect of grazing on rangeland degradation

Continuous grazing is not a grazing system as such but rather a lack of grazing management. Livestock are allowed to roam and graze freely on any land within village boundaries not assigned for crop production. There are no restrictions on their movement and no resting of the veld (Bennett & Barrett 2007). Some households will herd their livestock themselves, employ herders or leave them free to wander (Hey & Beinart 2017). Livestock are either chaperoned by local herders to limit stock theft or allowed to wander freely, but because movements are uncoordinated, grazing frequently overlaps before recovery can take place, resulting in overgrazing (Bennett and Barrett 2007) While not ideal because this form of grazing exacerbates environmental degradation, it is the only form of grazing available to livestock farmers utilising common grazing land.

3.4.2.1. No rest

In conventional systems, grazed lands are rested to allow for recovery after grazing. In continuous systems, where there is no rest period for grasses to recover, overgrazing occurs (Undersander et al. 2002). When livestock repeatedly graze grasses before they have had a chance to recover, the plant

is injured. If this happens often enough, the grass plant will die. When the grass dies, it leaves a bare patch which exposes soil, reduces soil moisture content and results in erosion (Beasley 2015). The loss of grass cover and exposure of topsoil plays an important part in rangeland degradation and will be covered in more detail in the next chapter.

In addition, cattle graze selectively and actively seek out the more palatable grasses, while leaving the less palatable ones. Over time this results in a shift of grass species towards a less palatable, less productive veld which may progress into bush encroachment (Hudak 1999).

3.4.2.2. Marginal land

Many villages in the former homelands are situated in marginal lands that are particularly prone to degradation (Hoffman et al. 1999). In Mceula, poor soil formation and erratic rainfall limit recovery of grasses if overgrazed and resultant bare patches exacerbate erosion when the rains do fall (Nkansa-Dwamena 1998). While some veld types are more tolerant of overgrazing, the sweetveld of Mceula is not one of them and is easily degraded if not managed correctly.

3.4.2.3. Cattle numbers

The former homelands are considered overstocked (Shackleton 1993). This is often cited as one of the major causes of rangeland degradation (Meyer & Turner 1992; Hudak 1999; Moyo et al 2008). While grazing capacity is estimated to be 6ha:1LSU (Large stock unit) (Trollope et al. 1995), Nkansa-Dwamena (1998) calculated that the grazing capacity of Mceula ranges from 6.7 – 15.9 ha/LSU depending on the area being sampled. Thus, in some of the really degraded areas of Mceula it takes almost 16 hectares to run a single head of cattle! A community livestock census carried out in 2015 by the OLF determined that there were 601 goats, 840 cattle and 2 971 sheep on the 3 133ha of available grazing land (OLF 2015). That equates to a combined total of 1 554 LSU (1 LSU = 5 sheep or goats) and translates to 1 LSU being

supported by 2ha of land, this is 3 times higher than the recommended stocking rate. It is important to note that this would be considered overstocking in a conventional system, but not necessarily in Holistic Management where high livestock numbers increase the herd effect which is beneficial to the veld.

3.4.2.4. Proximity to village

Livestock are precious commodities for families, both for their cultural significance and economic value. They need to be protected and thus typically return home to the village every day after grazing. Because people are concentrated in villages, so too are their livestock. The area around the village is typically the most overgrazed due to the constant flux of livestock in and out of their kraals. This is supported by veld evaluations done by Nkansa-Dwamena (1998), who has observed that there is significantly less grass cover closer to the village.

3.5. Tragedy of the commons

Due to betterment and the creation of common agricultural lands, frequently grazing land within the former homelands is assumed to be common property, and therefore subject to 'tragedy of the commons' where the short-term, selfish interests of individuals result in resource depletion at the expense of the community (Hardin 1968). While Hardin suggested that tragedy of the commons was an inevitable outcome of shared resources, Ciriacy-Wantrup and Bishop (1975) argue that this is not the case and that Hardin did not differentiate between common property and open-access property regimes. This is supported by research by Elinor Ostrom and others, that suggests the 'tragedy of the commons' is not an inevitable outcome, but rather one of several possible outcomes (Ostrom et al. 1996) and there exist governance structures in many parts of the world where common property is managed successfully (Niamir-Fuller 1998). Elinor Ostrom won the Nobel Prize in Economics for her work on the management of the commons and is widely seen as the person responsible

for disproving Hardin's hypothesis. According to Dietz, Ostrom and Stern (2003), how communal land is accessed plays a large role in whether the 'tragedy of the commons' occurs.

Land can generally be divided into four property rights regimes; state property, private property, common property and open access. The latter two are the most relevant when evaluating grazing in the former homelands. Common property consists of "a well-defined group of authorized users, a well-defined resource that the group manage, and a set of institutional arrangements that define both of these" (Bennett & Barrett 2007:98). Because there is a select group of people who would benefit from long-term resource stability and who contribute to the implementation and enforcement of norms and standards, common property regimes can reach a state where resources are managed sustainably (Niamir-Fuller 1998; Ostrom et al. 1999).

Open access on the other hand places no restrictions on who is allowed to use collective resources. Thus, everyone has a stake in the common resource but because institutional mechanisms are lacking, exploitation by individuals is likely, with resultant long-term detriments to the natural resource base (Bennett & Barrett 2007:98). Although the majority of land tenure in the former homelands is assumed to be common property, they are in fact closer to open access systems and therefore prone to exploitation by the individual at the expense of the collective (Cousins 1996). In areas where common property is still practised, human population density is relatively low and management structures are still in place. However, many areas with high densities of people have lost the control and management necessary for common property and have shifted to open access regimes and the expected consequences of 'tragedy of the commons' (Bennett & Barrett 2007).

After the Ciskei was granted independence in 1981, Mceula retained some of its institutional structures to govern land use and was considered controlled under common property conditions (Nkansa-Dwamena 1998). However, like much of the former homelands, these structures have eroded and, prior to establishment of Holistic Management, Mceula would have been considered an open access regime as there were no restrictions or limitations to grazing.

Bennett and Barrett (2007) suggest that it is only by shifting communal lands from open access back to common property regimes, that sustainable resource management can be achieved.

In her extensive research on sustainably managed common resources, Ostrom (1990) suggests criteria that will help in the establishment of sustainable management systems. First, that the number of participants who manage the resource must be limited. Secondly, that the rules, at least partially, must be designed by the users themselves. Thirdly, monitoring must be performed by those accountable to the people using the resource. Finally, sanctions for non-compliance should be in the form of graduated punishments. Part of the reason for the success of Holistic Management in Mceula was their ability to implement all four of these measures. This will be discussed in further detail in chapter 6.

Many authors blame cattle and poor management for the bleak state of the rangelands, stating over grazing as a primary source of degradation (Meyer & Turner 1992; Hudak 1999) and very little attempt has been made to manage commonage grazing. In light of the degradation, grazing schemes where put in place to control grazing. These were modelled on commercial systems, with a view to promote rotational grazing for rangeland health and help facilitate small holder farmers' entry into formal economies, thereby stimulating local economic development. Because none of them address the management of communal grazing lands, long-term success has not been achieved (Rootman et al. 2015).

These projects have been ill-conceived, formulated externally and implemented in a top-down manner. Externally formulated projects fail to take into account the complex history of a locale and how people interact with their environment to derive a livelihood. While consultation does generally occur, "villagers did not have a complete understanding about the shape, form and extent of the intended projects" (Rootman et al. 2015). The result is a rigid plan, that is imposed upon, rather than developed with the community it is supposed to help (Isidiho & Sabran 2016). Rotational grazing projects have failed because they fail to take into account the reason behind continuous grazing, i.e., the socio-economic reality of rural life in the former homelands.

3.6. Rotational grazing and the ‘Succession’ model

Rotational grazing is a relatively new grazing strategy employed by livestock farmers and is one of the most prominent forms of commercial livestock grazing globally (Undersander et al. 2002). It was developed in the United States of America in the early 20th century in an attempt to address the severe rangeland degradation that had occurred in the late 19th century due to the continuous grazing practised at the time (Briske et al. 2011).

Experiments in the United Stated in the early 1900s tried to validate the role grazing animals played in rangeland degradation by excluding livestock from plots of land. The “rapid, positive vegetation responses to grazing exclusion following extreme overgrazing prompted early researchers to conclude that rotational grazing would restore rangeland productivity” (Briske et al. 2011). These experiments, however, demonstrated more the effect of grazing cessation rather than the effect of grazing but it launched the practise of rotational grazing ahead of the discipline of rangeland ecology (Joyce 1993). Rotational grazing that was promulgated was not scientifically validated but gained momentum due to the benefits it provided over the previous continuous grazing regime.

The development of rotational grazing coincided with the establishment of the succession model. As rotational grazing was developing, American plant ecologist Frederic Clements (1916) developed the succession model that suggested under ideal conditions vegetation will naturally progress towards a fixed climax point, unless constrained by external factors (like overgrazing or fire) that keep the system in a subclimax state. In a typical example of succession in degraded lands, hardy pioneer weeds would establish first, followed by an intermediate community of annual herbs which, in turn, prepare the soil for climax species of perineal plants and grasses (Pidwirny 2006). Because this model was demonstrable, under certain conditions, it became the dominant model within rangeland science. The original model assumed a linear progression of vegetation states, but over time, due to limitation in the model,

has been expanded to include various types and mechanisms of succession (Pidwirny 2006). It has, however, remained linear and Briske et al. (2011) warns against relying on linear models to explain complex phenomena.

Acock's (1988) definitive guide to veld types of Southern Africa uses the underlying principles of plant succession combined with various geophysical markers to determine and classify the vegetation types of all areas across South Africa. In the central Eastern Cape grazing lands fall under three categories: sweetveld, sourveld and mixed veld, a variable combination of sweet and sourveld (Acock 1988). Sweetveld retains its nutritive value through the dry season and is associated with a high soil nutrient profile and low to moderate rainfall. It is also a resilient veld and recovers well after stress. Sourveld, however, loses its nutritional value through the dry season and can cause livestock to lose condition unless provided with supplementary feed. Sourveld generally occurs in areas with higher rainfall and nutrient poor soils. It is less resilient and is more prone to degradation with inappropriate grazing management.

This view of veld type is based on the underlying assumption that grassland composition is predominantly determined by climate. Because the succession model has been the predominant model influencing grassland science, it has also heavily influenced management in commercial ranching (Joyce 1993). Research in the 1960s and 1970s investigated the change from high quality Themeda triandra dominated veld to the low quality Aristida junciformis veld, demonstrated the influence of grazing, fire and rest (Venter 1968; Tainton 1972; Van den Berg et al. 1975; Vorster & Herbst 1976). This research focused mainly on situations of commercial ranching which consisted of low density grazing of a single species (usually cattle or sheep) and rotational grazing in fenced paddocks. Findings concluded that overgrazing (due to high livestock numbers) and insufficient rest were primary factors in the deterioration of grazing lands. As a result, recommendations to reduce stocking rates, increase the number of camps and allowing grazed land to be rested became mainstays of commercial livestock farming (Kepe & Scoones 1999).

The basic premise behind rotational grazing strategy involves subdividing the available rangeland into several smaller camps which are then systematically grazed (Undersander et al. 2002). This allows a single camp to be grazed while the remaining camps are 'rested'. The specific type of rotational system employed depends on the number of camps available, the duration livestock are allowed to graze, the intensity (or density) at which livestock graze and the amount of time camps are allowed to rest. For example, a simple system involves dividing a farm into 6 camps, and each camp is systematically grazed for 1 month. After livestock have grazed a camp for 1 month, they are moved to the next camp in the sequence and the recently vacated one is allowed to rest for 5 months before it is grazed again. Thus, every camp is grazed twice a year.

Some variations involve setting aside a single camp for a full year's rest (Pasture project 2016). A 7-camp system using this method would have a single rest camp while the other 6 camps would be managed as the example above. Each camp in the grazing cycle would experience a 1-month graze, a 5-month rest and have 2 full grazing rotations in the year. At the end of the cycle the camp that was rested for a full year would re-enter the grazing cycle, while another camp would be set aside for a yearlong rest. In this way every camp would get a yearlong rest every 6 years. Other variations like 'management intensive' grazing' or 'adaptive high stock density' involve moving livestock more frequently but this requires more camps and more management (Pasture project 2016). If a camp in a 6-camp system was further subdivided into 10 grazing cells by portable electric fencing, the herd would then graze for 3 days before moving on to the next temporary camp. After 30 days, all 10 temporary camps would be grazed, and the livestock would be moved to the second permanent camp that would also be subdivided into 10 grazing cells. The camps would still get a 150-day rest. But due to the quick rotation, overgrazing is drastically reduced if not eliminated entirely.

One of the limitations to rotational grazing is that it doesn't differentiate between growing and non-growing seasons or even variations within seasons (Smith 2015). Once in place, it follows that same, cycle, indefinitely. Rotational grazing

provided some benefits over the continuous system, mainly from a logistic perspective. It allowed animals to be grouped in a single herd, this facilitated easier implementation of animal husbandry and herd health management tools which improved herd productivity (Undersander et al. 2002). Because rangelands allowed longer rest periods for recovery, the grasses were more productive and fertile, resulting in better quality forage for livestock. Thus, when space is limited, rotational grazing can improve the economic potential of a livestock enterprise through herd management, improved efficiency and reduced degradation of rangelands (Undersander et al. 2002). Despite this, Briske et al. (2011:326) suggest that "although testimonials and anecdotal reports of the benefits of rotational grazing are abundant, systematic assessments and documentation are lacking; the number of cases where it has been either successful or unsuccessful is unknown".

Following these new ideas, attempts have been made to extrapolate and implement rotational grazing within the degraded grasslands of the former homelands. Unfortunately, very little research had been conducted on communal grazing systems in the former homelands and direct extrapolation of commercial practises are not appropriate (McKenzie 1982; McKenzie 1984). Typical interventions included, reducing stocking rates, erecting fences and encouraging resting of camps, much akin to the 'betterment schemes' which were first initiated in the late 1930s (Forbes & Trollope 1991). Unfortunately, these attempts have generally failed because they are premised on the linear progression of the succession model and ignore the social structure of village life.

3.7. The 'State and Transition' model

Kepe and Scoones (1999:32) disagree with Acocks's deterministic view of veld types and argue that 'since such classifications assume conventional unilinear succession, they fail to recognise the highly variegated nature of the grassland states actually found, and the range of transitions which give rise to such variety'. While Acock (1988) classified the Eastern Cape grasslands as either

sourveld, sweetveld or mixed, Kepe and Scoones (1999) argue it is only so under certain conditions.

While the succession model accurately predicts the step wise progression of vegetation over time in certain conditions, a major limitation is its inability to explain why some overgrazed lands fail to recover once livestock are removed (Milton & Hoffman 1994; O'Connor et al. 2014). Better models are needed to understand grassland behaviour over a wider range of circumstances, yet the current foundation of grassland ecology is based almost exclusively on the flawed succession model (Briske et al. 2011).

The linear limitations of the succession model cannot incorporate the complexity inherent in grassland ecosystems (Kepe & Scoones 1999). The new 'state and transition' model is a way of addressing the failings of succession. It suggests that there are multiple stable vegetation states that potentially exist and the current state or transition between these states depends on the external factors which influence their trajectories (Briske et al. 2003). The benefit of the state and transition model over the succession model is that it is "more flexible and incorporates cyclic and successional processes as well as stochastic [random] responses of vegetation to climatic or biotic disturbances" (Milton & Hoffman 1994:24).

Kepe and Scoones (1999:30) suggest that 'state and transition' models are more appropriate lenses through which to understand grassland ecosystems but state that, "models tended to be exclusively biophysical in orientation, whereby transitions between different grasslands states are described simply by ecological processes without acknowledgement of the socio-economic and institutional elements underlying any such process in the managed grazing system". They therefore suggest incorporating human dynamics into understanding grasslands and how society affects them. In their research on the communal grazing lands in the former Transkei, Kepe and Scoones (1999) state that social contexts like migrant labour, remittances, local management structures and shifting demographics all influence how people interact with the land and how the grasslands in turn respond. They demonstrate this by explaining how veld can change from a Themeda to Aristida dominated

grassland through three big socio-political factors. First, the breakdown of local governance structures, like headmen and elder councils, which previously co-ordinated seasonal burns. Secondly, due to entrenchment of migrant labour, men are no longer the primary herders, instead this task falls to the women and children. Because women have many other tasks and young children are encouraged not to stray too far from home, high grazing intensity close to the homestead has resulted in overgrazing and subsequently encouraged Aristida dominance. Thirdly, social stratification within villages has resulted in richer farmers wielding more power and contravening established norms and grazing restrictions during periods of rest, to the detriment of the collective. These socio-economic influences on rangeland health demonstrate how people are intricately connected to the grasslands of South Africa.

The grasslands of the former homelands are socio-ecological systems and unless management processes also address the social aspect of 'grassland degradation', substantial steps to improve rangeland productivity and rural livelihoods cannot happen. Additionally, although there may be broader common threads that exist within the communal grazing lands of the former homelands, every area has a unique history that needs to be understood in order for unique solutions to emerge.

3.8. Conclusion

The rangelands of the former homelands are severely degraded (Hoffman & Ashwell 2001) and have been since at least the 1930s when the 'betterment' schemes where introduced (De Wet 1987). Commercial livestock production causes less rangeland degradation, lower stocking rates, more productive cattle and contributes more to the formal economy than communal livestock production does (Meyer & Turner 1992; Hudak 1999; Palmer & Ainslie 2006; Moyo et al 2008). The most obvious difference between the two production systems is the grazing method used and it is tempting to lay the blame here. Despite many projects attempting to institute rotational grazing within the homelands, the majority of these have failed (Rootman et al. 2015). While there

may be a host of reasons for the failure of rotational grazing projects in the former homelands, the poor ecological foundation behind rotational grazing is definitely a contributing factor.

While research states rotational grazing allows for better management and performance of livestock and is less degrading to rangelands than communal grazing (Walton et al. 1981; Undersander et al. 2002), this doesn't mean that it is restorative or that it is a paradigm that can make communal livestock farming more productive, economically viable or sustainable. More recent meta-analyses reveal that rotational grazing has no notable superiority for ecological or livestock production over continuous grazing practises (O'Reagain & Turner 1992; Briske et al., 2008; De Villiers 2013). Conversion from continuous grazing to rotational grazing would require large initial infrastructure expenses mainly with regards to fencing and the establishment of watering points. This is usually unaffordable in the communal homelands and even if funding were obtained, mere maintenance of fencing is prohibitively expensive, and the lack of maintenance has accounted for failure of rotational systems in the homelands in the past (Moyo et al. 2008).

Not only has implementation of rotational systems in the former homelands failed in the past, they also offer no benefit over continuous grazing (Briske et al. 2011). Furthermore, the scientific rationale behind rotational grazing is, if not flawed, then incomplete (Kepe & Scoones 1999). Continuous grazing persists because it is the system that most easily conforms to the socio-economic climate of the former homelands but does hasten rangeland degradation and continues to reduce the productivity and the stability of the natural resources people depend on. While not ideal as this form of grazing exacerbates environmental degradation, it is the only form of grazing available to most farmers.

Chapter 4: Holistic Management

4.1. Introduction

This chapter explores the history and theory behind the development of Holistic Management (HM). It unpacks the ecological principles needed as a foundation for the practise of HM and the four pillars of HM are discussed. It is presented in the manner taught by HM educators who mainly facilitate the transition to privately owned, commercial farms practicing rotational grazing. Finally, HM is heavily criticised in established rangeland science circles and these critiques are presented.

4.2. History

Holistic Management is the brainchild of Allan Savory, an environmentalist employed by the Rhodesian government in the 1960s (now Zimbabwe) to investigate the cause of widespread desertification occurring in their national parks. Savory was instructed to determine the cause and, based on valid research at the time, concluded that high elephant numbers were partly responsible for the destruction of the veld (Savory 1969; Lawton & Gough 1970). After validation with government officials, it was decided that elephants needed to be culled to reduce their impact and over the next few years 40 000 elephant were slaughtered (Savory 2013). However, despite this drastic reduction in elephant numbers desertification continued and surprisingly, got worse. In his 2013 TEDtalk Savory said (Savory 2013):

> *"Loving elephants as I do, that was the saddest and greatest blunder of my life, and I will carry that to my grave. One good thing did come out of it. It made me absolutely determined to devote my life to finding solutions".*

On immigrating to the United States in the 1980s, Savory discovered a similar process occurring on the prairies where herbivores had been absent, sometimes for as long as 70 years (Savory 2013). Savory soon realised that,

contrary to conventional wisdom, it was not the excessive grazing pressure that had led to desertification in the former Rhodesia, but he still had not yet found the root cause. The answer started to become apparent when Savory discovered the work of Frenchman André Voisin, best known for developing the rational grazing system (not to be confused with the rotational grazing system). Over the next few years, Savory combined Voisin's grazing principles, herd effect and various management strategies to create Holistic Management, a decision-making toolkit for livestock farmers to improve the condition of the rangelands which they managed (Savory & Butterfield 1999).

4.3. Influences

4.3.1. Voisin and his 4 laws

Andre Voisin qualified as a biochemist in 1924, worked in a rubber factory soon afterwards, but quit his job and joined the French military at the start of World War II. After participating in multiple battles, he returned to Nazi occupied France in 1940 where he administered his family farm and secretly provide the French resistance with food. After the liberation of Paris, he participated in several campaigns, but when the war ended in 1945 he was able to return to his true passion, farming (Machado 2004). Voisin would spend many hours just observing his cattle and he noticed the difference between the action of a grazing animal compared to those fed hay (Voisin N.D.).

A grazing herd can only mow grass as fast as the herd can move, however, grass mown mechanically is essentially cut at the same time. Likewise, while a cow must walk to a desired spot to graze, a feedlot animal can eat as much as she wants without moving (Voisin 1988). Voisin realised that existing grazing theory of the time did not accurately describe the relationship between grazers and grass. Instead researchers, intent on following the scientific method, would isolate either variable and either focus on the growing of grass or the feeding of cut grass to livestock in feedlots (Voisin 1988). Very rarely was research

aimed at livestock grazing on pasture, which is fundamentally different to either action performed in isolation.

In his most popular book, *Grass Productivity*, Voisin (1988) outlined his four laws, the first two concerning the grass and the next two concerning the livestock. It is only the first two laws we will explore for the purposes of this study.

Law 1	Before a sward, sheared with the animal's teeth, can achieve its maximum productivity, sufficient interval must have elapsed between two successive shearings to allow the grass: • To accumulate in its roots the reserves necessary for a vigorous spurt of regrowth; • To produce its "blaze of growth" (or high daily yield per acre)
Law 2	The total occupation period on one paddock should be sufficiently short for a grass sheared on the first day (or at the beginning) of occupation not to be cut again by the teeth of these animals before they leave the paddock.
Law 3	The animals with the greatest nutritional requirements must be helped to harvest the greatest quantity of grass of the best possible quality
Law 4	If a cow is to give regular milk yields, she must not stay any longer than three days on the same paddock. Yields will be at their maximum if the cow stays on one paddock for only one day

Table 2 Table of Voisin's Laws (Voisin 1988)

Understanding the reciprocity between grass and livestock he said (Voisin 1988:200):

> *Up till now it has been thought that grass grows alone, and the cow eats it alone. From now on, our thoughts must be that grass does not grow alone, neither does the cow eat it alone. The conclusion to be drawn is: We must help the grass to grow and guide the cow in harvesting it.*

When a healthy grass plant is grazed, reserves from the root structure are mobilised for new growth. Because the tender new shoots are the most palatable for livestock, they are also the first to be grazed (Oesterheld &

McNaughton 1991). Depending on the season and climatic conditions it may take as little as four days for the new grass shoots to be of a sufficient length (about 5cm) for cattle to grasp, but at this stage the root reserves are depleted and still need time before they are replenished (Savory & Butterfield 1999). It is at this stage that the grass is most vulnerable. Voisin's first law states the importance of allowing individual grass plants to regenerate expended root reserves at this vulnerable stage and then only be grazed again when they have recovered and are at the stage of highest nutrient density (1988).

Thus, the second law suggests removing livestock from a paddock before the tender new shoots are grazed. This is because livestock in a paddock for prolonged periods of time will encourage selective grazing of palatable plants and regrazing of their new shoots, while less palatable species are less intensively eaten. This eventually leads to the decline of desired, palatable, nutritious grasses and the overgrowth of undesired, unpalatable and less nutritious species (Savory & Butterfield 1999; O'Connor et al. 2014). Thus, the first law is concerned about the optimal length for paddock rest, while the second law is concerned with the duration of paddock grazing. It is important to note that according to Voison, but contrary to popular perception, overgrazing is not dependent on animal numbers but rather time allowed in a paddock (Voisin & Herriott 1965). Following these principles, Voisin suggests, can lead to significant increases in grass yield and therefore animal production. Additionally, it can also lead to improvement in plant species composition with a preponderance of palatable species.

Besides the importance of timing, another significant factor affecting grazing areas is the effect animals have on the land, also known as 'herd effect'.

4.3.2. Herd effect

4.3.2.1. Macro-ecology

Some of the blame for rangeland degradation in the form of overgrazing is attributed to overstocking (Moyo et al. 2008). Controversially, Holistic

Management frequently advocates increasing stocking density when formulating a grazing plan. Many have questioned this practise for fear that it would exacerbate rather than alleviate rangeland degradation (Palmer & Ainslie 2006; Briske at al. 2011, Nordborg 2016). Some evidence that supports the use of large herd sizes lies in historic accounts of vast herds of migrating herbivores prior to the industrial revolution. Some early European colonists to South Africa observed and documented the movement of some of these herds. Below are just two examples (Bezuidenhout 2015).

> *"The town was woken in the morning by a sound as of a strong wind before a thunderstorm, followed by the trampling of thousands of all kinds of game – wildebeest, blesbok, springbokke, quaggas, eland, antelopes of all sorts and kinds, which filled the streets and gardens, grazing off everything eatable, drinking all the waters in the furrows, fountains and dams. It took three days for the trek to pass through town, by which time the town and country around was left looking as if a fire had passed over it." – 1894, Beaufort West.*

> *"On the first morning of the hunt they were met with a scene beyond my power to describe. Game, game everywhere, as far as the eye could see – all grazing. The game did not appear to be moving; the impression was that the earth was doing so, carrying the game with it – they were in such vast numbers, moving slowly and steadily, their heads down, nibbling the short grass. Here came a small herd of about 500 black wildebeest, their white tails switching; they passed 100 yards from the wagons at a gallop. Hundreds of thousands of blesbok, springbok, wildebeest and many others were all around us" … "On a front of two miles the great cloud of dust came rushing up. The thunder of hooves was making the earth tremble under our feet. We had to shout to make each other hear. For an hour and a half this kept up, and after our return to the wagons the cloud of dust could still be seen in the west." – 1879, Davel.*

If the historical rangelands could support these great numbers of migrating herbivores, why was the veld not degraded then and why is rangeland degradation such a problem now? In trying to mimic mass migrations, albeit on

a smaller scale, Savory realised that herd sizes substantially larger than those recommended by government agencies are necessary for effective rangeland management. Holistic Management therefore uses livestock as a proxy to simulate the effect of large-scale herbivore migration (Savory & Butterfield 1999).

It is interesting to note the similarities of this approach to the developing science of biomimicry, which involves the study and emulation of natural processes and cycles inherent in nature. The underlying premise being that over millennia, evolution has selected for the most efficient designs and processes which we can use as inspiration (Malcolm & Sanchez Ruano 2015). Natural processes are cyclical, rather than linear, with many cycles being interconnected and embedded within other cycles. When these natural cycles that evolved over millions of years are disrupted, degradation ensues (Benyus 1998). Thus, Savory (Savory & Butterfield 1999) believes that the rotational grazing practises currently in use disrupt the natural grass-grazer cycle, which then leads to rangeland degradation. Conversely, by emulating the natural grazing patterns of herbivores these cycles are restored and regeneration of rangelands can be achieved. This process of rejuvenation can be seen when keystone species, like apex predators, are reintroduced into areas where they have been absent for a number of years. Their re-introduction sets off a chain reaction called a trophic cascade which results in regeneration as biological health is restored to the entire ecosystem (Ripple & Beschta 2012).

This was well illustrated when wolves were reintroduced into Yellowstone National Park in 1995. None have explained their impact more eloquently than George Monbiot in his 2013 TEDtalk (Monbiot 2013):

> *“Before the wolves turned up, they'd been absent for 70 years. The numbers of deer, because there was nothing to hunt them, had built up and built up in the Yellowstone Park, and despite efforts by humans to control them, they'd managed to reduce much of the vegetation there to almost nothing, they'd just grazed it away. But as soon as the wolves arrived, even though they were few in number, they started to have the most remarkable effects. First, of course, they killed some of the deer,*

but that wasn't the major thing. Much more significantly, they radically changed the behaviour of the deer. The deer started avoiding certain parts of the park, the places where they could be trapped most easily, particularly the valleys and the gorges, and immediately those places started to regenerate. In some areas, the height of the trees quintupled in just six years. Bare valley sides quickly became forests of aspen and willow and cottonwood. And as soon as that happened, the birds started moving in. The number of songbirds, of migratory birds, started to increase greatly. The number of beavers started to increase, because beavers like to eat the trees. And beavers, like wolves, are ecosystem engineers. They create niches for other species. And the dams they built in the rivers provided habitats for otters and muskrats and ducks and fish and reptiles and amphibians. The wolves killed coyotes, and as a result of that, the number of rabbits and mice began to rise, which meant more hawks, more weasels, more foxes, more badgers. Ravens and bald eagles came down to feed on the carrion that the wolves had left. Bears fed on it too, and their population began to rise as well, partly also because there were more berries growing on the regenerating shrubs, and the bears reinforced the impact of the wolves by killing some of the calves of the deer.

But here's where it gets really interesting. The wolves changed the behaviour of the rivers. They began to meander less. There was less erosion. The channels narrowed. More pools formed, more riffle sections, all of which were great for wildlife habitats. The rivers changed in response to the wolves, and the reason was that the regenerating forests stabilized the banks so that they collapsed less often, so that the rivers became more fixed in their course. Similarly, by driving the deer out of some places and the vegetation recovering on the valley sides, there was less soil erosion, because the vegetation stabilized that as well. So, the wolves, small in number, transformed not just the ecosystem of the Yellowstone National Park, this huge area of land, but also its physical geography".

While the above example attributes the change in Yellowstone to the re-introduction of the wolves, it is important to realise that it is because they altered the deer grazing behaviour that these profound changes occurred. It is this effect that large herds of herbivores produce on rangelands that Savory calls the 'herd effect'. And while it is usually not possible to introduce apex predators into commercial livestock farms, it is possible to design a grazing plan that can approximate their effect on the land.

Large herbivores form herds for a multitude of reasons. The most commonly cited reason for herding is as a means of protection from predation. This strategy of safety in numbers has multiple benefits. From a purely statistical point of view, the larger the herd, the lower the risk of predation to an individual (Alcock 1984). Furthermore, with more animals, there are more eyes seeing and ears listening, allowing for better surveillance, reducing predator success (Werner & Dyer 2003). In addition, a herd also uses camouflage as a defence mechanism. The similar colours or patterns of the herd can confuse the eye making it difficult for hunters to focus on individual animals (Elischer 2015). Some herd animals gang together to form defensive circles and can sometimes even attack predators (McFarland 1987). There are therefore obvious advantages for animals to form groups. Recent evidence, however, suggests that there may be a deeper, ecological reason for this.

In a remarkable piece of research published in *Nature*, Fryxell et al. (2007) discovered that old population dynamic models for predator-prey relations did not predict reality because they regarded both prey and predators as individuals. When Fryxell et al. (2007) began to model wildebeest and lion in the Serengeti as groups, a strange picture emerged. When wildebeest and lion where both solitary, lions had the highest hunting success rate. When wildebeest moved in herds, lion feeding rates dropped. When lions formed prides feeding rates dropped further, a staggering 90% the rate of when both animals were solitary. Thus, lions as solitary hunters are more successful in hunting than lions in prides. This begs two questions. Why are lions less effective in prides? And if pride hunting is less effective, why do they form?

The answer to the first questions is fairly straightforward. It is thought that a pride is concentrated in a small area, covers less ground and is exposed to less potential prey than the same animals spread out over a given area (Packer & Ruttan 1988). The answer to the second question is a little more abstract.

Old theoretical predator-prey models predicted boom-bust oscillations (Coulson 2007). As an overly simplified example, if antelope were plenty, lion would eat well. The abundance of food would increase the size of the lion pride, which would then eat more antelope and the antelope population would, in turn, shrink. With less antelope around, the lion population would soon crash. With the lion population down, this would afford the antelope a chance to recover and their numbers would steadily rise, causing a subsequent, if delayed rise to the lion population. While plausible, these boom-bust cycles are not supported by real-world observations, instead populations of predator and prey tend to stay quite stable over time (Coulson 2007).

Fryxell et al. (2007) suggest that while lion prides may be less successful hunting units, they helped stabilise the wildebeest population. They found that models simulating either solitary wildebeest or lion populations soon resulted in either species collapsing, culminating in the extinction of both animals. On the other hand, Fryxell's model more closely resembles reality with both lion and wildebeest populations remaining stable over a period of time. While, Darwin's theory on natural selection is sound on an individual level, it also remains sound on a species level, a multispecies level and an ecosystem level (Marshall 2011). While there is a short-term loss in hunting efficiency when lions form a pride, there is a more substantial gain in population stability in the long term (Coulson 2007). Over millennia, there have been positive selections for traits that confer maximum stability to the ecosystem and the impact of large herbivores is one of them.

4.3.2.2. Micro-ecology

Lions, like the wolves in Yellowstone, affect the behaviour of herbivores and although this may seem trivial, the cumulative effect is enormous. Predators

keep herds bunched and moving (Alcock 1984). The concentration of herbivores in a small area forces the herd to constantly move in order to find food. While the benefits to the herd are obvious, the consequences for the ecosystem are even more profound A large, migrating herd has multiple, beneficial effects on the land (Odadi 2018). While it may be easier to isolate, evaluate and understand these effects separately they are in fact synergistic processes that are intimately connected.

4.3.2.2.1. Plant composition

A herd bunched and moving grazes very differently to a herd out in pasture. The high density of animals increases competition for food resources and therefore individuals are less selective when eating grasses (Peterson, Brownlee, & Kelley 2013). Because there is no selection, no single plant species dominates. This creates plant diversity, which in turn promotes soil health and macrofaunal diversity. Species diversity on both the microscopic and macroscopic scale are vital to the long-term health and resilience of any ecosystem (Rockström 2009).

As discussed in the previous chapter, cattle in pastures are much more selective and have a greater preference for the most palatable species or the tender shoots of regenerating grasses (Oesterheld & McNaughton 1991). Thus, palatable species are overgrazed and diminish, while unpalatable species proliferate. These pastures have both lower plant and macrofaunal diversity which in turn reduces the overall health of the pasture and makes it more susceptible to environmental fluctuations (Fuhlendorf & Engle 2001).

4.3.2.2.2. Hoof action

All large grazers are ungulates (but not all ungulates are grazers), or hoofed animals, which are either even-toed, like wildebeest, deer, buffalo and cattle or odd-toed, like horses and rhinoceros. The hoof of an ungulate is essentially a nail that covers the toe and supports the weight of the animal. Even-toed ungulates have two sharp hooves on each foot and because the entire weight of the animal is distributed over such a small area, there is a tremendous

amount of force on the tips of the hoof (van der Toll et al. 2003). Anyone who has had a cow step on their toe will be able to vouch for this fact.

Photo 2: Hoof effect assisting grass germination (Magan 2019b)

Dugmore (2012) states that hooves of herbivores have a number of beneficial effects on the ground and can help to restore rangelands through a number of processes. Firstly, any unpalatable grasses that are not eaten are trampled, creating a layer of litter over the soil. This organic litter works similarly to mulch and helps cover bare patches, helping the ground retain moisture. Secondly, the hooves break down hard, bare crusts on the soil, thereby having a similar action to a plough, but with the added advantage of being less destructive. Thirdly, hoof depressions in the ground create micro-environments that promote the germination of seeds. These effects may not be noticeable with one animal, but when an entire herd of, large, heavy herbivores is on the move, the consequences are significant.

4.3.2.2.3. Urine and dung

The waste herbivores produce is also vitally important. Beef cattle can produce approximately 13ℓ of urine and 15kg of manure per animal per day (Gupta, Aneja & Rana 2016; Misselbrook et al. 2016). Extrapolated against a herd, the volumes of excrement are large. While herbivores consume large quantities of grass, they simultaneously replace this with urine and manure. The waste products are worked into the soil via the action of the hooves and depressions collect urine and manure which provide optimum conditions in which new grass seeds can germinate (Dugmore 2012). As long as the herd doesn't return too soon, the devastated patch of ground will soon be transformed into healthy rangeland ready for the next season (Oesterheld & McNaughton 1991).

A degraded rangeland has fewer grass species with relatively high numbers of unpalatable plants and tufts of grass interspersed with bare ground (Smet & Ward 2011). The more bare the ground, the worse the rangeland. If grass cover is lost and bare ground increases, desertification occurs (Gibson 2006). Bare ground is a terrible blight to rangelands. Bare patches quickly lose moisture through evaporation. The loss of water results in a loss of microbial life and the soil becomes sterile (Kieft 1994). The loss of moisture also prevents seeds from sprouting, making recovery difficult. The more bare ground is exposed, the less moisture is retained in the soil and the less hospitable the ground is to plants (Reicosky 2017). Bare ground results in a hard crust on the surface and compacted ground below, causing rainwater to run off the surface of these crusts rather than being carried into the soil (Beasley 2015). This further reduces the water content of the soil. Bare patches are not necessarily apparent at first glance. At a distance, veld may appear lush, but when viewed from above, bare patches become more evident.

Photo 3: Veld viewed horizontally (Magan 2019c)

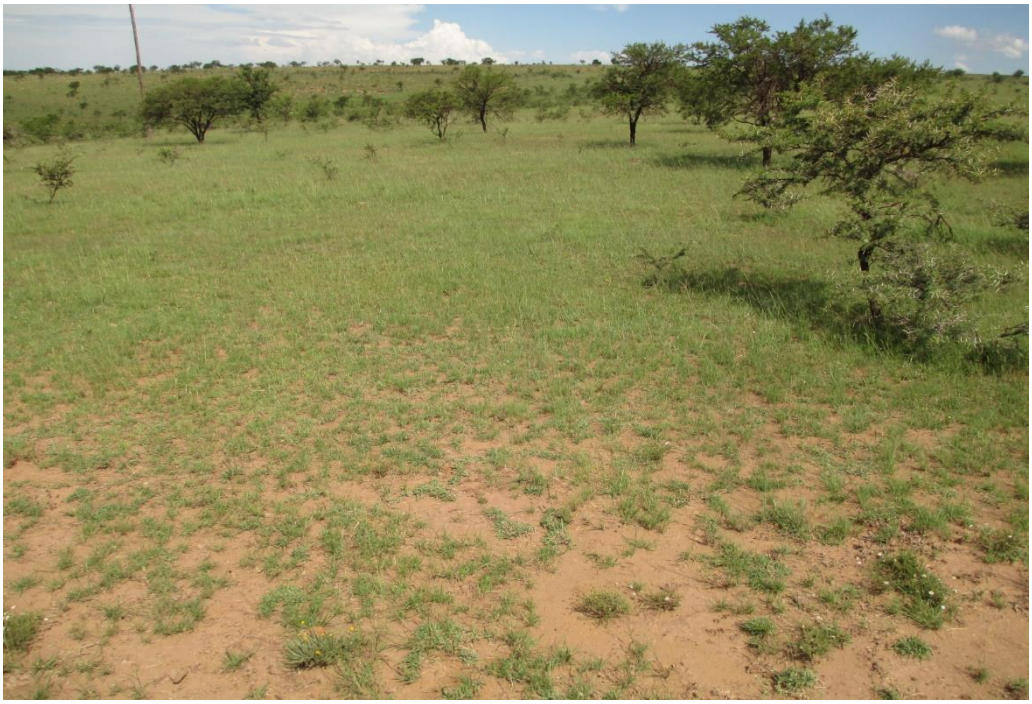

Photo 4: Same site as photo 3 - viewed diagonally (Magan 2019d)

Photo 5: Same site as photo 3 - viewed vertically (Magan 2019e)

The grazing pattern, hoof action and dunging of large herds, in concert, all help prevent bare ground. Concentrated grazing over a short period increases competition and reduces selective grazing, allowing both palatable and unpalatable grass species to be grazed evenly. Because palatable species are not overgrazed, there is less grazing pressure on these plants and subsequently fewer plants die, resulting in fewer bare patches (Odadi 2018). Hoof action breaks crusts while working urine and manure into the soil, allowing seeds to sprout (Dugmore 2012). Complete grass cover without bare patches results in porous soil structure made possible by extensive root systems, tunnels formed by burrowing insects and loose, moist soil. When rains fall, there is less runoff as water gets pulled into the porous soil. Plant litter keeps the soil from drying out thereby providing a more hospitable environment for plant roots, bacteria and insects (Saunders & Fausch 2006). The long-term benefit of this is that rainwater slowly percolates through soil and rocks replenishing aquifers (Weber & Gokhale 2011). The process is slow, but this delay allows water to slowly flow underground within the soil and rocks, eventually reaching streams that then flow into rivers (Savory & Butterfield 1999). This helps limit flooding in

the wet season while simultaneously maintaining riverine health during the dry seasons.

Thus, the health and integrity of the rangelands is not just reliant on abiotic factors like seasons and rainfall but is also intrinsically linked to the health and integrity of all animals which call the rangelands home.

4.3.3. Brittleness index

Another important factor in rangeland management under the HM paradigm is the consistency of precipitation an area receives. This affects the plant species composition, but more importantly, how plants respond to grazing and rest. The Savory brittleness scale is an arbitrary scale from 1-10 denoting the distribution of humidity throughout the year with the very wet environments, like rain forests, scored at 1, while deserts are scored at 10 (Savory & Butterfield 1999). Brittleness is not a measure of total precipitation or humidity but rather how evenly and predictably it is distributed throughout the year. Brittleness determines how an environment responds to grazing and resting. On the non-brittle end of the scale humidity is present throughout the year, vegetation breaks down rapidly through biological means (bacteria and fungi), herbivory is mainly done by insects, while larger herbivores and their predators tend to be solitary (Krishna & Mohan 2017). These are the rainforests of the world and they are very forgiving to overgrazing and respond very well to rest (Savory Institute 2015a).

At the other end of the spectrum are the deserts where humidity and precipitation are both seasonal and erratic. Vegetation breaks down slowly through chemical means (oxidation) in the absence of herbivores (Evans et al. 2017). When present, large herbivores are responsible for the majority of grazing and the breakdown of plant material through bacterial action in their digestive tracts. Prior to human interference, large herds of herbivores, bunched and moving, migrated across the landscape and facilitated nutrient cycling by eating and dunging (Wang et al. 2018). Because animals are

necessary for nutrient cycling and distribution in brittle environments, over resting can be more detrimental than overgrazing and will eventually lead to desertification (Savory & Butterfield 1999). Knowing the exact place on the brittleness scale is not important, but it is important to understand how brittle an environment is in order to understand how it will respond to certain grazing pressures. As a guide 1-3 is considered non-brittle, 4-6 somewhat brittle and 7-10 very brittle (Savory Institute 2015a). The vast majority of South Africa is considered either brittle or very brittle.

4.4. Ecosystem processes

There are processes that are essential to life and understanding them enables us to manage them. Frank Egler (1977) stated, 'Ecosystems are not only more complex than we think, but more complex than we can think'. Although we may not know every single detail, we can still understand the general concept, and using this understanding, make reliable predictions.

Ecosystems are dynamic environments consisting of the interactions between multiple processes. These include, but are not limited to, the water cycle, nutrient cycle, energy flows and community dynamics (Savory & Butterfield 1999). While it is easier to conceptualise and understand these cycles as discrete and separate processes, they are in fact intimately connected and dependant on each other. Understanding these four basic processes and how they contribute to ecosystems forms the foundation of the eco-literacy needed to apply HM principles, because it is only by managing the land as an ecosystem that degraded lands can be restored.

4.4.1. Water cycle

Every Holistic Management course contains within it the classic demonstration of soil water retention. Three 1m by 1m plots are selected on bare soil exposed to direct sunlight. The first plot is left as is, the second is poked with a stick or

garden fork to emulate hoof action by livestock. In the third plot the surface disturbed as in plot two but with grass strewn on top to simulate the effect of trampling and plant litter. Next, water is applied to each plot and then left for a few hours. When participants return to evaluate the pots, predictably, the first plot is hot, completely dry and has formed a hard cap. Plot two is cooler than plot one and still is a little damp. But it is plot 3 that is coolest, retains moisture for the longest period and is most conducive to microbial growth and seed germination.

This demonstration shows that is it not only the volume of precipitation that is important, but crucially, how much of that precipitation is retained in the soil. Effective rainfall is the amount of water that is retained in the soil root zone and is the difference between total rainfall and loss through the combination of run-off and deep percolation (FAO 1986). The fate of water once it has fallen as rain depends firstly, on what occurs at the soil surface and secondly, what occurs below the surface.

1) Arrive at the soil surface: When rain impacts on the soil, there are only two places it can go, either into the soil or over the soil as run-off. When rain falls on soil that is covered in litter, is not capped and is porous, it is available to the roots of plants. However, when rain falls on bare, hard and capped soil it runs off into gullies and streams, it is unavailable to any of the plants, severely limiting their growth (Savory Institute 2015a).

2) Below the surface: A bare soil surface that is exposed to the sun is susceptible to evaporation. Thus, rain that may have penetrated the soil surface can easily be lost again, reducing the amount of water available for plant growth. When soil is hard and capped, rainwater is not trapped in the soil and runs over the surface, down gullies, into streams and rivers and exacerbates flooding. Because this water is also not available to the plants, regional drought ensues.

However, on soils with sufficient litter and an open, porous soil structure, rainwater is effectively pulled into the soil, where is it is available to plants.

Thick, leaf litter covering bare soil protects against evaporation and aids in water retention (Savory Institute 2015a).

Rainwater can also percolate below the root zone, rendering it ineffective for plant growth, but it plays a vital role in replenishing ground water and the hydrological cycle (Encyclopædia Britannica 2019). This ground water flows slowly underground and plays an important role in maintaining aquifers and river levels, even through the dry season (Encyclopædia Britannica 2019).

Recent research suggests that there may be another benefit to increasing soil moisture content. Satellite data have demonstrated that the transpiration of plants increases available moisture and can stimulate rainfall (Gore 2009). While it was once thought that rainfall occurred independent of vegetation, it is now accepted that improving water retention in the soils increases vegetation growth and transpiration, which can actually increase the incidence of rainfall an area receives (Gore 2009). In light of the depressing consequences climate change may bring, this should give us hope.

4.4.2. Mineral cycles

The mineral cycle is the cycle that provides the nutrients necessary for plant growth. This is part of the much larger carbon cycle and consists of three main components (Bruce Ward Legacy Trust N.D). These three components are:

1) Moving minerals from below the surface to above the surface: During this phase, plants absorb minerals from the soil via their roots and use them to grow, incorporating nutrients and minerals into their leaves and stems above the surface. It is worth noting that the more effective the water cycle, the more effectively plants can assimilate minerals and grow.

2) Moving minerals back down onto the soil surface: The process by which this occurs depends on the brittleness of the environment.

In non-brittle environments humidity is present constantly and helps support large populations of microbes, invertebrates and small vertebrates that live above ground and actively decompose dead plant material. The resultant

material is rapidly incorporated back into the soil where it re-enters the mineral cycle (Krishna & Mohan 2017). Non-brittle environments don't suffer from over-rest as dead plant material isn't allowed the opportunity to accumulate.

In brittle environments, because humidity is seasonal, there is insufficient moisture for year-long plant growth. There is therefore a growing period and a non-growing period. Annuals undergo massive die-off at the end of the of the growing season, while perennials undergo dry-down and remain dormant for the dry season. Plant death or dormancy starts when atmospheric humidity falls and the environment becomes too dry to sustain the microbes, invertebrates and small vertebrates that facilitate decomposition. In the absence of biological decay, dead plant material starts to undergo chemical decay (Evans et al. 2017). This slow process can take years and breaks the mineral cycle, hampering further growth of plants. This is the fate of over-rested rangelands.

In intact rangeland ecosystems, large herbivores play a vital role in maintaining the mineral cycle. Large herds grazing bunched and moving eat much of the available plant material. The lignin rich plant material is digested in the bacteria-rich stomachs of the grazers and when they defaecate, the digested material lands on the soil surface ready to be incorporated into the soil and complete the mineral cycle (Teague et al. 2011). Additionally, when a herd, bunched and moving due to predators, traverses the landscape, they walk indiscriminately and trample many grasses and shrubs. The trampling created leaves litter which covers bare soil, thereby trapping moisture and helping facilitate bacterial decomposition (Dugmore 2012).

3) Moving minerals from the soil surface to below the soil surface: This stage is much more effective in the presence of an effective water cycle. Water encourages invertebrate populations which physically break down and pull dung below the surface of the ground, while water in the soil encourages bacterial populations which aid in further decomposition. In a fully effective mineral cycle, minerals will typically complete a full cycle in a year or less (Savory Institute 2015a).

4.4.3. Community dynamics

We are conditioned to view land as a stage upon which events occur. When we talk of rain forests, we assume these are wet places with trees, were forest animals live. When we talk of savannahs, we assume these are drier areas dominated by grasses upon which herds of herbivores graze. This plausible illusion is, however, false. Ecosystems are amazingly complex and resilient systems, but they are not stages. Ecosystems are the collective interaction of all aspects within the system. While ecosystems comprise abiotic factors like land, climate and seasons, the biotic components are just as important to the functioning of the system (Encyclopaedia Britannica 2019b). Just as the trees are an integral part of the forest, so too are the soils in which they grow, the mycorrhiza which nourish their roots, the insects that pollinate their flowers, the birds that spread their seed.

Many farmers may want to eliminate weeds and only have grasses for grazing. It is important to note that the word ‘weed’ describes a plant that is undesirable to people, but all plants play a role in the functioning of the ecosystem (Schonbeck 2013). Weeds tend to be pioneer plants, they are therefore beneficial in covering bare soil, retaining moisture and preparing the ground for succession (Schonbeck 2013). Having these pioneer species is beneficial to the ecosystem. Having a veld dominated by Themeda triandra, considered a good grazing grass, is not necessarily good for the ecosystem as systems with limited species diversity are more prone to shocks and stressors (Keep & Scoones 1999; De Belle 2009).

Thus, Holistic Management stresses understanding the role that all species play in maintaining the ecosystem. The more biodiversity, the more stable the system. The more stable the system, the more reliably the farm can operate (Savory Institute 2015a). While important from an ecological perspective, from an economic perspective, having a stable farm ecosystem makes business sense.

4.4.4. Energy flow

All organisms on earth, with the exception of those living near thermal ocean vents, are dependent either directly or indirectly on solar energy (Donovan 1998). Energy flow describes the capture of solar energy from the sun and the conversion into chemical energy by plants and algae through the process of photosynthesis. At every successive stage along the energy pyramid, organisms use their acquired energy for the process of living (Janzen 2015).

The water and nutrient cycles are circular systems that allow the building blocks of nature to be used and re-used across both species and generations. Energy flow on the other hand is the one-way movement of solar energy from the sun into the biomes of the world that provides the energy to power these cycles necessary for life (Janzen 2015).

Savory (Savory Institute 2015a) suggests that most of the money earned from agriculture should be in solar dollars, i.e. revenue derived from the sun. Instead, in industrial agriculture much of the growth is derived through mineral dollars. More specifically, this energy is derived from fossil fuels and mineral additives derived from mining. The harvesting process for extraction of these raw materials is usually costly and destructive to the local environment and society (Leonard 2010). Relying on the sun for these processes is simpler, cheaper and cleaner.

An extensive beef production farm relies on plant species engaged in photosynthesis to provide feed for the cattle. The grazing cattle eat the grass and grow, with the entire herd generally staying on the farm, except for surplus livestock which are sold off to the abattoir. All the energy required for grass growth comes from the sun and all the energy required for beef production comes from the grass, as opposed to feedlot systems, where concentrated grains produced through industrialised agriculture form a large part of their diet. Thus, beef production in this case could be measured mostly in solar dollars. Galan et al. (2016) demonstrated that a farm using this extensive paradigm can create a final product with lower reliance on external input, an overall lower energy input and increased farm plant biomass. The farm therefore was able to

reduce greenhouse gas emissions while simultaneously acting as a carbon sink utilising photosynthesis in surplus plant growth.

The industrial equivalent to extensive beef production, is intensive beef production, or feedlot systems. The majority of South Africa's beef, approximately 70%, is raised this way (DAFF 2012). The feedlot does not breed cattle, only feeds them to slaughter. There is therefore a constant stream of cattle arriving to the feedlot, with an equivalent number leaving for the abattoir. This constant movement of cattle is dependent on fossil fuels. Because cattle stay in small enclosures, food needs to be trucked in (a fossil fuel dependent inputs). The feed that is provided is generally maize, soy or wheat-based and because the volumes of feed and cost of transport are great, feedlots tend to be found in or around high grain-producing areas (Pollan 2006). Due to the volumes of feed needed for the cattle, an industrial process is needed for maize or soy production to ensure adequate supply. This generally includes GMO crops, inorganic fertilisers, pesticides and herbicides (all heavily fossil fuel dependent inputs) (Pollan 2006). While the feed stock used the sun for growth, much of its production and transport to the cattle for consumption required fossil fuels. The production of feedlot beef can therefore be measured in solar and mineral dollars. Extensive cattle production should be more energy efficient and environmentally friendly than feedlot systems (Koknaroglu et al. 2007).

However, multiple studies and meta-analyses have demonstrated higher green-house gas emissions in grass-fed beef compared to feedlot animals, prompting many to advocate for intensively produced beef over grass-fed systems (failing widespread adoption of vegetarianism) (Clark & Tilman 2017; Garnett 2017). Furthermore, grass-fed cattle require relatively more land and a transition from feedlot beef to grass-fed beef would require more land. In the United States, to meet current beef demand with purely grass-fed beef would require an increase of the national herd by 30%. Current grazing lands in America would only be able to support 27% of the herd, but if cropland forage was used, this could increase the potential of the herd to 60%. Thus 40% would need to be imported, resulting in further environmental costs through deforestation practises (Clark & Tilman 2017, Hayek & Garrett 2018). Thus, the

above evidence seems to strengthen the case for feedlot beef as the more environmentally friendly option. The Intergovernmental Panel on Climate Change (IPCC) has also noted the higher emissions of grass-fed livestock and while they support a reduction in meat consumption, they remain ambivalent about recommending extensive livestock production over intensive systems, due to the complexity and uncertainty around their environmental impact (Rogelj et al. 2018).

The research on greenhouse gas emissions in livestock has a few caveats. Firstly, environmental impacts differ greatly across and within production systems (Clune et al. 2017). For example, extensive production systems that are established after clearing of forests or that cause rangeland degradation will result in a net release of CO_2 into the atmosphere contributing to green-house gas emissions. However, extensive systems that promote grass cover and restore rangelands will result in increased atmospheric carbon sequestration into the soils and help mitigate emissions caused by the animals themselves (Derner & Schuman 2007). On the other side of the spectrum, intensive systems may help mitigate emissions if they process the livestock effluent and harvest biogas (Rogelj et al. 2018).

Secondly, most analyses of the environmental impacts of animal production are based on a single environmental indicator (Mekonnen & Hoekstra 2010). The pursuit of a single parameter, however, can be done at the expense of the whole. Thus, simply concluding that intensive livestock production is more environmentally friendly due to lower greenhouse gas emissions may be premature, because it may ignore other parameters that are not measured or are unmeasurable but may have beneficial effects. For example, grass-fed meat has a better fatty-acid profile and contains less residues than their feedlot counterparts making it a healthier choice. Extensively reared livestock may provide food security in marginal lands that are unsuitable for cropping (Clark & Tilman 2017).

Finally, given that only 14% of its land is arable, South Africa is eminently suited to grass production, and to extensive grazing of herbivores (Auerbach et al. 2013). Additionally, if the management system of an extensive livestock farm

resulted in increased grass cover, it could also result in more effective rainfall and contribute to water security by mitigating flooding and helping replenish aquifers (Weber & Gokhale 2011).

4.5. Holistic Management

4.5.1. Overview

The influences and ecosystem processes mentioned above are the foundation upon which HM is built. This needs to be understood before HM can be practised and for many it requires a paradigm shift.

HM is more than a grazing system; it is a decision-making framework that allows farmers to make decisions in complex environments that are constantly in flux. It was developed in the United States for extensive, commercial livestock production on privately owned lands. While the socio-economic structure of the USA is radically different to the former homelands of the Eastern Cape, the ecological principles are universal. As such, HM, as it is taught, may not be directly transferable to the former homelands, but the principles that underlie the system can be transferred in a way that is more appropriate to the context and the people who live there.

HM aims to use the effect of migrating herds of herbivores to restore the rangelands of the world. Herbivores congregate and migrate in herds which serve as a form of protection against predators (Alcock 1984; Werner & Dyer 2003). Obviously, removing the world's fences and introducing packs of wild carnivores is not always feasible, but by manipulating herd behaviour using HM the effect can be reproduced on both small and large extensive livestock farms (Dugmore 2012). Although technical grazing strategy is very important, Savory soon discovered that this was not the only aspect that needed to be considered. In his work on commercial farms, Savory realised that making a change, let alone a complete paradigm shift, is not easy and success is not dependent on grazing strategy alone. Inspired by the writings of Jan Smuts (1926), holism became a central philosophy behind HM (Auerbach 2019: 6). Smuts conception

of holism helped fill the gaps in the Savory's original HM framework (Hadley 1999). Smuts defined holism as "the fundamental factor operative towards the creation of wholes in the universe" (Smuts 1926). Although Smuts had a more discrete conception of holism than the modern definition (Poynton 1987), it allowed Savory to conceptualise the separate entities on a commercial farm. Utilising Smuts' concepts, Savory was able to view the farmer as a 'whole', embedded in a family, with each member being their own 'whole'. The family was a 'whole', embedded in the farm and this gave rise to yet another 'whole', the farming unit. This realisation came into sharp focus when implementation of the grazing system alone failed (Hadley 1999:47).

> *We had success for 15 years then total collapse. Something was still missing. What was missing was this concept of Smuts' 'whole'. We weren't looking at the family. We weren't looking at community. We weren't looking at people. We were looking at economics and land and cattle and wildlife and it wasn't working.*

To address previous shortfalls and encourage a more wholesome perspective, further components of HM were added, namely the Holistic Context (HC), Holistic Planned Grazing (HPG), Holistic Land Planning (HLP) and Holistic Financial Planning (HFP). Breaking HM into four aspects speaks less to the differences between them and more to our inability to view systems as 'wholes'. The complementary non-grazing aspects within HM set this system apart from conventional grazing strategies that focus solely on grazing. Briske et al. (2011) suggest that the non-grazing portions of the programme may in fact be more beneficial than the grazing portion, as they give farmers a robust, holistic framework that allows for better farm management. Crucially, they also allow farmers to plan, execute, evaluate and then re-plan. This iterative process enables farmers to continuously adjust and refine their management practises as time and contexts change (Firth 2017). Not only is this iterative process advocated to practitioners of HM, it is also used to refine HM itself. Additionally, an iterative process also helps retain beneficial practises while eliminating redundant ones. It is this process which helped and continues to help shape HM.

4.5.2. Holistic Context (HC)

Industrialisation and corporatisation have changed the face of farming, favouring large-scale industrial agriculture, which is able to produce vast amounts of food while simultaneously minimising costs (Pollan 2006). Although there are many hidden costs embedded in the process of industrial food production, this is currently not factored into conventional economics and is therefore not accounted for (Pollan 2006). This has resulted in a global phenomenon of farm consolidation, where larger, industrialised farms outcompete smaller farms (Heijden & Vink 2013). In this climate, farming as a livelihood has become more difficult and many farmers do not have a clear long-term goal for the farm and instead work from year to year, trying to make ends meet and keep the farm afloat amidst rising debt (DAFF 2018).

On a commercial farm it is the owner of the farm who determines the direction the business will take. It is the owner's desires, many times, unarticulated or disarticulated that drive those decisions. In light of the fact that many farmers face high debts and struggle to keep a farm operational, their focus is on short term survival, rather than long-term prosperity and this affects the decisions they make (Sihlobo 2018). Because HM is a decision-making framework, the shape it takes on a farm is heavily dependent on the decision makers. The purpose of developing a HC is for decision makers to question and understand why they are doing what they are doing, develop a vision for where they want to be, lay out all the factors that will help get them there and start to gather the resources they will need to sustain the vision (Firth 2016).

Paramount to making good decisions is knowing the 'whole' that is being managed (Hadley 1999). "Each of us is responsible for at least one whole – ourselves as individuals. And beyond that first whole, there may be several larger wholes – a farm, a family, or a business" (Savory Institute 2015a:17). Within the whole there are three key factors that need to be considered: the decision makers; the current resource base; and the money available (Savory Institute 2015a). With this information one can begin the process of

understanding where decisions are made, which tools are currently available for decision makers to utilise, and if the tools are not available, how much money is available to acquire new tools.

The beauty in the holistic context lies in its relevance to all participants. For individuals it helps create a guideline through which personal goals (and ultimately happiness) can be achieved. For the collective (the family, farm or business) it focuses disparate individuals along a common goal (Firth 2016). Generally, all decision makers start off by creating their own personal holistic context. Once this is done, they all collaborate and create an all-inclusive holistic context for the collective they help manage. By having multiple inputs, there is less chance that key areas are missed, resulting in a more robust and communally relevant HC (Savory Institute 2015a). When there are many participants, the process may not be quick and painless, but there is definite benefit to getting all decision makers active in the process. The HC begins by articulating the three components: a quality of life statement, forms of production and the future resource base. These are highly individualised statements and require time and deep introspection while they are being formulated. Because they are highly context dependent, they can change as the person's context changes (Savory Institute 2015a).

In summary, the HC is the foundation upon which purpose is built, made up of three aspects. The quality of life statement is what one wants out of life, the forms of production is what is needed to attain this, and the future resource base is what needs to be nurtured to grow or maintain this envisaged life. For an individual the HC may help guide one towards a vocation that brings happiness and fulfilment. For a business this may be the guide towards building a culture that promotes sustainable business ideals. The HC helps create the vision for the future and the roadmap for making decisions today that will get one there. Decisions both big and small are evaluated alongside the HC and those that coincide are adopted while those that don't are discarded. For example, if a farmer wants to start a new farm enterprise like aquaponics, the idea can be run through the HC. If the idea does not conform to the ideals behind the HC it can be discarded before major investments of time and money

are made. While the HC helps with big things, it can also apply to the small, encouraging miniscule daily behaviours that have a cumulative effect and gradually lead the individual or enterprise towards their long-term vision.

4.5.3. Holistic Planned Grazing (HPG)

Although farmers derive income from livestock through the production of meat, milk or fibre, this is really a by-product of farming. The healthier the soil and grasses, the more productive the livestock are. The primary purposes of the holistic livestock farmer are the harvesting of sunlight and the creation of the desired landscape (Savory Institute 2015).

> *There are four broad management tools available in shaping the landscape. First, technology, the most used tool. Second, fire, the most ancient tool, Third, rest, the most misunderstood tool. Finally, living organisms, which includes the whole biota but for management purposes centres around directing livestock behaviour in the form of grazing and animal impact. In formulating the Holistic Grazing Plan, rest, grazing and animal impact are the main tools that are used (Savory Institute 2015b).*

Timing is very important when these tools are used and it is important to understand the two seasons present in brittle areas. In brittle environments, the year can be divided into two seasons, a growing and non-growing season (Savory Institute 2015a). Each requires a different management strategy relating to the movement of livestock.

4.5.3.1. Growing season

The growing season generally coincides with the rainy season and as the name suggests, the grasses and plants are growing. During this period, when a grass is grazed, it will regrow lost foliage. Overgrazing occurs when animals defoliate grass before it has had time to recover (Voisin 1988). This happens if livestock linger in a camp too long or return to a camp too quickly. A rule of thumb

suggests that livestock should not stay in a camp for longer than three days, but this can be even shorter if growing conditions are optimal and the grasses start developing new shoots sooner (Savory Institute 2015b).

Recovery is the time necessary for the grasses to recover lost root reserves before they can be grazed again, and this will determine the period of absence in the grazing plan. This is a variable time frame and depends on climate, geography, season, type of vegetation and their growth form. This can vary from 10 days for runner type grasses under irrigation, to 90 days or up to a year for bunch grasses in semi-arid conditions (Savory Institute 2015b). Recovery is highly variable and although there are some guidelines, it is up to the farmer to learn and build the experience to determine the recovery rate under his or her specific conditions. Recovery only occurs in the growing season and in the absence of any grazing animals. When out of the growing season, the plants enter a dormant state and there is very little growth.

The grazing period and recovery period are times determined by the farmer. They are dependent on the conditions of the farm, climate, vegetation and change from year to year or even within a season. It is therefore very important for farmers to continually monitor the condition of the veld and make adjustments on a continuous basis. The grazing and recovery periods are always linked and when a grazing period in one division is reduced, the recovery period in all divisions are shortened. Keeping livestock too long in a single camp may cause overgrazing in one camp but moving them too soon reduces the recovery period of all remaining camps and this can lead to overgrazing in many more camps (Savory Institute 2015b). In general, slow growth requires slower rotation of livestock, while rapid growth requires faster movements between camps. It is important to plan the recovery period first and the grazing period and camp divisions around this. Recovery only occurs in the growing season, calculating the grazing period and recovery period is therefore only applicable for this time of the year.

When the recovery period has been established, the stocking density and grazing period can be determined. The principle in Holistic Planned Grazing (HPG) is to graze with high intensity for a short duration. Generally, animals

should not be in a paddock for longer than three days (Voisin 1988), but the more intense and rapidly moved (1-2 days) herd will increase herd effect, rangeland health and animal production. Equally, veld cannot be left for too long in order to prevent over-resting, which results in a reduction in plant palatability, nutrient cycling and animal production. Thus, there is a balance where the veld should not be over grazed, nor over rested (Savory Institute 2015b). For example, if the growing season for a farm is six months and the recovery period is one month, the entire farm should be grazed every month, ensuring six complete grazes of the entire farm. If the recovery period was two months, the farm would need to be grazed completely three times. This is only feasible in the growing season where recovery occurs, because there is no recovery in the non-growing season, this cannot be done (Burkhardt & Sanders 2012).

In all environments plants grow at different rates and herd movement requires thought and vigilance even without such complications as calving, lambing, poisonous plants, water scarcity, weather and competing land uses. Due to the inherent complexity of HPG, because there are many camps at different stages of recovery, and each camp is slightly different, a chart is necessary to keep track of the movements, grazing period and recovery period (see Annexure C). It allows the farmer to keep track of the grazing period and recovery period in each camp, because they can change over the course of the season. The chart also allows the farmer to keep track of the livestock, and place those that have a high nutritional demand, like pregnant and lactating livestock, on the best pastures (Bishopp 2016).

4.5.3.2. Non-growing season and drought reserves

In brittle environments like South Africa, rainfall can be erratic. Drought is therefore not a question of if, but when. It can be argued that because these dry cycles are frequent and regular, they are a natural feature of the environment (FAO 2004). The usual practise in rotational grazing is to have a number of camps which are rotated throughout the year and to set aside a plot of land for drought reserves, which is untouched until a time of need (NMSU

2016). The problem with this is that the land set aside becomes over rested, which results in lower nutritional value of the grasses, oxidation, increased risk of fire and can lead to bush encroachment. Even if the reserve is not used, when animals are allowed to graze, they do not graze the moribund grass, which then continues to oxidise and further promotes bush encroachment (Savory Institute 2015b).

Because no land is set aside for drought reserve in HM, a different strategy is needed. In the growing season, conditions are optimised for plant growth and when they are grazed, plants grow and recover. However, when the non-growing season starts, plants stop growing. It is the quantity and quality of standing forage at the start of the non-growing season that determines the carrying capacity of the land (Savory Institute 2015b). Stocking rate is then determined by setting aside forage for wildlife and calculating a drought reserve. Instead of setting aside land for a drought reserve like conventional systems, additional time is factored into the reserve. If a typical non-growing season is 180 days, adding a 10% reserve would factor an extra 18 days of grazing, while a 20% reserve would add 36 days. Knowing the total amount of forage and factoring in reserves, allows one to know how many animals can be fed through the non-growing season (Savory Institute 2015b).

This makes it very easy to formulate a plan at the beginning of the non-growing season while there is still forage and livestock are in good condition. This is one of the major benefits of HM. If one does not plan, or uses an inappropriate grazing strategy like continuous grazing, forage is exhausted before the growing season and two options are available to the farmer. Either sell livestock in poor condition at a loss or buy in supplemental feeding at great cost (NMSU 2016). Both of these costly exercises can be prevented through adequate planning.

Because the forage available at the start of the non-growing season, must sustain the entire herd until the growing season, the available food must be carefully managed, as poor management will result in inadequate nutrition towards the end of the season (Savory Institute 2015b). In HM, total grazing is divided into many small camps and livestock are moved frequently, the more

frequent the better. It may not always be feasible to have enough camps to allow animals fresh grazing daily. However, even moving livestock every 2 to 3 days is acceptable. On the first day there will be adequate grass but not so on the second day. However, livestock can manage the nutritional deficit on the second day because the next day they are moved into a fresh camp. Thus, condition is maintained because livestock receive adequate nutrition on alternate days (Savory Institute 2015b).

Because stocking capacity is determined at the start of the non-growing season, the farmer can calculate how many livestock the veld can support. If a farmer determines the herd to be too large, destocking can occur before the veld deteriorates and all animals lose weight. By destocking soon, the farmer can get a premium from animals still in very good condition and those that remain on the farm have access to more, quality forage.

4.5.3.3. Fencing and herding

Most commercial grazing systems require some form of fencing to control animal movement. The more rotations required, the more fences are necessary. This is usually done through the use of permanent fences or temporary electric fencing that can be easily moved. In some circumstances, however, fencing is not feasible. HPG, however, allows for herding to control grazing pressure. The combination of permanent fences, electric fencing and herding makes HPG a versatile system that allows herds to be moved frequently onto fresh grazing (Savory Institute 2015b).

Dimbangombe Ranch in Zimbabwe is an example where only herding is practised. Large game like elephant, buffalo and rhinoceros quickly destroy any fencing. In such a situation any fencing, be it permanent or electric, is simply not feasible, however, herding can be used effectively in managing grazing (Neely & Butterfield 2004). This is a learnt skill and requires the co-ordination of at least four herders; one in front, one behind and ones on either side. Herders form a perimeter around the herd and determine grazing pressure by the tightness of the ring in which livestock are kept and the speed at which they

are moved. The position of the herder in front determines the speed of the herd, while the position of the herders on either side determine how tightly packed the herd is. The lead herder therefore regulates the speed and grazing intensity of the herd by co-ordinating the position of the other herders. The lead herder is positioned behind the herd, assess the condition of the veld as the herd grazes and co-ordinates the other herders in order to get the herd effect he desires.

As he walks, if he sees ungrazed grasses, then he may slow the herd down to allow more time for animals to graze. If there are many bare patches, he may tell the herders on the outer edges to come closer and bunch the herd to enhance hoof effect and stimulate new plant growth. If there are toxic plants, he may get the front herder to speed up so there is less time for livestock to ingest sufficient quantities of the toxins (MI3). This is a much more nuanced and effective, although labour intensive, method of grazing than putting livestock in a camp for the required number of days. On communal lands in South Africa where fencing is not available or too expensive to maintain, controlled herding is one of the only feasible options for managing livestock movement.

4.5.4. Holistic Financial Plan (HFP)

A major factor in the success of a farming operation is the financial plan. The HFP has some key differences from conventional financial plans and it starts by questioning the fundamental assumptions about wealth and profit. The financial plan has been specifically developed around livestock production and allowing farmers to control cash-flow in a business where income is acquired seasonally in large amounts, while expenses are continuously being siphoned off. Commercial farms can have multiple herds in different stages of production and can have additional income sources adding to the complexity of financial management (Savory Institute 2015c). Although the technical aspects concerning the formulation and execution of the HFP are beyond the scope of this thesis, there are some principles that make this different from conventional

systems. These differences are highlighted in how the HC is integrated into the HFP, the broad concept of wealth and the manner in which profit is calculated.

4.5.4.1. The Holistic Context

The foundation of the HFP lies in having a HC that merges what one loves with what one does and a vision for what one needs to get there. The HC starts with the quality of life being sought, followed by the forms of production that will realise it and ends with the future resource base that will sustain it (Savory Institute 2015a). By having this foundation, finances can be managed and invested to contribute to quality of life and to achieving the overall goal. The HFP allows the farmer to manage cash flow and allocates money to the most necessary expenses. The HC provides the framework for the future vision and allows the practitioner to concentrate investment in areas that will contribute to quality of life, enhance production and build the future resource base (Savory Institute 2015c).

4.5.4.2. Wealth

Most people confuse wealth with money. Money is a medium to exchange wealth or a tool to measure profit. Wealth can be measured in financial capital, but includes many non-financial aspects like financial, natural, produced, human, and social capitals (Goodwin 2006). By having a well-structured HC, the financial plan is used to accumulate wealth, not just money, although money is a component that cannot be ignored.

Money exchanged can be measured in three forms; solar dollars, paper dollars or mineral dollars (Savory Institute 2015c). All require human creativity and labour in their generation. Having money distributed across all these forms helps protect against fluctuations. Mineral dollars are harvested from raw resources like oil, coal, ores and soil. They can be consumed completely or go through a renewable process where they can be used multiple times before exhaustion, but they are finite resources. Paper dollars require no resources but are based on the public's confidence in financial institutions and governments. They are versatile but intangible and are subject to fluctuations

(Harari 2014). Solar dollars are derived from the power harvested from the sun and can be in the form of electricity or derived from plants, trees or the animals that subsist on them. This form is free, clean and in practise, infinite. It is the only form of wealth that can actually feed people (Savory 2015c).

The importance of expressing wealth in these different forms serves to break the conventional belief that money and wealth are synonymous. It is to break away from the trap that the sole purpose of running a farm lies in making a profit, sometimes to the exclusion of other forms of wealth, like rangeland health or personal well-being. By expressing wealth in solar dollars farmers can start to see a healthy rangeland as a source of wealth instead of only looking at their bank balance.

4.5.4.3. Profit

In conventional economics, profit is the difference between incomes and expenses and is essentially what is left over (Encyclopaedia Britannica. 2019c). While income tends to reach a cap, expenses frequently climb and quickly erode the profits. Holistic Management tackles this problem from another perspective.

Profit itself is seen as a form of production and must be determined. Once income has been determined, profit is calculated as a percentage of income. Although Savory suggests that a profit of 50% should be attained, many start at a profit of 33% and work their way up. Expenses can then be calculated by subtracting income from profit. Thus, all expenses must come out of the allocated expenses budget. During formulation of the budget, all attempts must be made to keep expenses within this allocation. If this is not achieved, Savory suggests restructuring the budget at least three times to try and contain the expenses. If expenses can still not be reduced, then income needs to be augmented. If this is still not possible, only then should profits be adjusted downwards and then only temporarily, until expenses can be cut, or incomes raised (Savory Institute 2015c).

The HFP allows one to fulfil their HC. Far more than just finances are accounted for. This plan allows a business to achieve that elusive, holy grail in

sustainability, the triple bottom line, where a business is able to turn a profit, while building social capital and ensuring environmental regeneration. There are no trade-offs when a healthy system simultaneously supports all.

4.5.5. Holistic Land Plan (HLP)

The conversion from a conventional rotational grazing system to Holistic Management is not a simple one. On the surface it requires the restructuring of the entire enterprise. Below the surface it is a deep paradigm shift. Formulating the HC is deeply introspective, planning the HPG is a logistical challenge and HFP is an economic one. While the previous three are fairly fluid and changeable according to context, the HLP is a structural exercise. It requires investment and once committed, can be very difficult to change. Investing heavily in fencing or water points or extra land, if badly conceived, can lead to bankruptcy. The HLP will map the future use of the land and will affect many people and generations to come (Savory Institute 2015d).

It may seem counterintuitive that the HLP is the last of the pillars, but an ill-conceived plan can have disastrous consequences. It is vital that a robust HC is first formulated and that the fundamentals of HPG are understood. Additionally, understanding how the finances will be generated and in what degree will then determine when, where and how much money is available to invest in creating the desired landscape. Like biological succession, the most effective way is to build on small, incremental successes (Savory Institute 2015d).

Although there are a number of important considerations in the HLP, watering points are the single biggest factor limiting herd size in HM. Cattle require at least 60 litres of water per animal per day (DARD N.D.). Not only is volume a consideration, but size, access and location of watering points is vitally important to ensure each animal has enough water every day. In a conventional system with few camps and small stocking density, this is easily managed. In

HM, this can be a great challenge when cattle are moved every 1-3 days. Having an HLP helps place them strategically (Savory Institute 2015d).

The land plan is a long-term vision and the road map to create the desired landscape that will effectively harness solar energy, facilitate grass production and in turn grow healthy animals, which can then be used to generate wealth.

4.6. Criticism of Holistic Management

Since the beginning there has been distrust and cynicism towards HM, with criticism drastically increasing after the popularity of Savory's TEDtalk (2013). These critiques usually revolve around three issues: namely the scientific validity of HM, its environmental impact and claims concerning carbon sequestration.

4.6.1. Lack of peer review

Studies evaluating HM are limited, with the Savory Institute only approving a handful of them, contained within the 'Portfolio of scientific findings' (Savory Institute 2017). Naturally the reviews and studies in this portfolio all demonstrate the positive effects of HM. Norborg (2016) conducted a thorough scientific critique of HM and found that in this portfolio only 11 studies are peer-reviewed, with only six of these studies using quantitative data, while the remaining five are based on interviews and surveys. In Norborg's assessment of over 100 articles, including peer-reviewed articles, grey literature and testimonies, she concluded that while grazing in most cases causes rangeland degradation and a reduction in vegetative growth, any good grazing management can result in increased vegetative growth. Additionally, she notes, that while there is no evidence to suggest that HM is superior to any good grazing management strategy, practitioners themselves are strong proponents of the system and continue to demonstrate better results than their conventional counterparts.

Reviews and comparisons of extensive production enterprises tend to consolidate livestock systems and make recommendations based upon pooled data (Clark & Tilman 2017, Hayek & Garrett 2018; Rogelj et al. 2018). Since most extensive management systems result in rangeland degradation (Norborg 2016), using this skewed, pooled data to make inferences on regenerative systems, like HM, is problematic. Additionally, most scientific studies only measure a single parameter and parameters that are not measured, like soil water retention, or intangible benefits, like biodiversity, are not accounted for (Mekonnen and Hoekstra 2010). Because HM employs a systems approach, direct comparison to conventional systems is difficult. Attempts have been made to standardise parameters for better comparisons, due to the large variations in environments (vegetation, rainfall, prior land use, livestock characteristics) and management systems (systems, farmer ambitions, farmer abilities) (Briske et al. 2008). In the process of standardisation, many studies that evaluate HM have had to exclude the HM decision-making framework, an integral part of the system.

These assumptions and alterations can explain the lack of peer-reviewed studies that can be used to assess HM and why the Savory Institute, rightly or wrongly, has attempted to approve only those studies that take the entire system into account. Sherren et al. (2012) have noted that while most studies focus purely on the environment, the HM practitioners themselves play a critical role in the adoption and success of HM because they apply a whole systems approach, have a different mentality and place a greater emphasis on biodiversity, resilience and adaption than their conventional colleagues. Richard and Lawrence (2009) suggest that because a paradigm shift is needed, practitioners undergo ideological and cultural adaption and interestingly, it is women that seem to play a more prominent role in management. Thus Norborg (2016:21) suggests that “a special type of people seem to use holistic grazing and management, or the method itself helps to develop special characteristics. Many practitioners undergo training in the holistic framework for decision making that aims to improve efficiency and help them reach targets. It is likely that these farmers have a special drive and ambition to change and improve

their businesses, and that they in fact improve as a result of the training. Such factors could possibly partly explain the positive experiences and results that many farmers testify".

On the whole, the scientific community has not been able to establish clear benefits of HM over other well managed conventional systems, yet acknowledges that it does not take into account the decision-making framework that forms a key component of HM. Proponents of HM criticise the reductionist methodology used to compare it to conventional systems and say this is ineffective in evaluating the complete system which is multi-dimensional. Practitioners of HM, the farmers themselves, however, are staunch supporters of the system because they see the positive effects HM has on the ecological health of the land.

4.6.2. Environmental Impact of livestock

Livestock are widely criticised for the negative effects they have on the environment; firstly, for their high levels of greenhouse gas emissions and secondly, for their high resource usage. It is important however to understand the differences between production systems as they have very different impacts on the environment and society as a whole. There is no standard definition concerning these systems and substantial variation within the systems exist, but using Seré and Steinfield's (1996) classification, they can be broadly placed into three groups; grazing systems, mixed crop-livestock systems and landless systems.

Grazing systems: In these systems at least 90% of feed comes from the farm in the form of rangelands, pastures, annual forages and purchased feeds. The remaining 10% can be derived off farm for supplemental feeding, usually in the dry season. There can be huge variations in this production category, from cattle raised on fertilised and irrigated pasture in Europe, to sheep grazing on semi-arid scrub in the Karoo. Not all grazing systems are equal, with many of

them responsible for some form of rangeland degradation (Norborg 2016). Extensive livestock farms that practise HM fall into this category.

Mixed crop-livestock systems: This imprecise category includes livestock that are fed a mixture of between 10 and 90% grass, with the remainder derived from concentrates. It includes both farms that feed 89% grass and 11% concentrates and farms that feed 11% grass and 89% concentrates.

Landless systems: Also known as feedlots, concentrated animal production units, grain-fed, intensive, industrialised or concentrated systems. These systems feed more than 90% concentrates and less than 10% grass. Animals are not bred in these systems, rather they are brought in from grazing or mixed crop-livestock systems and are finished or fattened before being sent to the abattoir for slaughter. The majority of the world's meat is derived from these systems, with 70% of meat sold in South Africa coming from feedlots (Deblitz 2012). Cattle are the most popular species that are kept in feedlots, but small ruminants, pigs and poultry are also fattened in these systems.

4.6.2.1. Greenhouse gas emissions

Feedlot systems are popular because they operate independent of seasons as all feeds are bought in. They feed high energy concentrates which maximise livestock growth and results in marbling (deposition of intramuscular fat) which is in demand from consumers (Deblitz 2012). Cattle are usually bought in when they are 6-9 months old and only remain in the system for 3-5 months before being slaughtered (Garnett et al. 2017). Feedlot sizes are measured in One Time Capacity (OTC) with the largest feedlot in South Africa holding 130 000 cattle. Because cattle are only kept for a few months, feedlots generally have 2.5 – 3 cycles per year with the largest feedlots producing several hundred thousand animals per year (Deblitz 2012). The high concentration of animals means they are packed quite tightly, with the South African Feedlot Association recommending a minimum of nine square meters per head of cattle (SAFA N.D.). A major problem associated with the large numbers of animals is the accumulation of large volumes of effluent that needs to be treated and managed

appropriately and significantly contributes to greenhouse gas emissions (Cole & Greene 2007).

Grass-fed cattle do not fatten as quickly as feedlot animals and take about 6-12 months longer before they are mature enough for slaughter (Clark & Tilman 2017); on the other hand, they do not compete with humans by consuming grains and other concentrated food. Methanogen bacteria in the rumen require roughage and because grass-fed cattle consume more roughage than feedlot cattle, they produce more methane (Mitloehner 2019). In grass-fed cattle, 61% of greenhouse gas emissions come from enteric fermentation, while 20% come from feed production but in feedlot animals, 52% of emissions come from enteric fermentation and 30% from feed production (Clarke & Tilman 2017). The difference in diet and longer time spent on pasture mean that grass-fed cattle overall, have 20% higher green-house gas emissions (Clarke & Tilman 2017). But, under certain grass-fed livestock management systems, greenhouse gas emissions can be mitigated against if carbon soil sequestration is accounted for (Derner & Schuman 2007). Additionally, it is worthwhile noting that when emission comparisons are done between grass-fed and feedlot animals they are generally measured per unit of food. Thus, per kg of meat, grass-fed beef has a larger footprint. But if feedlots are able to get two or three cycles of cattle for every cycle of cattle on grass, then yearly emissions in feedlots would far exceed grass-fed beef. The management of manure and urine is also problematic in feedlots, while grass-fed animals provide nutrient recycling as a by-product of the grazing system, sequestering carbon and improving soil water holding capacity.

So, while it is true that grass-fed cattle produce more greenhouse gasses than their feedlot counterparts, care must be taken before determining that feedlots are the more environmentally friendly option. Not all methods of livestock production are equal and because the majority of grazing systems result in a reduction of vegetation growth, this is the benchmark against which environmental impacts have often been measured (Garnett et al. 2017). Because regenerative systems are still the exception, the true benefits of these systems remain unquantified. It is possible that if soil carbon sequestration was

included, grass-fed cattle under regenerative management would have a lower emission profile and better environmental credentials than they currently sport (Derner & Schuman 2007; Clarke & Tilman 2017).

4.6.2.2. Resource usage

Worldwide meat consumption is on the rise, yet the environmental impact of animal-based foods far exceeds those of plant-based ones. Emissions from meat production can be 250 times higher per gram of protein than those recorded for legumes (Tilman & Clark 2014). In a comparison of processed meat-substitutes, Mejia et al. (2016), found that they produced at least 10 times less greenhouse gas emissions than their meat counterparts. Furthermore, meat production uses more land, consumes more fresh water, uses more fossil fuels, results in more pollution, eutrophication and terrestrial acidification than plant-based foods (Poore & Nemecek 2018). All in all, there is generalised consensus that a global shift to plant-based diets will help ease some of the environmental pressure that meat production causes (Clark & Tilman 2017, Hayek & Garrett 2018; Rogelj et al. 2018).

While these claims are certainly valid and reducing the consumption of industrially produced meat is a component in alleviating some of the pressure humanity has placed on the planet, a systems approach is needed in evaluating the context in which these comparisons are done. The comparisons usually involve beef and industrially farmed grain or soy. And while plant-based foods may have a lower environmental footprint, that does not mean the way in which they are produced is regenerative. Industrially grown monoculture crops have a slew of negative environmental impacts, from being highly dependent on fossil fuels, reliant on industrial pesticides, herbicides and fertilizers, to needing irrigation and causing eutrophication from water run-off (Adler 2002). Additionally, soil health declines, resulting in a loss of soil carbon to the atmosphere, a reduction in soil bacteria and a loss of biodiversity for both plant and animal species (Lin et al. 2011).

Unless farming builds soil, it cannot be considered sustainable (Mollison 1988). Thus, while plant alternatives may have a smaller environmental footprint than

beef production, they are not necessarily sustainable alternatives. Sustainable alternatives need to practise regenerative agriculture and build soil biology and health. Livestock, grazed according to HM principles, are able to do this. They help cycle nutrients back into the soil, promote better grass cover and soil health. This results in better water retention which increases soil bacteria populations, plant, insect and animal diversity and helps re-establish the natural cycles of ecosystems.

Resource usage is an important aspect of determining the extent of the environmental impact of beef compared to soy. Where neither system in sustainably managed, both systems will deplete soils. While soy may then be the lesser of two evils, it will still cause degradation albeit at a slower rate. However, for both grazing and crop production, attention should be placed on regenerative agriculture, where cattle play an important role in nutrient cycling in the rangelands, provided they graze in an appropriate manner. Livestock and crop production are not necessarily mutually exclusive enterprises and animals can help support sustainable crop production in integrated farming systems where the land is suited to arable agriculture (Pollan 2006).

4.6.3. Carbon sequestration

Savory is most criticised over the claims he made during his 2013 TEDtalk where he suggested that widespread adoption of HM could help sequester enough carbon in soils to bring atmospheric carbon down to pre-industrial levels (Savory Institute 2013b). In Nordborg's (2016) assessment of HM, she critically analyses these figures and concludes they are wildly optimistic, resulting in a falsely high indication of what is possible through soil carbon capture. Substituting scientifically validated estimates for the ones used by the Savory Institute, she concludes that under better management soils would only be able to store an extra 0.35 tons of carbon per hectare per year, a value seven times lower than the Savory Institute's estimate. Additionally, an average pasture would only be able to store a total of 0.8 tons of carbon per hectare per year, resulting in a total of 27 billion tons of carbon globally. This represents only less than 5% of the total carbon released into the atmosphere since the industrial

revolution. Norborg therefore concludes that HM is unable to bring atmospheric carbon to pre-industrial levels.

The figures Nordborg uses are based on conventional agricultural systems. HM is restorative and by increasing grass cover and water retention increases the carbon sequestration in the soil. One can appreciate that HM will sequester more carbon than conventional systems. While the Savory Institute (2013b) note in their calculation that their figures are untested and not validated, the figures Nordborg uses are well established but based on conventional systems and may be inappropriate in HM scenarios.

4.7. Conclusion

Alan Savory developed HM out of a deep-seated drive to reverse desertification and restore rangelands. In developing the grazing strategy to help facilitate this, Savory discovered that implementing a grazing system was not enough. The grazing depended on farmers' ability to manage a farm and the grazing system was only sustainable if the farm in its entirety was sustainable (Hadley 1999). HM therefore developed from a grazing system into a decision-making framework that would help livestock farmers transform a conventional rotational system into a sustainable farming enterprise. Savory discovered that farmers frequently farmed to continue with the family business and had no clear goals behind why they farmed. HM therefore started by addressing why farmers farmed and what they needed in order to achieve their desired quality of life.

Additionally, HM allowed farmers to develop a set of goals, determine the resources available to achieve their goals and a blueprint for acquiring the resources needed to achieve their vision. The farm therefore became the means to achieve their quality of life and improved farmers' commitment to the farm (Savory & Butterfield 1999). HM provided guidelines to ecologically sound grazing, the design of the farm that would facilitate it and improved financial tools to achieve productivity and profitability. Productivity however is not based on increasing efficiency (in the conventional sense), but by creating a robust

and resilient ecosystem. HM is not a prescribed system but a set of principles that needs to be adapted to individual environments. Because it recognises the complexity of ecosystems, it dissuades strict adherence to rules, but rather encourages farmers to make changes, observe the results and change management practises accordingly (Savory Institute 2015a). It is an iterative system that is fully customisable to the variety of ecosystems where livestock are kept on rangelands.

HM has strong support from many practitioners who to have adopted the system (Norborg 2016). Many farmers have seen the benefits of the systems approach across multiple spheres of the farm, including improved soil health, improved grass cover, improved water retention, (with many reports of the revival of dry springs) and the return of biodiversity (2013). Despite the praises sung by the farmers themselves, the system has not seen widespread acceptance amongst the scientific community (Norborg 2016). Cattle have been vilified as major contributors to greenhouse gas emissions and many question the practise of increasing cattle numbers (Clark & Tilman 2017).

Additionally, rangeland science has documented the improvement of overgrazed pastures after livestock removal and have subsequently viewed cattle numbers as the major causes of rangeland degradation (Briske et al. 2011). Although this is true, this is not necessarily as a result of the cattle themselves, but rather inappropriate grazing practises. While studies have been done to compare HM with widely practised rotational systems, this has proven to be difficult as the conventional reductionist approach is difficult to adapt to the dynamics of complex systems (Norborg 2016). Thus, many studies have attempted to standardise grazing practises in their comparisons but due to the nature of standardisation have had to limit the inclusion of HM's decision-making framework (Briske et al. 2008). So, while scientific studies fail to demonstrate HM's superiority over well-managed conventional systems, HM practitioners have criticised the exclusion of the decision-making framework, stating that it is an integral part of the system (Teague 2013).

The next chapter explores the adaptation of HM to the communal homelands and its implementation in the village of Mceula.

Chapter 5: Introduction of Holistic Management in Mceula

5.1. Introduction

This chapter is an introduction of how the HM project was conceived, formulated and then introduced into the village of Mceula. It also documents how the programme, which was designed for commercial livestock farms, was adapted to the communal farming context of this rural village.

5.2. Formation of Holistic Management pilot project

The successful introduction of HM in Mceula required a synchronised sequence of events, which started many years ago. It is perhaps easiest to begin the story with Neil Evens, a commercial beef, wool and Merino stud farmer in the Eastern Cape, somewhere between Hogsback and Cathcart. Neil's great grandfather, Arthur Stubs Evens, worked as an educator for the infantry stationed in Grahamstown in the 1850s during the last of the frontier wars. In 1905 he bought the farm and in 1912 bought the neighbouring farm which has been passed down through the Evens family ever since. Originally the sheep and dairy cattle that he kept grazed continuously. Even when Arthur Stubs Evens eventually fenced the entire farm and set up rudimentary camps, they were too big and the livestock effectively continued with the continuous grazing practise, albeit in extremely large camps. When Neil's father inherited the farm, he constructed 6 camps with watering points and started a rotational grazing system. After completing studies in agriculture, Neil took over farming responsibilities. In 1997 Neil attended a HM course presented by Dick Richardson where he was instantly converted and began implementing HM on his farm. He has since undergone further training in order to become an HM instructor.

Before the HM course, Neil thought the farm had good veld, but subsequently learnt that while it was true that there was good rooigras (Themeda triandra) cover, much of it was moribund and of limited nutritional value. There were very

few fine seed grasses and an abundance of steekgras (Heteropogon contortus) which is unpalatable and decreases wool quality where it easily lodges and contaminates the fleece. Implementation of HM on the farm was slow as it took a long time to get rid of the moribund grasses without resorting to fire. Over the years, the veld condition has slowly improved and currently Neil's entire herd consists of 5 000 sheep and 1 200 cattle. His current stocking rate is 1LSU: 2.3ha, almost 3 times higher than government recommendations for the area. At the moment his average grazing period is 3 days, but he suspects once he starts herding within the camps, he will be able to decrease his average grazing period to just 1 day which would allow him to increase the herd size. He predicts that the farm will eventually reach a stocking rate of 1LSU: 1ha. That is twice as much livestock as he currently runs and five to six times higher than government recommendations! He has been farming in this manner for more than 20 years and continuously sees the benefit both on the rangeland and in the health of his animals (MI2).

When you speak to Neil, his passion is evident. He has a deep love for the land and is a grass farmer before he is a sheep or cattle farmer. His appreciation for the importance of biodiversity is evident in the excitement on his face when he spots a rare species of grass or when he proudly boasts that neighbouring wildlife frequently migrate onto his farm because the grass is so good. Equally important is his need to share this with others and his Christian duty to give back to the community. It is through these desires to both give back and share this new way of farming that he connected with the Olive Leaf Foundation (OLF). When questioned about how the partnership formed, he said, "it was both an organic and divine process" (MI2).

The OLF as it currently stands is a sustainable development organisation (SDO) which comprises around 5-6 permanent employees. This however was not always the case and the organisation has gone through a few iterations. It started as the 'Love Project' in 1989, a community-based organisation (CBO) that grew out of a volunteer church group. In the early 2000s, as the organisation grew and received more funding, it evolved into a non-governmental organisation (NGO) that then joined 'Hope Worldwide' and

became the South African branch. At its biggest, the organisation had around 400 permanent employees. In 2007 the organisation, disillusioned by the increasingly corporate trajectory and the high costs of running a top-heavy organisation that left relatively little money available for social change, underwent a drastic restructuring process and emerged in its current form, as an SDO called the OLF. The newly formed OLF identified urbanisation as a major problem in South Africa but needed a platform from which to operate.

The organisation already had a strong land-based focus and its biggest strength revolved around community mobilisation. After looking at various options, the OLF felt a strong affinity to the Savory Institute, which also had a very strong land focus and decided to become a Savory Hub. However, in order for the OLF to become a Savory Hub, it needed a demonstration site. This is where the partnership between Neil and the OLF was formed. Neil wanted to give back though some form of development initiative but lacked the necessary time due to the rigors of maintaining a commercial farm. Thus, Neil provided the site for training while the OLF provided the expertise needed to facilitate the community development. It is important to differentiate here between the Savory Hub and the OLF. The Savory Hub is the platform from which HM is taught while the OLF, along with Neil, provides the necessary training. In addition, OLF is also involved in other community mobilisation and development projects. The OLF feel that without a strong land focus, ancillary projects will not be successful. Thus, HM is promoted by the OLF because it aims to develop a strong natural resource base, upon which their other initiatives can emerge (MI2; MI3)

A key determinant in the manner in which HM was implemented was the learnt experiences of the people within the OLF. It started as a small community-based organisation that was intimately involved in the day to day lives of the people they helped. The growth and gradual expansion to join a large non-governmental organisation changed the way in which assistance was extended to the community. There were more barriers between those extending aid and those receiving it.

The organisation became top heavy and implementation became more top-down orientated. The regression back to a smaller sustainable-development

organisation allowed the OLF the ability to retain important skills and institutional knowledge and the opportunity to once more work more closely with communities they wanted to help. The OLF found a middle space where they had the skill sets to work with large, international companies but remained small enough to facilitate more intimate, ground-based work with communities. Having learnt from past experiences, it has good working knowledge of how to mobilise and facilitate introduction of new ideas and techniques in local communities. A large part of the success of Holistic Management in Mceula derived from how the OLF formulated, structured and introduced the project (MI3).

The OLF secured a 2-year grant from an overseas donor, with a brief to fund community mobilisation and the implementation of HM in the communal sector and to promote HM in the commercial sectors. Strangely enough, although HM was initially intended for commercial operations, uptake with the commercial livestock farmers was surprisingly poor (for the purposes of this discussion, the implementation the OLF facilitated within the commercial sector will be ignored). However, on the communal side, the community response was much more positive (MI3).

Once finances were secured then came the task of deciding on the specifics of the project. The main livestock in the communal area of the Ciskei are cattle, sheep and goats. Wool production was chosen as the most likely economic driver for a few reasons. First, wool grows back and can be harvested repeatedly. Second, there is a meat component when using the dual-purpose Mutton Merino sheep. Third, wool prices are stable because most of South Africa's wool is exported and prices are dollar based. Fourth, the market is established and mature, meaning entry for emerging farmers is relatively easy. Finally, market research shows that the demand for wool is rising and the South African market could easily increase their supply without saturating the market and affecting the price (DoA 2006; DAFF 2016a; MI3; MI4).

Goats are mainly consumed locally within the community and have very little market potential. The most common market for cattle is the abattoirs where communally farmed cattle fetch very low prices. These low prices are due to

the poor breeding of the cattle, due to genetic dilution with exotic cattle breeds (Bester et al. N.D.). There are many dairy operations in the Eastern Cape. Within the dairy industry, male calves are a liability and frequently sold at very low prices. Many farmers in the homelands buy these calves resulting in many dairy bulls entering herds in the former homelands. While a Holstein may be a big breed, they have very little meat. When these bulls breed with the smaller, local Nguni cows, the result is a small, skinny animal that fetches low prices at the abattoir (MI4). Although this can be rectified, it is a slow process and will take many years to develop the right genetics for beef production in the former homelands of the Ciskei (Bester et al. N.D.).

With the decision made of using wool as the economic driver, the OLF approached three other associations to assist emerging communal farmers from a commercial perspective. Cape Wools was the biggest partner and assisted with some of the direct operational costs of the project (mainly around financing the training of HM), the National Wool Growers Association assisted the communal farmers with technical expertise around wool production and BKB (one of South Africa's biggest Agri-businesses) assisted the farmers with sales and marketing training (MI4).

5.3. Deciding on the location for the pilot project

The OLF had been doing various community mobilisation projects in the Zulukama area since 2011 while the HM pilot was still being formulated. It is due to these efforts and their presence in the local community which prompted the Royal Family of the Rharhabe Kingdom to approach the OLF and ask them to work together with some local businessmen looking to do projects in the area. The request by the Royal Family coincided with the completion of the proposal for HM mobilisation in the communal homelands (MI3).

The OLF finalised the details of the HM project and presented this to the 36 villages of the Zulukama area in 2015 (MI3; MI4; MI5). In a community presentation to the royal family, chiefs, headmen and villagers, the project was

offered to the various villages, however, none openly volunteered to pilot the trial. But when the presentation ended and the OLF were packing up, a contingent of youth farmers from Mceula's farmers association, led by Ayanda Mrwebi, approached the OLF and said they were interested in this new project (MI5). It is no surprise that Mceula volunteered when one considers their history with Shane Brody, an employee of the OLF.

The youth farmers were a relatively new addition to Mceula's farmers' association who previously felt excluded and voiceless. They felt the farmers' association was mainly made up of old male farmers who did very little in actively improving livestock production. In 2006, the Zulukama Chiefs formed the Zulukama Community Investment Trust which encompassed all 36 villages with a view to improve agriculture. They were an active group and provided services like mending and erecting fencing, fixing dipping tanks and erecting shearing sheds. Part of the programme involved encouraging the youth to get involved in agriculture. Out of this initiative, some of the youth in Mceula tried to get involved in the local farmers' association but were met with some resistance from the local farmers.

After much negotiation, the youth formed a formal structure within the farmers' association in 2013 and in 2014 registered as a youth co-operative led by Ayanda Mrwebi. In 2014 the Chris Hani District Municipality donated 700 sheep, distributed evenly to seven such co-operatives in the area. The rationale behind the donation from the state was to stimulate rural development and help transition the subsistence farmers into commercial farming. Unfortunately, the 100 sheep they received were delivered in the middle of winter, when very little forage was available, and no provision made for supplementary feeding. To make matters worse, unbeknownst to the farmers, the sheep were all pregnant ewes (MI3; MI4; MI5).

Shane was employed by the OLF at the time when he was asked to help some young farmers in desperate need of assistance. Because the ewes started aborting and lambs were dying the OLF asked Shane to help the young farmers. Shane started a process to limit abortions and lambing mortalities and help find feed to supplement the poor winter grazing. Although many lambs

died, most of the ewes were saved. It is through this process that Shane earned the respect of the youth farmers. When the youth co-operative asked Shane if he considered HM a good idea, he said it was and that unless they improve the veld, the poor grazing would prevent any form successful farming in the future. Ayanda was sold on the idea of HM and convinced the group and later the village that this project was the best chance they had to restore the degraded landscape (MI3; MI4; MI5).

This choice to try a radically new approach to livestock grazing is not commonly done and this can be seen by the lack of uptake when the project was presented to all 36 villages. Shane had generated trust and earned the respect of the youth farmers, who valued his opinion that HM was the only way they were going to save their veld. Shane's credentials are based on more than just this single experience in rescuing pregnant sheep, he is also fluent in Xhosa and has farmed commercially for the last 27 years in both livestock and crops in the Eastern Cape. He is sensitive to the communities' feelings of dispossession because he also knows what it is like to be uprooted and have your land taken away. His father was a farmer in Lady Frere, but in 1974, their land was expropriated to form the Transkei and they were forced to move. They found another farm and moved to Indwe where they grew maize, but their farm was expropriated a second time when Shane was 4. His farther bought a third farm near Queenstown, but farming was never the same again. Shane studied social science at Rhodes University, but after studying, he went straight into farming. All this has allowed Shane the ability to embed himself within the communities he works with and has earned the respect of the people he trains and advises in livestock management. It is this trust and respect for Shane, that provided the impetus for the youth farmers of Mceula to take the risk of applying HM in their village (MI3; MI4; MI5).

5.4. Implementation

5.4.1. Implementation overview

The process of introducing HM in the former homelands started long before work began in Mceula, and involved a preliminary investigation into feasibility, acquisition of funding and then generalised community mobilisation to the broader Zulukama community. Once the village of Mceula was identified as the entry point for implementation, a community mobilisation campaign and training programmes were instituted to embed HM in the pilot site.

HM was specifically designed to facilitate the transition of commercial livestock farms from traditional rotational grazing to HPG. It requires a paradigm shift from the conventional linear perception of livestock production to a whole systems approach (Savory Institute 2015a). The importance of this came into stark contrast in the early stages of HM when earlier models failed because the grazing method was implemented in isolation (Hadley 1999). New theoretical frameworks were needed to help understand how the components of the farm were embedded in the whole. The other pillars of HM, namely the HC, HFP and the HLP, were developed and added to the HGP to help transform the commercial farm into a sustainable business.

This is a very different context than grazing in the communal homelands. The history of the homelands, as explained in detail in previous chapters, is one of forced resettlement of families, dissolution of cultural practises and forced labour migration (Mears 2005). It broke the social capital built over generations in the Eastern Coast of South Africa, and the former homelands are now characterised by “landlessness, vulnerability, unemployment, lack of basic services and, above all, poverty” (Lahiff 2005). The lack of economic opportunities (Bank & Minkey 2005), complex land tenure (Wotshela 2004), ambiguous governance (Wotshela 2004), urban migration (Kepe & Scoones 1999; Mears 2005) household demographics (Goni et al. 2018) and reliance on state grants (Baiphethi & Jacobs 2009) all play a role in why communal grazing is the only system currently practised in the homelands. It is systems thinking that allows HM to be sensitive to the fact that in the former homelands, multiple

households have variable amounts and types of livestock which are all grazed on commonage in an open access manner with no regulations (Mapekula et al. 2009). HM allows for local adaptation of the system and therefore increased chances of local success.

Training for commercial farmers usually involves traditional classroom teaching with computer generated slideshow presentations over the course of a few days. Students are given all the content, talked through the basic principles and taught the mathematics behind the HPG and HFP during the course. After the initial course, participants begin implementation on their own farms with very little further assistance, although there are online forums and community groups available (MI3).

This is radically different from what is needed in the communal homelands. The OLF had to drastically alter the delivery method and content in the training of the small-holder farmers in Mceula who have a different level of education and raise livestock on communal land. The content which consisted of introducing ecological principles, HC, HPG, HLP and HFP had to be adapted for the context of the community. Further ancillary training was added to address knowledge gaps, specifically regarding animal production, husbandry and health and market training (MI4). In addition, a method was needed to facilitate ownership of the programme, so that when the OLF eventually withdrew, the practise would sustain itself.

This was accomplished through a holistic process by including the entire HM programme adapted to the local context, augmented by ancillary training presented through a 4-phase approach which included: 1) Community Mobilisation, 2) Training, 3) Facilitation and 4) Enterprise Development (MI3). It is tempting to view these phases as sequential and when the first phase has been addressed, the project would move to the next one. Conventional training favours this linear progression but frequently can degrade to box ticking, rather than promoting deep learning (MI3). The OLF favoured a looser structure where any or all 4 phases could be presented simultaneously, but with emphasis being focused on certain phases depending on how far along the implementation phase was. This allowed a more informal interaction where people were able

to bring up topics that had been addressed previously, without feeling that certain topics were already discussed and now off-limits. This allowed internalisation of concepts, ownership of ideas and continuation of the practise without external support (MI3).

The importance of maintaining the integrity of the entire programme, filling knowledge gaps and presenting information in an empowering way cannot be overstated. It can be tempting to only teach grazing principles, but this is not HM, which requires the complete system to form the decision-making framework (Gill 2009). A project seeking to implement HM in Hwange Communal Lands in Zimbabwe attempted to implement two principles, namely HPG and animal impact on crop fields. Farmers were incentivised to follow the programme with a monetary allowance given to herders and improved access to water through water tank and trough construction. Many farmers joined the project to access these benefits but covertly resisted the programme (Chatikobo 2015). This demonstrates the importance of a systems approach, which the OLF employed with great success.

5.4.2. Community mobilisation

Community mobilisation is the process of encouraging, “communities in activities seeking to empower them or build their capacity to exercise greater agency over their well-being, through increasing their opportunities for meaningful social participation and building enabling partnerships with supportive outsiders” (Campbell 2014:48). The process of gathering disparate individuals and creating a shared community goal is a time-consuming process and in the case of the HM pilot, started in 2011, many years before HM was first implemented in 2015.

Because the OLF had been active in community mobilisation projects in the Zulukama area for some time, the Rharhabe Royal Family approached them in 2011 and asked the OLF to work with some local businessmen looking to do projects in the area (MI3). This became the impetus for the start of the HM pilot.

The OLF started preliminary investigation into the feasibility of implementation of HM and held informal meetings with local farmers and farmers' associations to gauge interest and commitment levels. Due to the positive response, the OLF began the process of becoming a Savory Hub and soliciting funding for the project of introducing HM into the former homelands. In 2013 a two-year grant was obtained from an overseas donor with the proviso that community mobilisation of HM be attempted in both communal and commercial sectors (the introduction of HM in the commercial sector was not successful, the reasons for which lie outside the scope of this discussion) (MI3).

An important part of the implementation process was getting to the people on the ground as soon as possible. Although it is important to get the approval of the relevant authorities and stakeholders, sometimes they can act as gatekeepers and prevent or hamper any project. The OLF know this first-hand because they have worked on many community projects and have learnt from past experiences. With the HM pilot, once approval was granted from the royal family, instead of working down the hierarchal ladder and trying to get approval from all intermediaries, the OLF went immediately to the farmers and started working with them. Although the OLF would not divulge too much information due to the sensitivity of the topic, they said they followed this approach because previous, unrelated projects were derailed when too many 'middlemen' became involved. Because they started working directly with the livestock farmers very early on in the pilot project, they developed a strong relationship with them. When other parties tried getting involved, attempting to infiltrate or derail the project for personal gain, it is the livestock farmers and villagers that prevented this from happening (MI3).

Initial community meetings would combine community mobilisation together with training. Community mobilisation was designed to allow villagers to understand the full scope of the project and set realistic expectations on what members could expect. It was open to all villages and allowed them the platform to raise concerns and ask further questions about the process. Because it was not structured, any topic could be discussed during the many informal meetings. Basic eco-literacy and the environment training was instituted at these same

meetings, which would set the stage for the more formal HM training later on. As community mobilisation continued, the HM implementation phase was being developed. While one could consider the mobilisation phase as starting in 2011, with the preliminary investigation and community buy-in, the vast majority of the active work occurred during 2013 and 2014 due to the financial support by the major overseas donor (MI3).

Because wool was chosen as the most appropriate economic driver, local partnerships were established with Cape Wools who came on board as a major financial contributor for the HM training, the Wool Growers' Association, who helped with technical training and BKB (one of South Africa's largest agribusinesses) who assisted with market related training. With the project structure finalised a village was needed in which to embed the HM pilot.

5.4.3. Training

The grazing plan can be taught in as little as two days. While the theory is not difficult to teach, the practical application and sustained usage of the system is much harder without the ecological background and community buy-in. Training first involved getting farmers to understand the importance of the grass. Many superficially know that grass is important to livestock but view the two as separate entities, not part of a continuum (MI5). Part of the challenge in education is cultivating the realisation that the grass is intrinsically connected to their livelihoods. That they are grass farmers before they are livestock farmers and their primary goal is to ensure the productivity of the rangeland (MI4; MI5).

Training happened simultaneously with community mobilisation. Due to the difference in education level in the rural homelands compared to commercial farmers, content and delivery method of HM training needed to be adjusted. Content delivered in the initial phase was aimed at eco-literacy and environmental awareness. Due to illiteracy of some farmers, instead of conventional PowerPoint presentations, flashcards were used. Because the

meetings were informal affairs with no strict agenda or timeline, progress, speed and content were determined by the community themselves. If villagers felt unsure about certain issues or had questions about a previously covered topic, they could bring these up during the meetings. While one would not consider this process co-production, the OLF taught it in a way that was respectful of the people involved, and helped people begin to identify with the environmental ideas and concepts while at the same time allowing assimilation of their own ideas and traditional knowledge. When questioning the OLF about the process of implementation, they said they did not like to use the term 'implementation', as it implied a linear progression with a checklist of things that needed to be done in order to fulfil the designated requirements. Instead they preferred the term 'community mobilisation', stating that it was a much more organic, informal delivery, but with better participation and community involvement (MI3).

When the community mobilisation and eco-literacy had progressed to a well-established point, it was time for the HM pilot to be introduced to a village. In 2015 at a large meeting with the Rharhabe Royal Family, the chiefs and members of the 36 villages of the Zulukama area, the OLF explained the intention using HM in the former homelands to restore rangelands but needed a village in which to trial the process and asked for volunteers. Mceula volunteered to host the pilot because of the affiliation the youth farmers had developed with Shane when he helped save the ewes that were donated in the well intentioned, but badly executed rural development programme initiated by the local government's agriculture department the previous year (MI3; MI5; MI6; MI7).

Acceptance at the meeting did not guarantee community buy-in. It took another 4 meetings with the whole village over the course of 2-3 months before the village decided to continue with the HM pilot (MI3; MI5). There are between 380 – 400 households in Mceula and almost every household owns at least some livestock (MI5). One of the basic requirements of HM in the former homelands is the need to consolidate the small individual herds into a single, large grazing unit. A mixed herd of ruminants like this is called a 'flerd' and included cattle,

sheep, goats and the occasional horse and donkey. Combining animals into a flerd can have distinctive advantages over grazing each species separately. First, a single herd is logistically easier to manage and is less labour intensive (Thomas 2010). Secondly, each animal has different dietary requirements and grazes different grass species. This allows for a more uniform and complete utilisation of available fodder (Thomas 2010). Thirdly, some plants may be toxic to certain species, letting the resistant species graze first will allow undesired plants to be trampled and reduce the concentration of the toxic elements for susceptible grazers. From a production perspective, animal husbandry is easier to manage and can improve livestock production efficiency by having specific breeding seasons and regulating male to female ratios (Undersander et al. 2002).

Once the principles and practises of HM were outlined and accepted then the technical training could begin. Over the next few months, Shane was responsible for training and knowledge transfer to all the livestock farmers in the pilot project (MI3). This entailed meetings with farmers which started at 2-3 days a week and then gradually tapered to 3-4 days per month (MI4; MI5). Content had to be adapted to the villagers in Mceula and this is where co-production became more overt. While the HC was not formulated by individuals, as it is done in commercial training, a collective HC was developed. The creation of a shared vision for the health of the rangelands created a common purpose and a common understanding of how the rangelands would be managed (MI3). This started to create the conditions necessary for a transition from an ‘open-access’ system to ‘common property’ and sustainable resource management (Bennett & Barrett 2007).

The HPG was simplified and only the mathematical calculations for fodder estimation were omitted. With the help of the facilitators, farmers were guided through the process of drawing up their own HLP. Villagers and herders drew out their available grazing lands on a map and marked and labelled various landmarks and created their own virtual camps. Villagers then worked with facilitators to create a grazing plan. With all animals being combined into a flerd, less herders were needed to control the livestock. Herders were employed by

the farmers' association and trained in herding, some herders from surrounding villages were also invited to training sessions.

The herding that was practised was not the nuanced herding practised on Dimbangombe, the HM training farm in Zimbabwe, where herders actively and continuously move the herd. Rather training started just with herders learning how to use natural landmarks to create virtual camps and keep the herd within these spaces. Later the size of these virtual camps was reduced, allowing for a concentration of animal impact, but herding essentially consisted of moving the herd to virtual camps and keeping them there for the desired time. This allowed the other areas of the rangelands time to recover. While it was always the intention to teach herders how to herd livestock actively, the drought which struck in 2015, when HM training started, severely affected recovery of the rangelands and the ability to implement the more advanced principles. It is only in 2019, four years after training started that herders were sent to Dimbangombe, the site of the African Centre for Holistic Management (ACHM), to witness first-hand the effect that this form of herding can have on the rangelands and how to implement it more effectively. The herders who went to the training farm recently returned and noted the abundance of grazing available due to HPG practises. They plan on implementing controlled herding at the start of the new year in 2020.

Finally, the principles of HFP were also taught. Large parts of the content within the commercial curriculum were technical details necessary for a commercial livestock operation. This was omitted but basic principles of financial planning were emphasised to help facilitate entry into formal markets (MI3; MI5).

In summary, the main portion of the active HM training occurred in Mceula after the big meeting with all 36 villages and only lasted 4-6 months. The reason for the short process was the bulk of the community mobilisation had already taken place. All the villages had known of the project for years and had been active participants in the development of the project. Furthermore, because Mceula had volunteered to be the pilot, there was no imposition from external sources, and they were invested from the beginning. It is important to note that all principles of HM were taught. While certain content was simplified, only content

that was technically inappropriate was omitted. Thus, HM in its entirety was taught. It is also worthwhile emphasising that HM is a decision-making framework. It is not a method of grazing. It allows practitioners to use environmental principless to manage rangelands in complex, dynamic environments. It promotes experimentation and the incorporation of results into management practises. Thus, while environmental principles can be taught, the decision-making cannot be. It needs to be facilitated by empowering the practitioner. There was no definite time when training transitioned into facilitation. Rather it was a gradual reduction in meeting frequency with less and less input given by the OLF and more agency employed by practitioners (MI3; MI4).

5.4.4. Facilitation

The facilitation process was characterised by a gradual reduction of Holistic Management training, introduction of ancillary training and a reduced presence of the OLF. Part of Shane's role, over and above teaching HM, was to introduce and teach other elements of livestock and wool production that would have a positive impact on all stages of production and income generation for farmers. Animal husbandry involves day to day care, breeding and raising of livestock. In communal systems, there is very little active animal husbandry practised which affects the production potential of the livestock (Scholtz et al. 2008; Stroebel et al. 2008). The OLF included training of basic animal husbandry, focussing specifically on wool production but alluding to aspects of cattle husbandry as well. The initial focus on wool was due to the potential of wool as most effective economic driver. Concepts of controlling breeding season, improving herd genetics through importing better stock, selective breeding and regulating male to female ratios where introduced (MI3; MI4; MI5).

In the continuous grazing strategy used in the communal homelands, there is no control over animal movement or behaviour. As a result, animal husbandry cannot be practised effectively. However, when combining all individual household livestock into a single herd, animal husbandry becomes more

important and also easier to manage (MI6; MI7). As discussed earlier, the potential of livestock is limited when poor breeding stock is used. Many herds in the communal homelands have a relatively high number of intact males, many of which are of poor genetic potential. While the ideal considered for commercial farms is one bull to 20-30 cows (Taylor 1984), Shackleton et al. (2005) suggest that the ratio in some communal villagers may be as high one bull to three cows. This large percentage of bulls limits the ability to influence the genetic make-up of the herd and also lowers the ability for the herd to grow due to the paucity of females. The same principles can be applied to wool sheep although the ideal ratio here is one ram to 35-50 ewes (Kenyon, Morris & West 2010). Altering flerd composition would therefore increase the genetic potential of the group while simultaneously allowing it to grow more quickly. Although it must be remembered that in the communal homelands, livestock are not solely kept for commercial reasons but are also kept for traditional and spiritual reasons as well as for draught power. Therefore, Beyene et al. (2014) suggest that it may be acceptable for these ratios to be adapted for local communities and allow for a larger proportion of male animals for cultural use, but not too large as this would reduce the herds' reproductive potential.

The OLF identified market training as another key aspect of empowering livestock farmers, as they found that livestock farmers frequently focused on increasing the number of animals they owned, but did not appreciate what the market required. Thus, the OLF invited BKB to give training on the logistics, marketing and selling of wool and invited speakers to talk on market requirements so farmers could focus on producing a product for the market that would provide a higher premium (MI4).

The National Wool Growers Association provided training on wool production and gave demonstrations on wool quality (crimp, diameter, length, strength and contamination) and how this translated into price differences. It was found that communal farmers received very low wool prices because their wool had weak spots and when the fibres were stretched, would snap in the middle. This was due to poor forage quality in winter and the lack of food corresponded to weak spots found in the wool. Subsequent grazing management allowed sufficient

forage during winter, eliminated weak spots which doubled wool fibre length and dramatically increased the price farmers received for their wool. Animal health was another aspect that received attention and training was introduced in the common diseases, highlighting recognition, treatment and prevention. Various drug companies were invited to give presentation on vaccines, dewormers, parasiticides and drugs used in the prevention and treatment of diseases (MI3; MI4; MI6; MI7).

With the end of HM training and ancillary training that would increase livestock production and give farmers tools to enter commercial markets, the OLF gradually reduced their presence in Mceula. In 2016, with the majority of the training in Mceula completed, villages in the surrounds had seen the improvement of Mceula's veld and asked for HM to be implemented in their villages. Ayanda was asked to join the OLF to help train other villages in Holistic Management. By the end of 2017, the OLF had effectively withdrawn from Mceula and functioned only in an advisory capacity (MI3).

In 2018, the OLF felt that HM in Mceula was sustainable and that the villagers could be considered fully fledged HM practitioners. The OLF still had a presence in the village as Ayanda who lives in Mceula is a HM trainer and facilitator, but they stopped organising training and facilitation sessions in the village. Instead any further training or information sessions are now organised by the various farmers groups, like the local Farmers' Association and the local Wool Growers Association (MI3; MI5).

5.4.5. Enterprise development

The final phase in the process is enterprise development where farmers are able to generate their own incomes without external initiation. Mceula is not at that stage yet but there are developments that indicate that this may happen soon as they begin to understand and exploit commercial markets.

There is a cultural practise called 'ukukapa' which means 'to accompany' and is the cultural practise whereby an ox (for a male) or a cow (for a female) is

slaughtered when someone dies. The animal's spirit then accompanies the deceased to the afterlife. Cattle for funeral ceremonies are sold at heavily inflated prices and can fetch between R10 000-R15 000. When sold locally within the community, the same animal would cost between R5 000-R8 000, but this is more a reflection of cultural value rather than market value. If the same animal was sold to the abattoir, the farmer would only receive between R3 000-R5 000 due to the poor carcass quality.

Local farmers therefore have a false impression of the value of their cattle and are reluctant to sell their cattle to abattoirs as they feel they are being under-paid. Sometimes this reluctance also means that they sell their cattle to the abattoir when the cattle are past their prime further reducing the price they receive and strengthening the belief that they are not getting the true value of their animals. If a farmer only has one or two animals, it may be worthwhile for him to wait for a funeral and try to sell his animal at the inflated price, however the funeral and local market are erratic and cannot be relied on to provide a steady income. Abattoirs are the most stable and consistent market and farmers have started to appreciate the reasons for the low prices they receive for their animals.

Previously the size of the herd was the most important metric for farmers, this is becoming less important and farmers are now starting to appreciate the effect the quality of the herd has on incomes. Farmers are now more likely to sell poor quality and old sheep to the abattoir before they lose condition or die. This improves overall herd genetics and offers additional income.

More attention is now paid to the quality of the animals that can be supplied to the abattoir. In addition, instead of selling livestock intermittently as individual animals, when possible they are selling larger numbers of animals and therefore getting larger amounts of money that can be invested in other enterprises. Now it is not uncommon for these farmers to sell 20 sheep at a time and this has enabled them to be better equipped to enter the commercial farming sector if given the opportunity (MI3; MI4; MI6; MI7).

5.4.6. Challenges

5.4.6.1. Drought

In 2015, when HM was introduced, a drought struck the Eastern Cape. For the last four years the region has received little rain with farmers reporting between 30 – 70% of the average rainfall (RNews 2019). Some areas were declared disaster areas and required emergency assistance (Parliamentary Monitoring Group 2019). This has had major impacts on both crop and livestock farmers. Many farmers have had to buy in supplementary feeding while many in the homelands have experienced stock losses (Gift of the Givers 2019).

The drought has severely hampered the veld recovery expected from HM. Despite the drought, there have still been some benefits experienced by Mceula due to the programme. For the first two years, Mceula did not lose any livestock due to drought, while significant losses were experienced by surrounding villages. The third year, 2017, was less kind and Mceula lost a few old cows; this is when HM started to break down (MI4; MI5; MI6; MI7).

The traditional response to fodder shortages in the former homelands was to let the cattle loose and allow them to find their own food. Because the change in management for the first two years of the drought ensured adequate grass for the livestock, adhering to Holistic Management was easier. In the third year, the protracted drought started taking a toll on the Mceula herd and they lost a few of the older animals. Villagers naturally started getting worried about their livestock and some started falling back to older, trusted traditions like letting cattle loose and allowing them to find their own grass. Because more and more villagers started reverting back to continuous grazing, enforcement of HM became more difficult. Meetings and discussions were held to convince farmers that the best thing to do was to continue with the HPG and although many agreed and tried to continue, a growing proportion of members started pulling away from the grazing programme. Many of them demonstrated their willingness to return to the programme when the drought ended. Those less willing to follow HM were in the minority while most of the villagers in Mceula were still strong supporters of the programme (MI4; MI5; MI6; MI7).

It took the combination of a little more rain during the last year (although still battling drought conditions), group meetings and peer pressure to convince the splinter group that the best way to save livestock is to follow the grazing plan. It is worthwhile noting that the OLF did not get involved in this process. Because the OLF was in the latter stages of facilitation and had allowed the development of agency in Mceula, this challenge was addressed and solved by the community themselves (MI4).

5.4.6.2. Water and fencing

A major challenge remains water. A river runs through Mceula, but this only contains water for a few months of the year. In the dry season, two additional water pumps are available. One of the water points borders an adjacent village, but because there is no fencing, stock theft is a major concern when the flerd is grazed there. Thus, the herders are reluctant to graze and water their animals at this site and the central water pump is more frequently used. This, however, concentrates the movement to and from this central point, resulting in high animal impact without adequate recovery. This is an ongoing problem without an immediate solution. A scoping exercise was performed by the OLF (2015) to determine the feasibility and cost of fencing and fixing old water infrastructure like a silted dam and non-functional boreholes. The total cost for assessing functionality of the borehole sites was estimated to cost R23 340, for fixing all water infrastructure issues R460 000, and for fencing R290 000. The repair of these vital resources lies outside the scope of the Holistic Management training and will require a solution internally generated by the farmers' association. But with a more cohesive community structure in place, it is now more likely that this big challenge can be addressed. If not immediately, then at least over a period, tackling one area at a time by following the community generated HLP (MI5; MI6).

Photo 6: Current state of fencing in Mceula (Magan 2019f)

Photo 7: Fence washed away by flooding (Magan 2019g)

5.5. Expansion of the Holistic Management project

While this study focussed on the implementation of HM in Mceula, community mobilisation occurred simultaneously across multiple villages in the Zulukama area. Mceula was the first village in which HM training was implemented in 2015. After the initial success in Mceula after the first year, other villages requested HM training. Due to community mobilisation having already taken

place, implementation and training occurred very quickly and three villages where trained in 2016, with more added every year since then. HM has expanded organically and now training occurs at sites outside the Zulukama area and has extended into the Transkei. To date a total of nine sites have either been trained in HM or are in the process of being trained (MI4).

A new development has occurred and although it lies outside the scope of the study, it is worth mentioning. Tré Cates, who worked as the chief operating officer at the Savory Institute since its inception, was instrumental in helping design the conceptual framework of HM (Grassfed Exchange 2018). While HM was specifically designed for commercial, extensive livestock farms, the principles can be used in other businesses and organisations. Tré has subsequently started a company, nRhythm, dedicated to designing 'regenerative organisations' which he defines as "a living, evolving and naturally functioning organization where abundance and resilience are recurring outcomes of its underlying health" (nRhythm 2018). The exciting new development is that the OLF is now adapting this idea to Mceula to create a regenerative community. It takes similar steps as HM buts expands it to a broader context for a broader audience. While HM is focused more on the environment and farmers, nRhythm expands this to a social perspective and involves the entire community. It has a five-step process which involves (MI4):

1) Community context: much like HM this is expanded to the entire village and involves the creation of a community wide context.

2) Community health: this involves a yearly questionnaire to help gauge community health and identify problem areas. The questionnaire covers many diverse aspects that cover social, economic and environmental issues.

3) Community structures: once a context is developed and the problem areas are identified in the community health survey, structures are then developed by the community to address these challenges. If the community health assessment determined education was a problem, the community would then create a structure that would try to assess and manage the problem (much like the Mceula Farmers' Association is a structure that manages grazing).

4) Community work: HM is a form of community work that is socially and environmentally regenerative. Many other forms may be developed by the community though the structures that were created. If education was identified as a problem area in the community health assessment, then some form of community structure would be created to assess the various issues and problems. The community structure may then set up a programme (community work) like hiring tutors, or creating study groups, or any other intervention that would address the needs of education in the community.

5) Resilience and abundance: This aspect is less a step and more a goal. A benefit of the system is that because the community is united in its approach, systems can be designed that are interconnected and benefits compounded. For example, a food garden promoting food security could intersect with an agricultural programme run at the school.

The HM project in Mceula started essentially at step 4. While it did encompass a big part of the community and introduced the Holistic Context, it was essentially a form of community work that was centred around livestock and grazing. It was appropriate at the time, particularly because it introduced abstract concepts, but with tangible results. It therefore served as a model that residents could understand and when nRhythm came along, the principles where easily expanded to include the entire community over multiple dimensions (MI4). The potential of this latest adaptation to create a ‘regenerative community’ is exceptionally exciting and has far reaching consequences.

5.6. Conclusion

While HM was formulated for commercial livestock farms in the US, its principles are universal to all brittle environments and therefore also applicable to the rangelands of the former homelands. However, the process is not directly transferable and needs to be adapted to the unique circumstances of the Eastern Cape. Widespread poverty, decreased agrarian economies, low levels

of local economic development and low education levels in the former homelands (Bank & Minkley 2005; Lahiff 2005; Pereira et al. 2014) have challenged conventional development initiatives which have generally failed to improve conditions in these areas (Gwaravanda 2017; Mawere 2017).

If introduced in the appropriate manner, that empowers practitioners to fully utilise the decision-making framework of HM, the system can help management of the rangelands of the communal homelands. Its philosophy of holism allows the system to incorporate many factors that influence the whole, in this way, many non-grazing factors that affect grazing in the communal homelands can be addressed. In addition, it advocates experimentation and including the results into shaping future practise. The system is therefore adaptable to local environments and explains the success experienced in Mceula. It is important that the system be taught in its entirety. If only aspects thereof, like HPG, are taught the ability for practitioners to respond to changes is hampered and success is less likely (Chatikobo 2015).

The manner in which the OLF introduced the HM to Mceula was a critical factor that ensured the successful integration of HM in the community. The success of the project and its implementation can be seen in the expansion of HM training in the surrounding villages. Further flung villages in the Ciskei have also approached the OLF, requesting HM training. While HM is centred on rangeland regeneration and livestock production, a village-wide community regeneration programme, nRhythm, is building on the success of HM and is in the process of being implemented in Mceula. The rapid expansion from the HM pilot in Mceula to multiple villages and the introduction of nRhythm in Mceula is a testament to the success of the project.

Chapter 6: Discussion of Case Study

6.1. Introduction

This chapter involves analysing the interviews of the case study and attempts to find common themes amongst the various participants in the project. It uses a reflexive thematic analysis, as defined by Braun and Clarke (2006) to code the data and extract common themes across all interviews. It then uses both an inductive and deductive approach to determine the impact HM has had on the small-holder farmers of Mceula.

6.2. Inductive analysis

6.2.1. Tangible effects of Holistic Management

6.2.1.1. Veld

During the interviews, there was unanimous agreement amongst all respondents that HM significantly improved veld condition. Although this improvement was hampered by the drought, it increased grass production enough to prevent weak spots in the wool of sheep during winter. While surrounding villages experienced substantial cattle losses in winter, in Mceula there were no cattle mortalities during the first two winters. However, due to the protracted drought, during the third winter a few cattle died, but there were still substantially fewer mortalities when compared to surrounding villages not practicing HM (MI4). This is what prompted some villagers in Mceula to question HM and a breakdown in HPL ensued, where a splinter group started allowing their cattle to wander freely and restart continuous grazing (MI5).

The subjective improvement in veld condition has been validated in an experiment comparing the effect of continuous grazing and HM on the Mceula veld. Mudyiwa (2019) demonstrated holistically managed plots in Mceula yielded 261 kg/ha dry matter in the dry season, while plots that practised continuous grazing yielded 109 kg/ha. He goes further and states “holistic

grazing can enhance vegetation conditions in communal degraded lands and improve rangeland productivity for sustainable livestock production" (Mudyiwa 2019:91).

One of the main herders noted that the veld seemed more alive as he started noticing other types of grasses and saw more termites and earthworms. As an avid hunter, he also started seeing rabbits again, which had been absent for a long time (MI6).

One respondent commented that when he first saw the veld in the Transkei, he didn't think the veld could be saved, the degradation was that bad. After this project however, he said, "Holistic Management is the only hope for these [degraded] lands". He added that one should be wary in judging the HM project based purely on veld condition. Due to the drought the veld has not recovered as well as it should have, but based on the other parameters of success like livestock body condition, livestock mortality, wool yields and income, the project has been an unequivocal success (MI1).

As indicated by Briske et al. (2008), the veld improvement could be a result of the management practise rather than the grazing methodology. This could well be the case, as the drought severely limited the veld recovery expected from HM and the improvement may have happened too rapidly to be explained by new grass growth expected from the new grazing practise. Yet, the management practise is an integral part of HM and cannot be viewed in isolation to the grazing practise. Even if one cannot ascribe the change of veld solely to HPG, the benefits can still be attributed to HM.

6.2.1.2. Livestock

The condition of livestock has improved due to the increase in veld grass quality and quantity. This has resulted in better wool quality in sheep and reduced mortality of livestock in winter. In 2014, before HM, Mceula experienced a 30% mortality rate in their adult ewes during winter, but in 2015, this had decreased to 10% (OLF 2019a). A very important parameter in livestock production performance is weaning percentage, a measurement of how many lambs reach maturity from ewes mated (Crettenden 2014). The parameter is therefore a

measure of flock fertility as well as lamb survivability. In 2014 Mceula had a lamb weaning percentage of only 10%, but in 2015 this had increased to 79% (OLF 2019a).

> *"In previous years we were losing lots of stock in winter and the drought made people more willing to try something else that change the situation. Three years prior to the project I lost almost 100% of my lambs. We used to see carcasses everywhere in winter. I was going to give up farming. Now my herd is growing" (MI7).*

With this increase in production, one would expect the Mceula flock to have grown. The flock however has not grown but has in fact shrunk from 1 792 in 2016 to 1 391 in 2017 (OLF 2019b). This is because there has been a conscious decision by the farmers to cull the unproductive sheep from the flock and import better breeding stock from commercial farmers to improve their herd genetics in favour of wool production (MI2).

Because wool production was the emphasis during the HM training, cattle production, although addressed, was not a key focus. Cattle in the former homelands are kept for a variety of social, cultural and economic reasons and there is a greater focus on the size of the herd, rather than genetic composition (Stroebel et al. 2011). The genetics of cattle are therefore generally not suitable for commercial operations. The easiest commercial market to enter is beef production where livestock can simply be sold to the abattoir. However, the genetic make-up of the Mceula herd comprises mainly a mixture of Nguni and dairy cattle, which fetch low prices at abattoirs (MI4). It will take a longer time to alter the cattle herd for better production, but the underlying principles have been introduced to the community and it is likely that the farmers' association will pursue improved cattle production in the near future (MI3).

6.2.1.3. Income

The most direct and measurable impact to the livestock farmers was the increased income generation from wool. Previously, small holder farmers received poor prices for their wool. This was mainly due to the fact that sheep faced food shortages during winter and the nutritional stress resulted in weak

spots in the wool. Traction on the fibres caused them to break resulting in very short wool fibres. With appropriate grazing through HM, more fodder was available in winter, eliminating these weak spots and effectively doubling fibre length and substantially improving incomes. Average wool price per sheep went from R146.15 in 2014 to R235.43 in 2015, an increase of 60%.

In addition, talks by the National Wool Growers Association informed farmers what kinds of wool receive premium prices as well as how to minimise wool contamination. A combination of measures resulted in a rapid increase of income for small-holder farmers. Wool quality is also affected by sheep genetics and the Mceula farmers are attempting to improve their flock genetics by culling non-productive sheep and buying in good quality sheep from nearby commercial wool farmers (MI2).

6.2.2. Importance of grass to livelihoods

The integrity of the rangeland ecosystems is vital to the people of the former homelands, but due to the decline of the agrarian economy and the increased reliance on wage labour and social grants, this association has become more obscure. Ainslie (1999) suggests that because there is less direct reliance on the natural resource base, there is a lower incentive to conserve these rangelands. Yet the natural resource base remains important to the livelihoods of many rural residents and sustainable local economic development is only likely to occur if these resources are conserved (Fabricius & Turner 2004). Getting villages to appreciate the importance of the rangelands was an important aspect of the training process.

While the importance of grass to livestock is obvious, the importance of grass to livelihoods is less obvious, but not less important. A simple trick used in initial training sessions was to hold out a handful of grass and ask, “what is this?”. Many say, “grass”, but the facilitator says, “No, this is money”. So starts the process of getting farmers to start viewing grass to be as important as the livestock that eat it. At a later stage, a course in grass identification was given

to allow farmers a more thorough understanding of the diversity of grass species and what they mean for the health of the veld. Farmers were told that above all else, they are grass farmers first and the health and integrity of the rangelands affects the health of their livestock (MI4; MI5).

> *"I always knew livestock ate grass but did not see how the grass affected livelihoods. Now I see how life, and everything is connected to nature. I used to see them as separate" (MI5).*
>
> *"The better the meat or wool, the better the income. It is all dependent on grass" (MI6).*

6.2.3. Capacity building

One of the ways the OLF adapted HM from its commercial origins was introducing the ancillary training assumed to be present in commercial farms. Eco-literacy was introduced to teach villagers the importance of water cycles, mineral cycles, community dynamics and energy flows. This helped to contextualise the reasons behind the practises of HPG.

> *"They capacitated us with lots of information. I always knew the importance of the veld, but we had no tools to manage it" (MI7)*
>
> *"They taught me how to identify grass. I thought grass was grass. They showed us how to group the herd to make them easier to control and decrease stock theft. They also showed us how to repair bare patches" (MI6)*

While information transfer is one form of capacity building, the OLF also encouraged agency. From the beginning they were told that the HM initiative was not OLF's, Ayanda's or Shane's. It was the community's initiative. The community owned it (MI4).

The change in agency can be seen in the approach villagers had to broken fencing, which was constantly being damaged by rains, cattle or theft. During the early stages of implementation, whenever fencing broke herders would

contact Ayanda as the local leader in HM and expect him to get it fixed. During a preliminary site visit to Mceula in 2018, I was present when Ayanda received a phone call from a herder who phoned to report a broken fence. Fully expecting to be called out to fix the fence, Ayanda was pleasantly surprised when the herder informed him that he had already fixed the fence but was just calling to let him know. This small incident indicates the important transition from villagers as passive observers to active participants in their community.

It must be difficult for a farmer to view the degradation of the land on which he is dependent and not know why it occurs and how to fix it. HM provided the conceptual framework for farmers to understand the degradation process and the tools with which to solve the problem.

6.3. Deductive analysis

6.3.1. Development ideology and the Co-Production of Paulo Freire

Although the implementation of HM was not specifically designed around co-production, Paulo Freire's '*Pedagogy of the oppressed*' or traditional knowledge, elements from these ideologies can be discerned in the way knowledge transfer was employed.

Traditionally the perceived role of the state was to determine and provide services for the use and consumption of its citizens. Due to the limitations of governments not knowing what their citizens want and need, citizens desired more involvement, but this was limited purely to consultation (Bason 2010). The concept of co-production was first developed in the 1980s, when, disillusioned by the increased trend of centralisation, increasing bureaucracy and a reduction in citizen involvement in civic affairs, it was imagined as an alternative to sole reliance on state services were citizens became actively involved in conception, design, steering, and management of services (Ostrom 1996; Mitlin 2008). Co-production occurs in both the private and public sectors but because it is still a relatively new concept, it is poorly defined (Voorberg et al. 2015). Within the private sector it occurs when end-users take over specific activities in the

production chain (co-production) or when end-users' experience with the product or service adds value to a company (co-creation). Within the public sector, it generally corresponds to Joshi and Moore's (2004:40) definition where, "Institutionalised co-production is the provision of public services through regular, long-term relationships between state agencies and organised groups of citizens, where both make substantial resource contributions". Bovaird (2007:847) suggests that this definition is too narrow and that co-production is better defined as "the provision of services through regular, long-term relationships between professionalized service providers (in any sector) and service users or other members of the community, where all parties make substantial resource contributions". While this definition does encompass many more co-production interactions, it is unclear whether it includes the operations of the OLF which seems to work more as a facilitator than a service provider. Ostrom (1996:1073), one of the initial developers of the concept defines co-production as 'the process through which inputs used to provide a good or service are contributions by individuals who are not in the same organization'. Bovaird states that Ostrom's view is too broad and that partnerships are so widespread that the definition is unhelpful (Bovaird 2007). However, Ostrom has done more work in developing countries where weak state governance is unable to provide basic services and the informal sector has had to step in to fill the gap. The many types of configurations that this produces necessitates the broader definition.

Co-production has a number of distinct advantages over the sole reliance in state provision of basic services. It allows for the contribution by the state to be tailored to the needs of the community, particularly in developing countries where alleviation of poverty by the state is at worst inappropriate, and at best depressingly slow. Ostrom (1996) suggests that in these developing countries co-production is not only desired, but necessary for poverty alleviation to occur. In developing countries were the level of basic service provision is weak and underfunded, it allows the public to contribute both financially and in labour costs which allows for a better quality of product or service which the state would not be able to provide on its own. In addition, this creates a sense of

ownership which promotes better care of the product or service by the community. Mitlin (2008) suggests that while this material benefit is important, possibly more significant is the effect of agency the process of co-production imparts on the public, particularly on previously marginalised communities who were historically excluded from input in the services which affected their lives. Outdated developmental paradigms created a perceived dichotomy between the educated, developed and the uneducated, underdeveloped (Bank & Minkley 2005), and it was the role of the developed to bestow upon the underdeveloped a better way of life (Gwaravanda 2017). Co-production helps break this old ideology and gives value to the views and opinions of poor, marginalised communities, giving them a voice and allowing them to be active, contributing citizens.

The benefits of co-production echo the work of Paulo Freire (1970), whose seminal work '*Pedagogy of the Oppressed*' demonstrates the importance of dialogue and collaboration in education. Freire was highly critical of the education system, likening it to 'banking' where ideas are deposited into the brains of people and where no critical thinking occurs. This lack of critical pedagogy and self-exploration re-enforces the passivity of citizens and the dichotomy between the teacher and the pupil, between the educated and the uneducated and between the developed and the under-developed. It removes agency and self-actualisation from people. Freire's solution was to facilitate the engagement of dialogue, where the lines between teacher and learners are blurred and knowledge is allowed to flow both ways. This allows the teacher to learn from learners and learners to teach teachers, creating 'teacher-learning' interactions, helping to disrupt these dichotomies.

South Africans are still deeply scarred by the effects of apartheid and the impact it has had on the psyche of all South Africans. This has influenced the relationship of small-holder farmers to the land and is partially responsible for reducing subsistence agriculture, far more subtly but no less relevantly, than the more commonly cited causes like market dynamics (Louw et al. 2008), the effect of unemployment, labour migration and social grants (Baiphethi & Jacobs 2009), the poor and deteriorating natural resource base (Aliber & Hart 2009),

the lack of infrastructure and equipment (Khapayi & Celliers 2016) and limited governmental support of subsistence and small-holder agriculture (Altman et al. 2009). The deeply rooted psychological impact of apartheid changed the way rural black South Africans feel and therefore how they act and react. This effect is succinctly summarised by McCusker and Carr (2006):

> *Today the forms of racialized knowledge produced by apartheid relations of power are still vividly evident when speaking to black smallhold[er] farmers who often still seek "white" or "scientific" expertise. Granted, in the generations since dispossession many rural blacks have been completely deskilled in agrarian production, but for people who still maintain small plots of land to survive, the apartheid program was successful at convincing many that blacks were, if not incapable, at least less capable than whites of farming productively. While there was widespread resistance to this notion, its impact is clearly visible in the contemporary land/livelihood ethos in many areas of rural South Africa. Specifically, we can see the products of this power/knowledge in what appear to be contradictory notions about land and livelihoods. Discussed below, this power/knowledge is often manifest as a strong desire to farm but a lack of confidence/skills/labour to do so (McCusker and Carr 2006:796).*

While this is deeply disturbing, one way of overcoming this is by changing the narrative by getting people involved in the decisions that shape their lives. McCusker and Carr (2009:578) suggest that, "co-production is therefore a foundation for arguments supporting a locally-sensitized form of development. Further, it is a counter-narrative to the ideas of economic rationality and universality that guide much development planning and practise today". One benefit of this locally sensitised form of development is that it allows for the incorporation of traditional knowledge.

6.3.2. Traditional knowledge

The Xhosa have been herding livestock for hundreds of years and there was a wealth of traditional knowledge embedded in the practise. Unfortunately, much of this has been lost due to the collapse of Xhosa autonomy (Stapleton 1993; Mears 2005). While much of the older generation, and generations past, may remember seeing herding in practise, they did not grow up learning all the laws and cultural norms governing the practise. Many families were split up and moved to new locations, often to smaller places with different vegetation and many times losing their cattle in the process (Mears 2005).

The knowledge that they acquired for herding in their homesteads may have been inappropriate in the new environments they found themselves in. When the next generation left the homelands in search of jobs, they frequently had not been taught the full gamut of all that is required for traditional herding. When they returned to the homelands after many years, they did not have the experience or knowledge of herding and were unable to transfer this indigenous knowledge to the youth. The current farmers therefore know of herding from stories passed down through generations but don't have the knowledge of their herding ancestors or only retain fragments (MI3). These fragments are scattered amongst individuals within in the older generation and mainly revolve around animal health or the use of plants for specific conditions, not the cumulative knowledge that grazing management requires (MI3). But the process of co-production is sensitive to even these small fragments and allows them to be incorporated into the bigger HM structure, enhancing the sense of ownership to the livestock management practise. By doing so, it validates the traditional knowledge and indirectly validates the value of Xhosa culture and identity. In addition, while youth farmers want to farm, they frequently lack the knowledge, skills or confidence to do so. HM can provide the knowledge and skills while co-production can help build confidence and agency.

The HM training takes the fragmented traditional knowledge and communal grazing practises, supplements it with ecologically based HM principles and creates a coherent whole. The benefit of this is two-fold, it built on existing and

it acknowledged the validity of previous practises. The HM pilot did three things: first, it introduced new knowledge; second, it built on existing knowledge; third, it incorporated traditional knowledge.

The implementation of most projects occurs in a top-down manner where information from experts is given to farmers. Experts are the repositories of knowledge and farmers are the recipients (Freire 1970). This lends credence to the perception that small-scale farmers don't know how to farm and need support from commercial farmers who have the farming knowledge they lack. This in turn removes agency from small-holder farmers. HM however is a decision-making tool. While there is a framework that is used, the onus is on the farmer to decide when and how often to move his livestock. It gives rural livestock farmers agency. When combined with the implementation strategy of the OLF who have done community mobilisation for many years, the result is a reciprocal, generation of knowledge. The OLF believes that they have not taught the farmers anything they did not already know. They repackaged disparate bits of grazing knowledge into a coherent whole and provided a framework, namely HM.

6.3.3. Transition from open access to common property

'Tragedy of the commons' has long been viewed as an inevitable outcome to shared-property regimes (Hardin 1968). Ciriacy-Wantrup and Bishop (2016) suggest that this is not necessarily the case and criticise Hardin for not differentiating between shared-property regimes. Bennett and Barrett (2007) identify two different shared-property regimes: common property and open-access. Open-access regimes have no restrictions on who can access them. There is therefore very little control, exploitation by individuals is common and 'tragedy of the commons' is a very real possibility (Bennett & Barrett 2007). Common property regimes are characterised by "a well-defined group of authorized users, a well-defined resource that the group manage, and a set of institutional arrangements that define both of these (Bennett & Barrett 2007:98)". Under these conditions, the 'tragedy of the commons' is not an

eventuality, rather there exist many parts of the world where common-property is managed successfully (Niamir-Fuller 1998; Ostrom et al. 1999).

The grazing lands of Mceula were once managed, under the apartheid government, as common property regimes (Nkansa-Dwamena 1998). These management structures, as in many areas of the former homelands, have slowly been eroded and while many areas are assumed to be common-property regimes, they have in fact shifted closer to open-access systems resulting in Hardin's predictions of 'tragedy of the commons' (Cousins 1996).

Bennett and Barrett's (2007) definition of common property regimes fits very closely to Ostrom's (1990) criteria for sustainably managed land. The implication is that, in order for many areas in the communal homelands to achieve sustainable natural resource management, they have to transition from open-access systems back to common-property regimes. This has been achieved in Mceula, as the following discussion of Ostrom's 4 criteria shows:

1) **Limited number of users managing the resource:**

   Almost every household in Mceula owns at least some livestock. However, they are all represented by the Mceula Farmers' Association which is responsible for managing HPG for the village. Open meetings are generally held every two months (although a monthly meeting is being proposed), which all livestock owners are welcome to attend. The Mceula Farmers' Association was historically comprised only of older men, however, since the HM it has become more inclusive. Just prior to the establishment of HM, a youth farmers branch was formed, and after HM a women farmers' branch was introduced (MI5).

2) **Designed by the users themselves**

   At the bi-monthly meetings a HPG programme is drafted with the help of the herders and any issues relating to grazing in Mceula are discussed (MI5). The herders are responsible for the daily grazing schedule (MI6). If any major problems arise, emergency meetings are called for greater input. It is important to note that although the Mceula Farmers' Association makes the decisions, all villagers have been trained in HM

and understand the theory and process behind the decisions being made (MI3).

3) Monitors are accountable to users

The herders do most of the monitoring of the veld. A total of six herders are permanently employed by the Farmers' Association and are therefore accountable, by proxy, to the villagers of Mceula (MI6).

4) Sanctions for non-compliance

Two main areas of non-compliance have arisen. First, by the surrounding villages. An important aspect of HPG is the consolidation of the Mceula herd, so all areas where the herd is not currently grazing can rest. These rested areas are carefully noted and factored into the grazing plan. If these rested areas are prematurely grazed, it severely inhibits the recovery of the veld. A major problem facing Mceula is the lack of boundary fencing. Because surrounding villages still continue to practise continuous grazing, their cattle would wander onto Mceula's grazing land, affecting veld recovery. Because Mceula had the backing of the Zulukama chiefdom, they were allowed to impound the neighbouring livestock found grazing on Mceula land and only released the animals after fining the offending owner. This was an effective measure to limit incursions on Mceula grazing land (MI3; MI5).

The second area of non-compliance was more difficult to control and arose within the village itself. The implementation of HM coincided with the start of a drought. Although recovery of the veld was severely hampered, HM practises still allowed for retention of sufficient fodder during winter and eliminated cattle deaths over this period. During the third year of the drought, cattle in Mceula started to die. Although the numbers were significantly lower than surrounding areas not practising HM, some farmers in Mceula got nervous. A common perception in the rural homelands is that in times of stress, livestock will know where to find sufficient fodder for survival. While the majority of the community still strongly supported HM, a small splinter faction stopped HM practises

and reverted to continuous grazing. No formal sanctions where placed on these farmers, but through a combination of peer-pressure, slightly better rain and re-invigoration of community spirit by an nRhythm project (to be discussed in the final chapter), the splinter group re-joined the communal HPG strategy (MI3; MI4; MI5; MI7).

In an open-access regime where no one is responsible for a shared resource, exploitation by individuals is a very serious problem and results in the deterioration of the resource to the expense of all users (Bennett & Barrett 2007). However, when sufficient structures are in place to manage the resource, it can be conserved for the benefit of all users (Ostrom 1990). In the communal grazing area of Mceula, the goal, however, is not just to conserve, but to restore the rangelands to be highly productive for livestock farming. The transition from open-access to common-property is an important step in facilitating the sustainable use of the rangelands for the benefit of the whole village.

6.4. Conclusion

From the interviews, common themes emerged. The most important being the unanimous agreement that the HM pilot was successful and beneficial to livestock farmers in Mceula. This success was based on a variety of impacts HM had on the community. While the farmers in Mceula could see the rangeland degradation occurring before their eyes, they did not know why it was happening or how to stop it. HM provided the conceptual framework through which to understand the causes of the degradation. Crucially it also provided the farmers with the capacity to restore the rangelands by altering their grazing practises. This capacity building was facilitated by a combination of provision of information and co-production. Information was provided in HM training but also in ancillary training to build eco literacy and capacitate small-holder farmers to enter the formal market, earn money and create livelihoods.

Co-production allowed farmers to participate in and design their own grazing system using the tools provided. This provided agency and the importance of this cannot be overemphasised.

Chapter 7: Conclusion and recommendations

7.1. Introduction

In this chapter the original research objectives are revisited and conclusions are made based on this case study. It then looks at the expansion of HM in the villages surrounding Mceula, which lay outside the scope of this study, and looks at interesting developments that are currently underway. Recommendations are then made, followed by a discussion of the limitations to the study and the potential for future research.

7.2. Revisiting the research goal and objectives

The goal of this research was to assess whether the rangeland management system of HM is able to improve livestock production while simultaneously being able to reverse the rangeland degradation occurring in the former homelands of the Ciskei.

The research objectives of this study were:

- First, to review the literature regarding the history of the homelands and Mceula, to understand and appreciate the complexity of influences that formed the homelands, why that history is still relevant and how development needs to be sensitive to the past.
- Second, to review the literature about conventional grazing in order to understand why these paradigms may not be applicable in the former homelands and if they are responsible for rangeland degradation.
- Third, to review the literature about HM, to determine if this newer grazing strategy could help restore the degraded rangelands of the former homelands.
- Fourth, through exploring the case study, to assess whether HM is an appropriate grazing strategy in the communal grazing spaces of the former

homelands in Mceula village of the Ciskei, and to determine if the pilot project was successful in delivering the rangeland restoration HM promises.

7.3. Achieving the goal of the research

The overall aim, or goal, of the research was to determine if HM is a feasible grazing strategy in the former homelands. The HM pilot project in Mceula was assessed and there was unanimous agreement amongst all respondents that the project was a success and that HM in Mceula was beneficial to veld and farmers. HM has a number of benefits over the current continuous grazing practised in the former homelands and rotational grazing commonly practised by commercial livestock farmers. HM is a form of regenerative agriculture where soil health, veld health and ecosystem health are pursued. When this is achieved, livestock production naturally ensues. HM is therefore able to restore degraded rangelands while simultaneously improving livestock production in the former homelands. Rangeland restoration was not immediately evident during the implementation of the project due to the prolonged and on-going drought occurring in the Eastern Cape. While restoration of the veld was hampered due to the drought, improvement in winter forage, decreases in livestock mortality and increases in livestock farmers' incomes were still experienced. It is important to note that the way in which HM was introduced and taught by the OLF was paramount to the success of the project. While HM is a management strategy that would benefit both rangeland health and livestock production in the former homelands, the method of delivery is as important as the information delivered. If HM is to be disseminated through the former homelands, the method employed by the OLF should be used as a blueprint.

7.4. Achieving the objectives of the research

The study had four objectives; each one will be discussed below.

7.4.1. Objective 1: The importance of history

The first objective was addressed in Chapter 2, which discussed the literature of the background and complex history of the homelands and Mceula. It stressed that histories affect how we understand the present and in turn influence the choices we make. This discussion was necessary to understand and appreciate the complexity of influences that formed the homelands, why that history is still relevant and how development needs to be sensitive to the past.

The former homelands in the Eastern Cape are characterised by entrenched poverty, unemployment and a reliance on migrant labour and social grants for survival (Bank & Minkley 2005; Hajdu 2005; Pienaar & Von Fintel 2013).To a large extent this desperate situation is due to the collapse of Xhosa society during the British colonisation and occupation (Stapleton 1993), apartheid policies which resulted in uneven development, forced relocation of families into the homelands and betterment planning (Mears 2005), which further impacted the families in the Ciskei.

Due to the lack of economic development, many families rely on multiple livelihood strategies and income sources (Mathebula et al. 2017). Although not a main source of income, most households own at least some livestock which can be used as an income source, food source, for social status, insurance and lobola (Sikhweni & Hassan 2013). It is because livestock are not a major income source and households are engaged in multiple activities that continuous grazing is practised, as it fits the socio-economic constraints of most families. Some families use herders, but they do not practise any grazing management. Rather, they simply escort the livestock to and from the kraals and protect them from theft (MI6).

Continuous grazing practises and the high livestock numbers have been blamed for the severe rangeland degradation experienced in the former homelands (Meyer & Turner 1992; Hudak 1999; Moyo et al. 2008). This is compounded by the fact that many areas in the former homelands are situated

in marginal areas that are particularly prone to erosion and degradation (Hoffman et al. 1999).

The rangeland degradation problem of the former homelands in the Eastern Cape is therefore a complex combination of historical influences, social-economic factors and lack of livestock management. This complex social construct needs to be, if not understood, then at least appreciated if interventions to reduce rangeland degradation are to have any chance of success.

7.4.2. Objective 2: Rotational grazing as an inappropriate solution

The second objective was to review the literature about conventional grazing in order to understand why these paradigms may not be applicable in the former homelands and if they are responsible for rangeland degradation. This was done in Chapter 3, which unpacked rangeland degradation and the influence of grazing.

A commonly proposed solution to rangeland degradation in the former homeland has been to introduce the commercial practise of rotational grazing (Ministry for Agriculture and Land Affairs N.D.; Katikati & Fourie 2019). Under betterment planning which began in 1939 (Seneque 1982), rotational grazing was instituted and managed mainly by the apartheid government (Forbes & Trollope 1991). After independence many fences were taken down because they represented the oppressive regime. With the acceleration of rangeland degradation in the former homelands, rotational grazing has once more been proposed as a possible solution.

One of the biggest challenges in rotational grazing is the cost of fencing infrastructure. The cost is prohibitive in many communities, and even if fencing was to be donated for the initial construction, maintenance costs remain a problem. The faults with rotational grazing lie with more than just its cost. The system fails to take into account the social constraints of the villagers in the former homelands (Rootman et al. 2015) and it is based on an outdated

conception of grassland science (Joyce 1993). Rotational grazing is therefore inappropriate, impractical and of uncertain benefit in the former homelands (Scogings et al. 1999). In summary, the current continuous grazing practise in the former rangeland caused rangeland degradation and the commonly used rotational grazing system used in commercial livestock farming is inappropriate. Clearly a novel grazing strategy is necessary.

7.4.3. Objective 3: Assessing the restorative potential of Holistic Management in the former homelands

The third objective was to review the literature about HM, to determine if this newer grazing strategy could help restore the degraded rangelands of the former homelands. This was done in Chapter 4, which unpacked the concept of HM, its influences, the importance of understanding ecosystem processes, and the four aspects or components of HM, namely the Holistic Context (HC), Holistic Planned Grazing (HPG), Holistic Land Planning (HLP) and Holistic Financial Planning (HFP). This chapter also addressed the criticisms that have been voiced about the system.

HM is a system that, unlike rotational grazing, can be a viable grazing management strategy in the complex social environment of the former homelands of the Eastern Cape. Although it was developed for commercial livestock farms, the ecological principals are universal, and the system can be adapted to the communal grazing practise in the former homelands. HM is not a grazing system per se, but rather a decision-making framework that allows livestock farmers to practise HPG in a complex, changing environment, which is particularly important in the face of climate change (Neely et al. 2009).

HPG is ecologically based and aims to mimic the effect of migrating herds of herbivores by using livestock as a proxy. In the former homelands where almost every household has some livestock, it requires the assimilation of these disparate, small herds into a single, community herd. High intensity grazing is practised and animals are moved frequently to allow for adequate recovery of

the veld. The result is increased 'herd effects' which has a number of advantages. Due to the high competition of grazers, animals are less selective in their grass selection and a more even graze occurs. This helps limit the number of undesirable grass species. When livestock walk over bare patches, their hooves help disturb hard, compact crusts and form depressions in which moisture and seeds collect. Their faeces and urine help fertilise these microenvironments and stimulate new grass growth. With less bare patches, there is less erosion and water run-off. Rainwater is more likely to get absorbed into the soil, enhancing soil microflora, replenishing underground aquifers and helping ensure better river water levels, particularly in the dry season (Neely & Fynn 2013). Healthier soils and grass cover increase plant biomass which in turn not only increases livestock production, but insect and wildlife populations which contribute to increased biodiversity, resulting in improved ecosystem resilience. In addition, HPG allows herders to effectively manage grazing without the need of expensive fencing.

Continuous grazing has been shown to cause rangeland degradation (Moyo et al. 2008; Meissner et al. 2013) and rotational grazing is inappropriate in the former homelands (Scogings et al. 1999). HM is ecologically based and has been shown to restore rangelands in a variety of conditions (de Villiers 2013) as well as being flexible enough to be adapted to the complex social constraints of the former homelands.

7.4.4. Objective 4: Assessing the successful implementation of Holistic Management in Mceula

The fourth objective was to explore the case study, to assess whether HM is an appropriate grazing strategy in the communal grazing spaces of the former homelands in Mceula village of the Ciskei, and to determine if the pilot project was successful in delivering the rangeland restoration HM promises. This was done in chapters 5 and 6, where the case study of Mceula was unpacked and then discussed.

While HPG is an integral part of HM, other components contribute to the effectiveness of the entire system. As opposed to previous continuous grazing practises where there was no shared method of grazing and no management of the grazing lands, HM allowed the villagers of Mceula to develop a shared vison for the future and alter their grazing practise to achieve it. This was created by the collaboration of all livestock farmers, who articulated their goals and desires for livestock production and the health of the veld they grazed in the communally drafted HC. The landscape necessary for optimal livestock production was discussed, with particular attention being paid to water and fencing infrastructure and was documented in the HLP. A HFP was formulated to allow the farmers to determine where investments would be most beneficial and necessary. It is the entire HM system which has given the livestock farmers of Mceula the tools necessary to manage the livestock and the rangelands in a sustainable manner. Crucially, after the training programme the OLF instituted, Mceula has successfully continued to implement HM and manage the communal herd without assistance from OLF. The implementation process has therefore been a major success (MI3; MI4; MI5; MI6; MI7).

Due to the drought that started in 2015 (the same year that HM was implemented) and as of writing has still not abated, the rangelands have not experienced the restoration that was expected. However, there are other parameters that indicate positive effects of HM in Mceula (MI1). First, there is approximately twice as much fodder available to livestock on holistically managed areas compared to areas where continuous grazing still occurs (Mudyiwa 2019). This has provided better nutrition during the dry season and has resulted in fewer livestock deaths, greater lamb survival and better wool quality which again has translated into better incomes for farmers when compared to surrounding villages (MI4).

7.5. Recommendations

Rangeland degradation is a big problem in the former homelands of South Africa, influenced by various factors, such as colonial and apartheid policies,

and misguided agricultural 'betterment' policies (De Wet 1987; Bank & Minkley 2005; Mears 2005). For any kind of development initiative, it is important to understand the complex history and background of that area and community.

Rangeland degradation requires urgent attention and this study demonstrates that, compared to rotational grazing and continuous grazing, HM is the better grazing strategy for managing rangelands and livestock production in the former homelands. The implementation of HM in Mceula has been a great success. So much so that the OLF has managed to divest itself of the project and HM is now co-ordinated by the Mceula Farmers' Association. Although success can be attributed to the HM programme that was adapted to the social context of Mceula, one cannot ignore the pivotal role the OLF played in the success of the project.

Recommendation regarding the HM pilot can be divided into parts. Firstly, the implementation process and secondly, the HM training.

7.5.1 Recommendations for Implementation

- **Work with community as soon as possible:**

  Important in the success of the project was the ability for the OLF to work directly with the community. While it is important to get permission from the relevant authorities, it is equally important to start working with the community as soon as possible. By doing this, the project acquired the support of the community very early on in the process and this prevented interference of middlemen trying to disrupt the project for personal gain.

- **Invest time in community mobilisation:**

  Community mobilisation was key to the success of the HM pilot. The first 2 years were focused on community buy-in and training only occurred over a 4 – 6 month period. Community mobilisation consisted of semi-structured meetings where topics were discussed through open dialogue. Additionally, community members were given the freedom to go home, digest the information, return to subsequent meetings and rehash ideas that had already been discussed. These meetings were

specifically designed to allow community engagement and deep learning, rather than superficially going through a checklist of topics that needed to be covered.

- **Ensure a respected facilitator:**

  Shane Brody had earned the trust of the farmer's association after he helped the youth farmers save the pregnant ewes that were donated in the middle of winter. Equally important was his fluency in Xhosa, farming experience and his ability to transfer information to small holder farmers successfully.

- **Choose a local champion:**

  Ayanda Mrwebi was identified as a champion for the HM pilot. He was paramount in securing the pilot project in Mceula. He also allowed for a smoother facilitation between the community and the OLF.

- **Co-production:**

  This method of knowledge transfer allows the community to be active participants in designing and setting up the HM system. Firstly, it recognises the knowledge present within the community. Secondly, it gives the community power and ownership of the system. Because the community helped develop the processes and management structures, they are empowered to try alternatives and adapt the system to their changing environment and needs.

7.5.2. Recommendations on adapting Holistic Management to the former homelands

- **Transfer of the entire HM system:**

  In an attempt to save time and money, it may be tempting to focus on grazing management and only institute HPG. This however cannot be advised as HM is a complete system, without the other components stability is lost. This can be seen in the lack of compliance experienced

when HPG was introduced in the Hwange Communal Lands in Zimbabwe (Chatikobo 2015). A key feature of HM is that it provided the community with all the power and confidence to be active participants in restoring their grazing lands. They make the decisions that affect their lands and their lives. Without the entire system, HPG is just a static programme. In a changing environment a static programme is likely to fail as it cannot adapt to the inevitable social and environmental shifts.

- **Focus on income generation:**

  Key to the success of the HM pilot was the identification of wool production as the main economic driver (discussed in more detail in chapter 5). This ensured a rapid rise in incomes and livelihoods and improved compliance within the project.

- **Ancillary skill development:**

  There are many skills necessary for improving livestock production in the former homelands. Firstly, most livestock farmers in the former homelands don't cater to the needs of the market. Because of this, income derived from sales to formal markets are limited. By producing for the market, livestock farmers are able to ensure better prices and therefore better incomes. Catering to the market, however, requires training in animal health, husbandry and genetics.

7.6. Limitations

This case study evaluated the first attempt of introducing HM in the communal homelands of South Africa. Because a novel grazing system was used, the underlying ideology and principles needed to be assessed and then compared to current continuous grazing practises and commercial rotational grazing. In addition, the process of implementation was documented and analysed. Finally, personal interviews were conducted to identify common themes present in the process of introducing and the effect of HM in Mceula.

The study provided a broad overview of a village-wide project that started in 2015 in Mceula addressing rangeland health and has now progressed to

include nRhythm which looks at community health. Over this timeframe and shifting nature of the project, it was difficult to focus on specific shifts and changes that occurred. The study therefore depicts the broader process well but lacks specific details on both the implementation process and the effect HM had on the rangelands of Mceula.

The interviews with farmers depended on arrangements made by Ayanda Mrwebi and were conducted in July 2019. A funeral and last-minute cancellation resulted in a smaller pool of interviews with the livestock farmers of Mceula. While the pool of interviews may be small, the interviews all had similar views on the HM project. A few more interviews, however, would have improved the rigor of the study. In addition, all respondents were male, the perspective of female livestock owners would have been beneficial.

Ayanda is the go-to-guy for all things HM in Mceula. He was the best entry point to farmers for the study. This does, however, introduce an element of bias. In interviews with Ayanda, he mentioned a faction of farmers who stopped HM in the third year of the drought and reverted back to continuous grazing. When asked if interviews could be secured with them, he stated, “no one will say that they don’t agree [with HM]. If you came to do interviews, they will see you in your fancy GP bakkie and would not want to be seen to disagree in case it disadvantages them”. This was supported by another participant who said that the dissenters practised covert resistance. At meetings to decide on grazing strategy, they would agree to the proposed plans, but would not implement them as discussed (MI6).

Due to the drought, the restoration of the rangeland as predicted by HM was not realised. There were definitely positive effects on grass biomass during the dry season which were reflected in the reduced livestock mortality and better wool quality. However, the restoration of the veld was severely hampered and ecosystem restoration is only likely to occur once the drought abates. Evaluating the success based on rangeland restoration was not possible.

7.7. Future research

Because this was a broad overview, it lacked specific details. There is therefore scope for a more detailed analysis on specific components of the project. From a HM perspective, while a useful comparison of HM, continuous grazing and rotational grazing was conducted by Mudyiwa (2019), it focussed on grass composition and biomass. There is scope for further analysis of the environmental effects of HM such as soil analyses for changes in soil organic carbon, water retention, micro and macro fauna and biodiversity.

The implementation process was critical to the success of HM in Mceula and further research would be beneficial in determining the key aspects that contributed to the success of the project. Evaluation of implementation ethos, methodology and process would greatly contribute to the field of rural development in South Africa. Furthermore, changes in community behaviour and changes in people could be correlated to the implementation process.

Part of the success in the project was the congruence of values embedded in OLF and HM. The OLF believed in the project and were passionate about HM and its ability to restore the rangelands. Passion cannot be outsourced. Research could be useful in determining what effect this had on the project and would help align future projects to teams with similar visions and goals.

A detailed analysis of the splinter faction would be helpful in determining the cause of dissent. There is always local politics at play as some people in the community resist new systems. According to one of the local farmers, “Sometimes there is politics where members disagree with each other and this may impact the programme, even though the disagreement is not related to the programme” (MI7). Some relevant questions include: What are the stated reasons for dissents, compared to the actual reasons for dissent? How much dissent is normal? At what point does it help and when does it derail the project? These would be helpful for any future developmental programme in the rural areas.

Finally, HM is based on a systems approach. One of the problems with reductionist research is ‘not seeing the wood for the trees’. While some form of

reduction is necessary to delineate the parameters of a study, it is important that further research not lose sight of the bigger picture.

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Annexures

Annexure A: National policies regulating, controlling and expanding Protected Areas (DEA 2015).

Annexure B: Policies promoting increases in the area under commercial and small-scale agriculture (excluding plantation forestry) (DEA 2015).

Annexure C: Example of a grazing and planning chart (Bishopp 2016)

Annexure D: Interview schedule for commercial farmer / Cape Wools

Annexure E: Interview schedule for Olive Leaf Foundation

Annexure F: Interview schedule for Mceula livestock farmers

Annexure A: Policies regulating, controlling and expanding Protected Areas (DEA 2015)

Policy	Activity	Magnitude of Impact
National Environmental Management: Protected Areas Act 2003	Protection and conservation of declared protected areas	Substantial
National Environmental Management: Biodiversity Act 2004	Protection and conservation of biodiversity that may fall outside protected areas	Substantial
National Biodiversity Framework 2009	Declaration and establishment of bioregions	Substantial
National Protected Areas Expansion Strategy 2008	Expansion of Protected Areas	Substantial
Guidelines Regarding the Determination of Bioregions and the Preparation of and Publication of Bioregional Plans	Identification and designation of critical biodiversity areas	Substantial
Land-Use Planning and Management Act [Since replaced by Spatial Planning and Land Use Management Act 16 of 2013]	Future spatial planning makes provision for ecologically sensitive areas	Substantial
National Environmental Management Act 1998	Protection of ecologically sensitive areas (outside protected areas)	Substantial
National Environmental Management EIA Regulations 2006 [Since replaced by EIA regulations of 2014]	Protection of ecologically sensitive areas (outside protected areas)	Substantial
National Environmental Management: Environmental Management Framework Regulations 2010	Protection of ecologically sensitive areas (outside protected areas)	Substantial
NEM: Biodiversity Act Threatened or Protected Species Regulations 2012	Regulating controlled activities to protect threatened or protected species	Substantial
Biodiversity Strategy and Action Plan	Promotion coordination of conservation network	Substantial

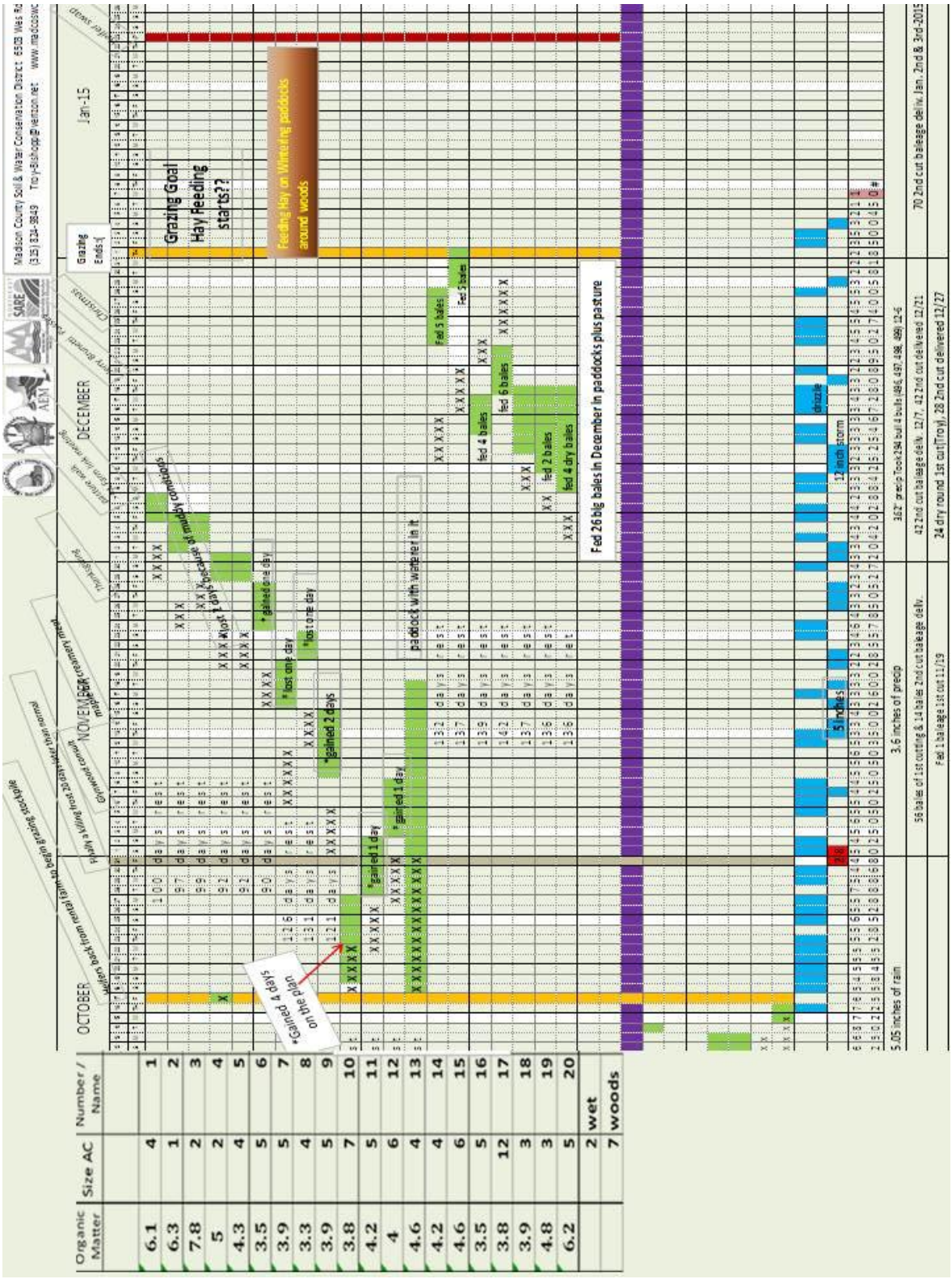
Conservation of Agriculture Resources Act 1983	Conservation of degraded land and soils	Substantial
National Parks Act 1967	Protection and conservation within national parks	Substantial
Regulations on the National Forests Act 2009	Regulating activities in forests and plantations	Moderate to Substantial
National Forests Act 1998	Protection of state forests and woodlands	Limited to Substantial
National Protected Area Expansion Strategy 2008	Expansion of Protected Areas	Substantial
Woodlands Strategy Framework for the Department of Water Affairs and Forestry 2005	Protection and Rehabilitation of Woodlands	Substantial

Annexure B: Policies promoting increases in the area under commercial and small-scale agriculture (excluding plantation forestry) (DEA 2015).

Policy	Activity	Magnitude of Impact
New Growth Path	Increase the area under agricultural production; support the land reform process; support plantation forestry	Substantial
National Development Plan	Promotion of the expanded protected areas strategy, increase land under agricultural production; improve spatial planning; improve agricultural techniques such as composting; support the land reform process	Substantial
Industrial Policy Action Plan: 2012/2013 – 2014/15	Increase agricultural production, including biofuels and commercial forestry	Substantial
Medium Term Strategic Framework: 2009 – 2014	Increase land under agricultural production and plantation forestry, and growth of the agro-processing industry	Substantial
The Strategic Plan for South African Agriculture	Rapid expansion of land under agricultural production	Substantial
Strategic Plan for Smallholder Producers	Support new smallholder producers by 2020, including in the former homelands. Limited to marginal commitment to agro-ecological agriculture	Substantial
Department of Rural Development and Land Reform, Strategic Plan 2011-2014 (amended 2013)	Expansion of small-scale agricultural production	Substantial
Integrated Growth and Development Plan: Agriculture, Forestry and Fisheries	Agricultural expansion, mediated by improved farming techniques, including conservation agriculture, soil rehabilitation	Moderate to Substantial
Strategic Plan 2012/13-2016/17 for the Department of Agriculture, Forestry and Fisheries	Agricultural expansion, notably of small-scale farmers, complemented by conservation of agricultural lands, limited rehabilitation of rangeland and soils, and support of climate-smart agriculture	Substantial
White Paper on Renewable Energy	Production of biofuels	Moderate to Substantial
Department of Energy Revised Strategic Plan: 2011/12 – 2015/16	Increase in biofuel production	Limited to Substantial
Draft Climate Change Sector Plan for Agriculture, Forestry and Fisheries	Support expansion of biofuel production; promotes adoption of “climate smart” agricultural techniques; improved spatial planning	Limited to Moderate

Integrated Strategy on the Promotion of Entrepreneurs and Small Enterprises	Expansion of small-scale agriculture and of agroprocessing capacity	Limited to Moderate
Biofuels Industrial Strategy of the Republic of South Africa	Expansion of the biofuels industry	Limited to Moderate
Long-term Mitigation Scenarios	Increase in biofuel production	Limited
Green Economy Accord	Increase in biofuel production	Limited
National Climate Change Policy Response White Paper	Increase in biofuel production	Limited

Annexure C: Example of a grazing and planning chart (Bishopp 2016)



Annexure D: Interview schedule for commercial farmer / Cape Wools

Questionnaire 1:

HM Commercial farmer / Cape Wool

Code:

Name: _____ **Sex:** _____ **Age:** ____

E-mail: _____ **Phone:** _____

Occupation: _____ **Role in WGA:** _____

Herd composition: _____ **Farming method:** _____

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1. What is your role as a HM practitioner / Cape Wool?
2. How did you / Cape Wool get involved in this HM project?
3. How / Why choose OLF?
4. How / Why choose Mceula?
5. What did implementation of HM entail for you / Cape Wool?

6. What was the veld like before & after HM? (personal inspection?)
7. What was the herd like before & after HM?
8. What is wool quality before & after HM?
9. What do you think the future potential of this project is?
10. Overall impression of the project?

11. Additional comments:

Please delete as appropriate:

I give permission for my name to be used in the study / I wish to remain anonymous

Participant Signature: _____ **Researcher Signature: _____**

Date: _____ **Date: _____**

Annexure E: Interview schedule for the Olive Leaf Foundation

Questionnaire 2: Demographic

NGO

Code:

Name: _____ **Sex:** _____ **Age:** _____

E-mail: _____ **Phone:** _____

Role in NGO: -

HM experience: _____

_____

Farming experience:

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1. How did OLF get involved in the HM project?
2. Why choose Mceula for the site of the HM project?
3. What grazing system was in place before HM? 4. How was it managed? Land/water/fencing/disputes?

5. How did OLF introduce HM in Mceula?
6. Were any parties averse to the introduction of HM? Where there any farmers associations and were they averse to HM?
7. How did OLF conduct the consultation phase?
8. What where the successes/failures of the consultation phase?
9. How did OLF conduct the implementation phase?
10. What where the successes/failures of the implementation phase?
11. What would you do differently / the same?
12. What effect has HM had on:

Veld Livestock Livelihoods
13. Have there been any unintended consequences?
14. Is the project dependant on external support (financial / technical / administrative)?
15. If so, will there be a point were sustainability is achieved?
16. Do you see future potential for the expansion of the project?
17. Did HM improve veld? Did HM improve livestock? Did HM improve livelihoods?

18. Overall impression of the project?
19. Additional comments:

Please delete as appropriate:

I give permission for my name to be used in the study / I wish to remain anonymous

Participant Signature: _____ **Researcher Signature: _____**

Date: _____ **Date: _____**

Annexure F: Interview schedule for livestock farmers

Questionnaire 3: Demographic

Livestock Farmer

Code:

Name: _____ **Sex:** _____ **Age:** _____

E-mail: _____ **Phone:** _____

Occupation: _____ **Education:** _____

Farming experience: _____ **Personal herd:** _____

1. How long have you been farming?
2. How did you get involved in HM project? Why?
3. How did you graze livestock before HM?
4. How do you graze livestock now?
5. What are the problems with grazing like this?
6. What are the benefit of grazing like this?

7. Is HM better or worse than what you were doing before?
8. How was the project introduced to you?
9. What was good about how it was introduced?
10. What were the problems in how it was introduced?
11. Could it have been done differently?

12. What effect has HM had on: Veld Livestock Livelihoods
13. Are there people who disagree with HM?
14. Do you see future potential for HM?
15. Do you see future risks for HM?
16. Should this project be expanded into other areas?
17. What was the participation levels of? WGA: TA: NGO: Local government:
18. Did HM improve veld? Did HM improve livestock? Did HM improve livelihoods?

19. Overall impression of the project? Has this project helped you?
20. Additional comments:

Please delete as appropriate:

I give permission for my name to be used in the study / I wish to remain anonymous

Participant Signature: _____ **Researcher Signature: _____**

Date: _____ **Date: _____**