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Evaluating the effectiveness of rangeland resting initiatives in communal grazing systems in South Africa

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Abstract

In South Africa, rangeland environments provide ecosystem services upon which many broader natural processes and millions of livelihoods depend. Against a background of environmental degradation and widespread poverty, trade-offs between different services must be carefully managed. 17% of South African rangeland is held under communal tenure, bringing unique management challenges. This thesis investigates the efficacy of Conservation Agreements (CAs) - an example of a Payments for Ecosystems Services approach - in achieving positive environmental and social outcomes within three communities in the Mvenyane region of Eastern Cape, South Africa. It seeks to establish whether areas of rangeland in these communities were successfully rested, a key tenet of these agreements. Biomass sampled from designated rested areas was compared against samples from exclosures within these rested areas. Focus groups (FG) were also conducted with local signatory institutions known as Grazing Associations (GAs) to identify factors contributing to in/effective resting. The findings show that rangeland was not effectively rested in any of the communities studied. Insights from the New Institutionalist paradigm and the broader literature were used to analyse data from focus groups and a household survey. This indicated inadequate institutional capacity to deliver management strategies required to satisfy the terms of the CAs, and limitations in the pro-social outcomes the CAs were designed to provide. In particular, the design of CAs contributed to the exclusion of marginalised groups from GAs. More broadly, a dichotomy was revealed between the market-based approach underpinning the CA arrangements, and the priorities of many rangeland users. Further research into reasons for non-participation in GAs, and into other local institutions of power, is suggested, alongside key policy recommendations.

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ANOVA	Analysis of Variance
CA	Conservation Agreement
CSA	Conservation South Africa
FG	Focus Group
GA	Grazing Association
IAP	Invasive Alien Plant
LSU	Livestock Units
MLM	Matatiele Local Municipality
PES	Payments for Ecosystem Services
PSB	Programa Socio Bosque
SES	Social Ecological System
TOCASA	Trade-offs in communal areas in South Africa
WfW	Working for Water

Chapter 1: Literature Review

1.1 Overview of rangelands and their global importance

Covering approximately 54% of terrestrial ecosystems (Sala et al., 2017) and present in almost all continents, rangelands are unique and multifaceted ecosystems. Rangelands are defined as areas where indigenous vegetation predominates, consisting mainly of grasses and shrubs (Society for Rangeland Management, 1998); this vegetation is managed as a natural ecosystem, as opposed to being transformed to other land uses such as agriculture or forestry. Rangelands are considered drylands by the Millennium Ecosystem Assessment, indicating the aridity index value of these areas is less than 0.65 (Millennium Ecosystem Assessment, 2005). Types of rangelands include “natural grasslands, savannas, shrublands, many deserts, tundras, alpine communities, marshes and meadows” (Society for Rangeland Management, 1998), revealing the heterogeneity of this ecosystem (Fuhlendorf et al., 2017). Either vegetation type or land use type (primarily grazing) may be the primary focus but these are the defining tenets of the term rangelands (Briske, 2017).

The centrality of land use type to the very definition of rangelands indicates the close links between these environments and human societies, to the extent that rangelands are best understood as Social-Ecological Systems (SES) (Hruska et al., 2017). This conceptualisation recognises that the social and ecological components of rangelands are “integrated and interdependent” (Hruska et al., 2017, p.264) across multiple temporal and spatial scales. Iterative cycles characterise rangeland SES, whereby changes at one level of society may provoke an ecosystem response that in turn affects people occupying a different time or space (Ostrom, 2009). Recognising the complexity of such systems is fundamental to understanding the social and environmental implications of rangeland management decisions.

Across the world, rangelands have long played an important role in the lives of humanity, most tangibly in the livelihoods and cultures of rangelands’ local user communities, but also less directly at the global level. This is captured by the term ‘ecosystem services’, which emerged in the 1990s and, significantly, was used to frame the *Millennium Ecosystem Assessment* in 2005 (Kull et al., 2015). Broadly, the term recognises that humanity – at global and local levels – remains reliant upon a multitude of natural processes beyond those over which it has complete control. The services that nature provides are divided into four categories: provisioning, regulating, cultural and supporting (see Table 1.1), helping to understand the multiple forms in which rangelands provide benefits to society. This concept has been criticised for an anthropocentric focus on the use value placed by humans on nature (Kull et al., 2015). As a framework to understand and articulate humanity's ultimate reliance on natural systems, the ecosystem services approach arguably serves an important

purpose in providing language to advocate for these systems within neoliberal paradigms currently dominating political and economic discourse. Equally, drawing on discourses which critique these paradigms (eg Buscher, 2010; Fletcher & Buscher, 2017; Kull et al., 2015) enables recognition and interrogation of the politics inherent to the concept of ecosystem services, providing a broader basis for understanding the merits and challenges of management approaches derived from this understanding of the relationship between humanity and the natural world.

Table 1.1: Examples of ecosystem services, arranged by type.

Types of ecosystem services		
Provisioning	**Regulating**	**Cultural**
Food and fibre	Climate regulation	Inspiration
Wood: firewood and timber	Pollination of crops	Recreation
Construction materials	Store carbon	Education
Clean water	Control flooding	Aesthetic
Medicines		Tourism
		Sacred areas
Supporting		
Soil formation		
Biodiversity		
Primary production		
Habitat		

Source: Adapted from Sala et al. (2017, p.468).

The ecosystem services that rangelands provide to society vary spatially and by scale. Rangelands play a vital role in the livelihoods of local communities across the world, particularly in developing countries where many are located (Coppock et al., 2017). Benefits to local communities include provision of food, fibre, firewood, construction materials and medicines (Sala et al., 2017). Providing grazing resources for livestock is one of the most widespread and economically significant ways that rangelands contribute to livelihoods of people across the world, again, especially in developing countries (Herrero et al., 2009). Taking a broader perspective, rangelands regulate the climate by sequestering significant quantities of carbon; rangelands also support biodiverse habitats and the formation of soil (Sala et al., 2017) and play important cultural functions in many societies (Ainslie, 2013). This demonstrates some of the ways in which rangelands sustain human societies at multiple scales.

Like many other ecosystems, rangelands face multiple threats, which may be of a global or local nature. These threats include desertification, degradation, encroachment by woody plants and

expansion of urban areas (du Toit et al., 2017; Joyce and Marshall, 2017). For example, degraded rangelands may provide grazing resources of inferior quality and quantity; equally, degraded rangelands are less able to regulate flooding by holding water (Sala et al., 2017). Given the interlinkages between ecological and social components of rangelands as complex SES, the impact of these threats on local and international communities is significant. This increases the importance of rangeland management policies that are adaptable to local conditions and promote resilience (Allsopp, 2013).

Implementing such policies may be especially challenging for collectively managed areas, a common form of tenure for rangelands in developing countries. Akin to other common pool resources, rangelands are vulnerable to exploitation by individual users. In the scenario of individuals acting in their own short-term interests, not only are the resources available to other users reduced in the short term, but long-term outcomes are generated that are not in the interests of any rangeland user (Ostrom et al., 1999). This often takes the form of degradation; as described above, this rapidly has detrimental effects on livelihoods and the environment. The work of the New Institutionalist paradigm, in particular Ostrom (2015), offers a useful theoretical lens to understand the challenges inherent to the management of common pool resources and how these might be overcome, primarily through the development of strong institutions. This paradigm is further explained in section 1.3 below. When applying such tools, it is important to emphasise the complexity of rangelands as SES, in order to generate appropriate and effective management strategies (Allsopp, 2013).

These challenges are felt particularly keenly in South Africa. Approximately 70% of South Africa's land surface area is comprised of rangelands (O'Connor and van Wilgen, 2020). Of South Africa's total farmland, 17% is managed communally (Gwiriri et al., 2019). The grazing resources provided by these communal rangelands are a vital component to the livelihoods of 3.3 million smallholder livestock farmers (Gwiriri et al., 2019). Significant diversity can be observed in how rangelands are used and disparity in how benefits accrue to users, often based on factors linked to the economic status or gender of the rangeland user (Cousins, 2007). Degradation of these communal rangelands has been exacerbated by climate change and by a history of political interventions, particularly under minority rule, which has significantly weakened pre-colonial systems and institutions responsible for effective rangeland management. Such degradation threatens the ecological integrity of communal rangelands, the livelihoods of millions of users and the ability of these areas and surrounding private rangelands to maximise their potential contribution to the South African economy. Whether motivated by their interest in the environmental, economic or social aspects of

rangeland SES, a variety of state and non-state actors are thus exploring strategies to address degradation of communal rangelands.

1.2 Rangelands in South Africa

1.2.1 Rangeland types

Several biomes are found in South Africa's rangelands, including grassland, savannah, Nama-karoo, thicket, succulent karoo, fynbos and forest (Palmer and Ainslie, 2005). Of these, grasslands are the biome sustaining the majority of rangeland-based livelihoods and cover 295,233 square kilometres, of South Africa (Palmer and Ainslie, 2005). Whilst South Africa's grasslands can be divided into multiple categories, the most common distinction made by both rangeland users and researchers is between sweet and sourveld. Sweetveld is more likely to occur on soils with a high clay content at low elevations with a warm, dry climate and sustains relatively high forage quality all year round (Ellery et al., 1995). By contrast, sourveld is more common in cool, moist areas of sandy soil at high elevations (Ellery et al., 1995). Forage quality of sourveld declines markedly during autumn and winter, when nitrogen and other key minerals translocate from standing biomass to plant roots, reducing the protein content and digestibility of remaining material for livestock (Dedekind et al., 2020). From a livestock production perspective, this "seasonal forage bottleneck" (Dedekind et al., 2020, p.191) has historically been mitigated by practices of transhumance (Salomon et al., 2013), moving livestock to more productive areas during the dry season. The legacy of colonial and apartheid policies, which significantly curtailed such movements, remains significant in determining the choices of contemporary farmers, who often rely on purchased supplementary feed during the winter (Dedekind et al., 2020).

1.2.2 Importance at national and international scales

On national and international scales, South African rangelands provide a variety of ecosystem services. Livestock farming is an important contributor to national and international food supplies and thus to South Africa's GDP, contributing 47% of agricultural production in 2016 (Department of Agriculture, Forestry and Fisheries, 2018). The South African government has implemented several policy initiatives over the last decade to encourage participation in the formal market by smallholders utilising communal rangelands (Marandure et al., 2020). As a water-stressed country, South Africa also relies on its rangelands to filter water and act as catchment areas, maintaining consistent base flows to surrounding areas during the dry season (Turpie et al., 2008). By sequestering carbon, South Africa's rangelands play an important role in regulating the global carbon cycle (Palmer and Bennett, 2013). They also provide supporting services through hosting biodiverse

ecosystems (O'Connor and van Wilgen, 2020). Furthermore, South Africa's rangelands provide unique cultural services to local communities (Palmer and Ainslie, 2005).

1.2.3 Rangeland tenure

Approximately 17% of South Africa's rangelands are held under communal tenure (Gwiriri et al., 2019). The problematic nature of the term "communal tenure" must be acknowledged, as it implies a singular system with universal application across South Africa (Weinberg, 2015). Instead, it is more useful to consider the term as denoting a variety of land tenure practices specific to local communities, yet which retain sufficient common characteristics to separate them from systems based on private property (Weinberg, 2015).

In the pre-colonial era, mobile agro-pastoralism was common (Ainslie, 2013; Salomon, 2013) and land rights were largely socially embedded, negotiated through relationships within and between autonomous political groups (Bennett et al., 2013) which differed significantly between communities (Weinberg, 2015). Colonial and apartheid laws confined black South Africans to just 13% of the country and vested power over land in an imposed system of tribal authorities (Weinberg, 2015). This undermining of existing, varied forms of tenure suited colonial authorities' desire for political and economic control of rural areas. Since the transition to democracy, Section 25 of South Africa's constitution has enshrined the right to security of land tenure for all South Africans (South African Government, 1996). With regard to communal rangelands, the Interim Protection of Informal Land Rights Act of 1996 offers only flimsy protection of communal rangeland users' rights (Weinberg, 2015). Since then, there has been no significant reform of communal land tenure law; instead, South Africans have witnessed a consolidation of traditional authority through laws such as the Traditional Leadership and Governance Framework Act of 2003 (Cousins, 2007). Many have argued that this does not reflect the wishes of the majority of South Africans and is particularly detrimental to the position of women (Weinberg, 2015)

1.2.4 Importance to local livelihoods

Whilst it is difficult to quantify the direct market value of many of the ecosystem services provided by rangelands (Sala et al., 2017), there is extensive documentation of their importance in sustaining rural livelihoods in contemporary South Africa, which provide a variety of ecosystem services to local users (Villamor et al., 2014). In the context of communal rangelands, this includes the provisioning of, timber, thatching grass, fuelwood, medicinal and edible plants for local people (Shackleton and Shackleton, 2004). These may be used directly by households or sold on in raw or processed forms to provide cash income (Shackleton et al., 2001). The role of these services in rural livelihood strategies should certainly not be underestimated (Shackleton and Shackleton, 2004; Shackleton et

al., 2005; Shackleton et al., 2001; Ngorima and Shackleton, 2019). Communal rangelands also provide unique cultural services and spaces which are highly valued by users (Shackleton et al., 2001) and which may be underestimated by policies which focus on protecting ecosystem services that provide economic gain (Ainslie, 2013).

The provision of grazing resources is especially important: the significance of livestock, both to local people and in government policy, means that their unique role in rural livelihoods must be understood. It is estimated that there are 3.3 million livestock farmers utilising rangeland commons in South Africa (Gwiriri et al., 2019). A minority of livestock owners can be considered small-scale commercial farmers; they manage a small herd so as to maximise body condition and achieve profits from sales. For most owners however, the main reason for keeping livestock is a form of savings (Vetter and Bond, 2012). For these owners, their livestock are effectively a means of insurance (Goqwana et al., 2008), which could be sold during periods of economic hardship or to release cash for infrequent large expenditures such as dowry payments (Shackleton et al., 2001). These owners may not select breeds or husbandry strategies to rear animals that will fetch high prices at auction, as this is not their primary goal and such standards are not required in the informal market (Gwiriri et al., 2019). Livestock owners are more likely to sell into informal markets due to lower transport costs, higher prices and greater trust in the process (Vetter, 2013). Livestock reared for these purposes are also more likely to provide "flow products" (Marandure et al., 2020, p.840) which extend beyond livestock owners, providing those who do not own livestock with local access to draught power, manure, meat and milk (Shackleton et al., 2005; Hall and Cousins, 2013). In a context of precarious economic security for many households, livestock offer an important safety net to many rural communities in South Africa (Gwiriri et al., 2019; Sayre et al., 2013).

Gender differentiation in the way landscapes are used must be emphasised (Villamor et al., 2014). Women are more likely to make use of non-grazing resources (Shackleton et al., 2001) and women headed households are less likely to own livestock, particularly cattle, as dictated by traditional customs (Gwiriri et al., 2019). Where women do own livestock, they are more likely to keep smaller livestock such as chickens or sheep, which are considered to be of less cultural and economic significance (Ainslie, 2013), reflecting women's marginalised position in society in relation to men (Kleinbooi, 2013).

This demonstrates that ecosystem services available from communal rangelands continue to play a vital role in the livelihoods of millions of rural South Africans. A wide range of services is utilised in diverse ways by different community members, meaning that any changes to the provision of these services could have a significant impact on the security of local livelihood strategies.

1.2.5 Rangeland degradation in South Africa

In common with rangelands across the world, South Africa's rangelands face the issue of degradation, the definition of which has been contentious (Palmer and Bennett, 2013). By understanding rangelands as SES, there has been a move away from considering degradation purely in biophysical terms (Palmer and Bennett, 2013), and instead as "persistent net reduction of the basket of ecosystem services potentially yielded by the landscape" (Scholes, 2009, p.124). Indeed, this is the definition adopted by several key international organisations (Millennium Ecosystem Assessment, 2005; Food and Agriculture Organisation, 2019). By these definitions, much of South Africa's communal rangeland is considered degraded (Palmer and Bennett, 2013; Rutherford and Powrie, 2013).

Degradation may occur on multiple levels. Amongst vegetation, degraded rangeland may present through lower basal cover, reduction in higher quality forage species, reduced diversity of plant and animal species, and invasion by invasive alien plant (IAP) species (Gouws and Shackleton, 2019). *Acacia*, *Eucalyptus, Hakea, Pinus* and *Prosopis* species are particularly problematic invasives in many areas (le Maitre et al., 1996). Soils on degraded rangeland are likely to be more vulnerable to erosion, compaction and reduced nutrient levels; this decreases infiltration by water, increasing the risk of flooding. Secondary production data for livestock production, for example lower body condition scores, declines in milk production and decreased reproductive success, are also indicators of degradation (Vetter and Bond, 2012). As rangelands are complex SES, links between different forms of degradation are important to note, as outlined in Table 1.2: invasion by IAPs tends to reduce water availability in the soil and reduce occurrence of palatable species, to the detriment of animal production. Considering the social component of SES, degradation clearly curtails the extent to which rangelands can provide key ecosystem services to users on local, national and international scales.

Whilst a reduction in the ability of rangelands to provide key regulating and supporting services is clearly problematic at high level spatial and temporal scales, the impacts of degradation are arguably most keenly and rapidly noted on a local scale. This is particularly so in terms of the provisioning services upon which the livelihood needs of many local people depend. For example, one of the most significant provisioning services in communal systems is grazing, and by reducing the quantity, variety and quality of available forage (Reed et al., 2015), degradation makes it more difficult for owners to sustain livestock. Whilst buying in supplementary feed is fairly common practice during the dry season in sourveld areas, farmers on degraded rangeland are increasingly forced to do this during the growing season. In a context of declining milk and wool production and declining reproduction rates (Vetter and Bond, 2012), this added expense is damaging to many farmers

(Dedekind et al., 2020). Degradation of rangeland grazing resources thus has a significant impact on the livelihoods of many in rural communities. Whether the focus of analysis is anthropocentric, looking at the impacts of environmental change on humanity (Kull et al., 2015), or considers the preservation of rangeland ecosystems as important in and of itself, degradation is highly problematic in the South African context.

Table 1.2: Forms of degradation and resultant social and environmental impacts

Sources: Ngorima and Shackleton (2019); Palmer and Bennett (2013).

1.2.6 Policy approaches that have contributed to degradation of communal rangelands

A consideration of rangeland degradation in South Africa requires some understanding of historical processes of dispossession and intervention that have created the systems of land tenure within which contemporary institutions sit (O'Laughlin et al., 2013). In 2019, the South African government stated that the "dispossession of the land of native South Africans by European settlers caused devastating poverty and fractured economic well-being for African families and their communities" (2019, p.41). Indeed, the "sheer scale" (Bennett et al., 2010, p.341) of intervention may be considered more extreme than in many other colonialised areas. The 1913 Native Lands Act confined black South Africans to 7% of the total land area, later increased to 13% by the 1936 Native Trust and Land Act and consolidated into homelands by subsequent apartheid governments (Land Degradation Neutrality Target Setting Programme, 2018). Practices of "betterment" from the 1930s onwards, ostensibly aimed at tackling land degradation, relocating people within reserves and introduced fencing to more actively manage grazing (Salomon et al., 2013). This forced resettlement

of millions of South Africans disrupted traditional grazing practices, reduced areas available for grazing and undermined local management institutions and social cohesion (Vetter, 2013).

In terms of their access to land and the security of their tenure, smallholders accessing communal rangelands have reaped few rewards from the transition to democracy. Despite grandiose rhetoric promising poverty alleviation through land reform (Cousins, 2010), policy has largely prioritised development of black-owned large-scale commercial farms outside communal areas, at the expense of smallholders within them (Lahiff and Cousins, 2005; O'Laughlin et al., 2013). Since 1999, the Land Redistribution for Agricultural Development programme and the Proactive Land Acquisition Strategy have been key policies operationalising government preferences for private ownership and commercial use of land (Hall and Cousins, 2013). This trend has been continued by the Land and Agrarian Reform Project initiated by the South African government in 2008 (O'Laughlin et al., 2013) and the Recapitalisation and Development Programme introduced by the Department of Rural Development and Land Reform in 2009 (Hall and Kepe, 2017; South African Government, 2013). Indeed, the 2011 National Development Plan emphasised that the process of transferring land to black beneficiaries would prioritise those forms which did not harm investor confidence in the agricultural sector (Weinberg, 2015); namely, private ownership. A focus on creating "a new class of black commercial farmers" (Lahiff and Cousins, 2005, p.129), has failed to account for the needs of those seeking to make use of commons, rather than own land (Vetter, 2013). This is seen not only in the dearth of legislation and policy pertaining to common land, but also in the state's failure to provide key support services – development of infrastructure, training and veterinary services (Lahiff and Cousins, 2005) – that users of rangeland commons were starved of under apartheid (Cousins, 2010).

Government policy under colonialism, apartheid and democracy has thus contributed to a situation where communal rangelands are required to provide ecosystem services to greater concentrations of people than in pre-colonial times. Such pressure on these areas pre-disposes them to degradation.

1.2.7 Options for addressing rangeland degradation and shortfalls in productivity

Addressing degradation requires some understanding of the historical, social and environmental processes that feed into rangelands as SES. In broad terms, the condition of rangeland is determined by climatic factors such as rainfall, interactions between plants and herbivores, and human management decisions (Salomon et al., 2013). Beyond this understanding, there is unresolved debate as to the drivers of rangeland degradation (Palmer and Bennett, 2013; Rutherford and Powrie, 2013; Vetter, 2013). Briefly, it is agreed that climatic variables and weather are key

underlying factors. Further, the presence of large numbers of invasive alien plants contributes to degradation through altering water flow, reducing biodiversity and replacing palatable species (Gouws and Shackleton, 2019). This is explored extensively elsewhere in the literature (O'Connor et al., 2014). Grazing pressure constitutes another key factor in understanding degradation processes although there is considerable disagreement in the literature as to appropriate stocking levels and grazing management for communal areas (Briske et al., 2008; Hawkins, 2017). However, there is general consensus that continuous grazing by large numbers of livestock is a key contributor to degradation (O'Reagain and Turner, 1992; Briske et al., 2008; Vetter, 2013).

Whilst multiple options have been advocated for reducing grazing pressure, evidence indicates that several have significant flaws, particularly in relation to communal areas. Firstly, access to more land via land reform is unlikely to be a realistic option for reducing grazing pressure in communal areas because the only viable mechanism for achieving this was land restitution, claims for which have now all been settled (Bennett et al., 2010). Destocking has also been advocated, but Vetter (2013) suggests that this is not a realistic option, as most livestock owners in communal systems would like to expand their herds rather than reduce them. Rotational intensive grazing promises to maintain high stocking levels whilst encouraging restoration of degraded areas, however, this is highly contested (Briske et al, 2008; Hawkins, 2017). More pertinently, the complex management systems required to manage rotational grazing (whether intensive or not) are difficult to implement effectively in communal settings (Bennett et al., 2010).

In contrast, the introduction of rest into communal grazing systems enjoys a broad church of support (Briske et al., 2008; Vetter, 2013). Indeed, rest in one form or another was always part of traditional management systems (Salomon et al., 2013). Periodic rest is seen as essential in maintaining range condition (O'Reagain and Turner, 1992), particularly to promote plant growth (Briske, 2008) and sustained use of rangeland for grazing (Dedekind et al., 2020). Resting is proposed as one of the more straightforward strategies to implement successfully in communal management situations with appropriate infrastructural and institutional support. This has led to widespread advocacy of resting as the rangeland management strategy most likely to secure long-term provision of ecosystem services by rangelands (Briske, 2017; Vetter, 2013).

1.3 Local institutions for natural resource management

Understanding the practices and institutions involved in management of rangeland commons is clearly vital to the planning and implementation of strategies such as resting to halt or reverse degradation. Whilst management of rangeland held under communal tenure clearly requires

different approaches to land that is privately owned, Hardin's (1968) prediction that "[f]reedom in a commons brings ruin to all" (p.1244) is by no means an inevitable outcome. Proponents of the New Institutionalist paradigm develop distinctions between different kinds of property regime which can enable outcomes more beneficial to resource users and the natural environment. Ostrom et al. (1999) agree that, in an open-access situation, "degradation and potential destruction" (p.279) are likely. Crucially, they find that if all users are able to communicate, and to form and enforce rules, resources may be managed for the common good under a common property regime (Ostrom et al., 1999). Effective institutions to facilitate communication, rule creation and sanctioning are considered to be integral to the effective functioning of a common property regime (Swallow and Bromley, 1995). Ostrom (2005) defines institutions as "the prescriptions humans use to organize all forms of repetitive and structured interactions" (p.3). In South Africa, mounting pressure on communal rangelands to provide ecosystem services to an extensive population, with little possibility of this pressure being relieved through land reform, emphasises the importance of finding more effective ways to manage existing common pool resources (Bennett et al., 2010; Hall and Cousins, 2013).

Building on pre-existing relationships and retaining some decision making, monitoring and enforcement at the local level helps to generate the trust needed to overcome the free-rider problem (Marshall, 2008). Further, Ostrom (1999) finds that systems built around local knowledge, by those who enforce them, are better adapted to local contexts and design rules with lower enforcement costs. Equally, involving institutions at higher levels, with wider jurisdictions or holding alternative forms of knowledge may be necessary to achieve change (Ostrom, 1999). Ostrom (1999) emphasises the nesting of local institutions within wider regimes as vital to developing the decentralised polycentric governance systems that she finds are most effective for managing common pool resources. Furthermore, Ostrom (1999) regards any development of resource management policy as "experimentation" (p.520); having multiple local groups experimenting simultaneously with different policies is, according to Ostrom (1999), the most efficient way to identify the most appropriate policy.

As in many other African nations, policies of indirect rule in South Africa resulted in institutions of governance characterised by what Mamdani (1996) famously referred to as "decentralized despotism". Bolstered by the might of colonial and apartheid forms of the state, laws such as the 1927 Native Administration Act and the 1936 Native Trusts and Land Act gave traditional authorities tighter control over land allocation and management than in pre-colonial times (Cousins, 2007; Weinberg, 2015). Since the transition to democracy, a slightly more complex institutional picture in rural South Africa has emerged (Bennett et al., 2013), with considerable heterogeneity between

different areas (Weinberg, 2015). Case studies from across South Africa have identified multiple institutions that may exist, coexist or compete in controlling access to land and managing land in a particular area (Bennett et al., 2013; Bennett et al., 2010; Claassens, 2003); this may include traditional authorities, ward councillors, Residents' Associations and Farmers' Associations. Despite the emergence of new institutions, it must be emphasized that, given the dearth of policy on communal land since 1994 (Hall and Cousins, 2013), traditional leaders have remained the default custodians of land in many communal areas (Bennett, 2013). It is also important to note the broader context of considerable state withdrawal from rural areas, as part of a process of political decentralisation, compared to under apartheid. Without the backing of the powerful apartheid state, retaining *de jure* control over natural resource management is increasingly difficult for traditional leaders (Bennett, 2013).

This situation of uncertainty is problematic in several senses. Firstly, this has reinforced inequalities, particularly in terms of power and financial security, which Section 9 of South Africa's constitution and subsequent policy documents such as the Land Reform Gender Policy purport to tackle (South African government, 1996; Kleinbooi, 2013). This can be observed in terms of gender: most women continue to have only secondary rights to land, which they must exercise via a male relative (Claassens, 2005; Cousins, 2007). Accessing communal land often requires women to compete with the patriarchal structures of traditional authority (Kleinbooi, 2013). Furthermore, traditional leaders have often been able to capture or contest the activity of new institutions such as Common Property Associations (Cousins and Claassens, 2004; Gwiriri and Bennett, 2020), which offer a mechanism by which legal recognition and therefore rights are given to a group of people inhabiting a particular geographic area (Bennett, 2013). Capture of such groups has prevented their effectiveness in acting as checks on traditional forms of power through democratic means (Bennett, 2013). Such consolidation of the power and wealth of the existing elite can be regarded as counter to the 1996 constitution and has been contested by many civil society actors (Claassens, 2003; Fortin, 2010).

Beyond the questions this raises in relation to national aspirations to greater equality, traditional leaders' dominance in the management of the rural commons is problematic in another sense: their leadership has often been found to be ineffective. Multiple case studies (Bennett et al., 2010; Bennett et al., 2013) have found that without the top-down support that traditional leaders received from colonial and apartheid governments, they are often ineffective in enforcing community rules on the management of the commons. The issue of fencing provides an illustration of this. Since the fall of apartheid, traditional leaders in many areas have no longer received the capital support required to maintain fencing, which they relied on to exercise community control over grazing management (Bennett et al., 2010). This has resulted in a laissez-faire management scenario,

whereby livestock owners make their own decisions about where livestock graze, making community-based management of grazing (e.g. resting of designated areas) very difficult. Thus, whilst traditional leaders remain dominant as or within institutions governing rural commons, their inability to enforce collective resource management rules indicates that they are unable to fulfil the requirements of a common property regime. Simultaneously, traditional leaders' ability to co-opt or block the work of other institutions curtails the development of effective management regimes through alternative structures (Bennett, 2013; Claassens, 2003). As a result of such institutional weakness, many of South Africa's commons can be regarded as open access resources and thus vulnerable to degradation (Bennett et al, 2013).

To summarise, strong institutions are important to ensuring effective management of rangeland commons and consequently to implementing strategies that may halt degradation and its associated impacts on rural livelihoods. Institutional oversight of commons tends to be weak in South Africa; developing robust institutions may offer a valuable point of intervention.

1.4 Payments for Ecosystem Services approaches to managing communal rangelands.

Payments for Ecosystem Services (PES) is one mechanism for addressing degradation that acknowledges the links between the social and ecological components of rangelands. In general terms, PES has been used to describe any market-based approach to conservation (Engel et al., 2008). Building on the ecosystem services framework outlined above, PES schemes recognise that in economic terms, the contribution of key provisioning, regulating, cultural or supporting services are regarded as externalities (Engel et al., 2008). The costs of maintaining such services are thus borne by the land manager and the ecosystem itself; this has proven to be unsustainable in many cases as users rarely have sufficient incentives to maintain ecosystems for sustainable service provision in the long term (Kumar, 2010). Many land managers may simply be under too great a financial pressure to adopt management practices which are more environmentally friendly, even if they have the knowledge and desire to do so (Jones et al., 2020). This is certainly the case in South Africa, where most communal rangeland users have little personal financial security (Gwiriri et al., 2019). PES can be seen as both a short-term tool for incentivising rangeland users to adopt management strategies that build environmental capacity, and as a means of recognising that such management strategies often involve transferring costs from the environment to the user, costs that many rangeland users can ill afford. By paying land managers to adopt particular practices, PES thus provides a financial incentive for local actors to safeguard provision of key ecosystem services in the short and long term

(Engel et al., 2008). Proponents of PES argue that commodifying certain services (such as the provision of clean water) and rewarding their provision offers a powerful tool for safeguarding valuable ecosystems (Turpie et al., 2008). PES schemes may also include goals of poverty reduction or equity in payment distribution, although this is not the primary function of the approach (Turpie et al, 2008).

Reviews of PES schemes in operation across the world have identified several key features as key to the success of a PES scheme; several of these overlap with findings from broader reviews of development projects from the field of International Development (Chambers, 2017). Careful brokerage was found to build commitment to the scheme (Jones et al., 2020), with signing of a formal contract particularly important (Ola et al., 2019). Unsurprisingly, ensuring that payments covered all costs of the management practices required by the scheme made success more likely (Ola et al., 2019). Conditionality is regarded as the cornerstone of PES schemes (Engels et al., 2008) and indeed good monitoring of programme activities has been found to increase the probability of obtaining environmental and social outcomes (Ola et al., 2019). Recognising that a range of factors beyond rational choice theory may influence an individual or community's ability or willingness to participate in PES schemes is a significant influence on participation (Jones et al., 2020). Finally, temporal variances were found, with PES programmes deemed to be most effective 10-30 years after implementation (Ola et al., 2019).

It must be emphasised that even proponents of PES acknowledge that it cannot provide a "silver bullet" (Engel et al., 2008, p.665) to address any environment issue. In particular, the approach may fail to address the local or broader politics that are central to land management decisions in many areas, including the SES of communal rangelands. The choice of ecosystem service to reward the provision of is inherently political (Kull et al., 2015). PES approaches to rangelands may favour supply of more marketable services such as carbon sequestration over those for which there is no immediate market, such as wildlife habitats (Reed et al., 2015). Further, different communities, or different members of the same community, may have varying preferences for the management of the same ecosystem (Reed et al., 2015). The choice of management strategy to reward via a PES scheme is likely to be influenced by power relationships amongst those involved, meaning that PES schemes tend to reinforce pre-existing social systems (Ola et al., 2019). Furthermore, the distribution of PES payments is vulnerable to elite capture within communities. Indeed, in their review of 78 studies of PES schemes, Jones et al. (2020) find that wealthier or better connected households are more likely to participate in a scheme. Marginalised groups, particularly women, may thus find themselves further disempowered as a result of PES schemes (Ola et al., 2019).

In addition to these challenges with the ecosystem services model, PES has been criticised more broadly for shoring up a neoliberal approach to humanity's relationship with the natural world (Fletcher and Buscher, 2017). Whilst a particular PES scheme may not conform to all key tenets of neoliberalism, by applying the logic of the market to the functions of the natural world, PES excludes any conception of human relations with nature beyond those which can be monetarised (Fletcher and Buscher, 2017). PES schemes also tend to depoliticise management of natural resources, failing to question the causes of degradation (Fletcher and Buscher, 2017), particularly where broader structural issues are relevant and institutional capacity is lacking. It has been suggested that such discourse has in itself been responsible for widespread degradation of the natural environment and that looking for solutions within this paradigm will not lead to success (Fletcher and Buscher, 2017; Kull et al., 2015).

Applying these debates around PES to the South African context, South Africa has a precedent of using PES approaches to tackle rangeland degradation. Encroachment of rangelands by IAP species has had a significant impact on South Africa's water resources. "Working for Water" (WfW) is a scheme designed to address this form of degradation by paying contractors – usually members of the local community - to clear IAPs (le Maitre et al., 1996). Certainly, WfW has gone some way to improving water supplies and biodiversity in many areas (Turpie et al., 2008). However, there have been significant criticisms of the scheme, particularly with regard to its treatment of workers. Piecemeal employment on short-term contracts, payments below minimum wage and inadequate health and safety standards were found to be commonplace (Bek et al., 2017). Further, despite promises to develop workers' capacity in both clearing and in secondary industries, required training and capital investment has been lacking (Bek et al., 2017). Absence of long term planning and engagement with landowners – whose responsibility it is to keep land clear after WfW intervention – have been identified as factors contributing to missed environmental targets with regard to area of land cleared, although lack of monitoring activities has made this difficult to evaluate (van Wilgen and Wannenburgh, 2016).

In structural terms, the costs of WfW have been shared between the South African government and water companies, who have often passed on increased charges to end users (Turpie et al., 2008). By forcing these broader communities to acknowledge environmental degradation, WfW may go some way towards rebutting the charges of Fletcher and Buscher (2017) that PES depoliticises such issues. Familiarity and institutional engagement with the PES model may put South Africa in a favourable position to use similar approaches to address other forms of rangeland degradation (Turpie et al., 2008), depending upon whether lessons from WfW are integrated into the design of future schemes.

1.5 The PES approach to rangelands in South Africa

Problems associated with degradation and poor institutional oversight of communal rangelands are recognised by non-governmental organisations in South Africa and to some extent by the government. Conservation South Africa (CSA) is a South African NGO which is leading efforts to restore rangelands, in line with its overall aim: "helping society to adopt a more sustainable approach to development" (Conservation South Africa, 2021). CSA initiatives such as Meat Naturally, which seeks to increase smallholder livestock sales into formal markets (Conservation South Africa, n.d. -a), demonstrate broad support from the organisation for government efforts to increase off-take from communal rangelands, as demonstrated by the National Red Meat Development Programme (Marandure et al., 2020) and Custom Feeding Programmes (Gwiriri et al., 2019).

One form of intervention managed by CSA uses the PES model to encourage communities to adopt rangeland management strategies that accrue benefits to the environment. CSA has been a contractor for the WfW programme, giving the organisation some experience of the delivery of PES schemes. It is now trialling a broader PES approach to rangeland management, based on a Conservation Agreement (CA) co-constructed by CSA and a Grazing Association (GA) in each local community (Conservation South Africa, 2019). The GA accepts several responsibilities, primarily that of designating an area of rangeland to be rested and ensuring that all rangeland users comply with this decision. The choice of resting as the management strategy most likely to reverse degradation in communal rangelands is supported by the literature (Briske et al., 2008; Vetter, 2013). Social and economic benefits are provided to incentivise compliance, including supplies of vaccinations for cattle and arranging mobile auctions to facilitate sales of local cattle into formal markets. Facilitating mainstream market access by local livestock owners dovetails the scheme with the broader national policy agenda outlined above. Equally, by supplying vaccinations, the scheme tackles a deficit in agricultural extension and veterinary services (supposed to be provided by the government) that has been identified as problematic for many South African smallholders (Lahiff and Cousins, 2005).

As previously outlined, insights from the New Institutionalist paradigm and the broader literature on PES are valuable in identifying factors which may enable or prevent effective delivery of promised environmental and social benefits. This intervention hinges upon the creation of an institution (the GA), in the form of a locally constituted membership group, which is sufficiently empowered to implement the negotiated Conservation Agreement in each local area. Given existing evidence of the weakness of many institutions currently involved in managing communal rangeland in South Africa (Cousins, 2007; Bennett et al., 2010), the strength of the GAs involved in CAs must be critically

analysed. Previous evaluation of PES approaches suggests that an important measure of this is whether there will be sufficient community buy-in to the process to ensure that membership of the GA includes all rangeland users (Ostrom, 2015). Limited GA membership of rangeland users in the GA will reduce participation in critical institutional processes such as defining areas to be rested and creating and understanding the rules which govern this. Under these circumstances local support for the institution and the GA's ability to enforce rules of use is likely to be highly compromised. The situation will likely also be exacerbated by the fact that rangeland users who are not members will not receive the short term benefits promised by the PES scheme and thus have less incentive to comply. Unless GAs have the institutional capacity to enforce rules on rangeland resting, this intervention is unlikely to effectively deliver promised environmental gains.

In terms of the ability of CAs to deliver benefits to livelihoods, it is important to understand how the payments provided by the scheme are distributed within participating communities (Jones et al., 2020). Focussing the intervention on grazing resources and linking payments to ownership of cattle immediately excludes many women-headed and poorer households, who are less likely to own livestock of any type, particularly not cattle (Kleinbooi, 2013). Further, there is considerable evidence that access to the formal market – one of the benefits promised by CAs – matches neither the needs nor the desires of most rural South Africans (Goqwana et al., 2008; Hall and Cousins, 2013), who keep livestock for flow products (such as milk and dung) and as a means of savings or insurance and sell only occasionally into informal markets (Marandure et al., 2020). Instead, those most likely to capitalise on the benefits offered through CAs are livestock owners with larger herds, who already have the capital to invest in rearing livestock specifically to sell (Gwiriri et al, 2019). This may entrench disparities within communities with poorer households and women, less likely to benefit from the incentives being offered and thus being less inclined to participate. Therefore, understanding the receipt of benefits from GAs by different members of participating communities is important in analysing whether CAs offer a mechanism for delivering benefits to livelihoods effectively and equitably.

Potential issues with institutional capacity and equity of participation in GAs present significant challenges to achieving the goals set out in CAs. Determining whether CAs have been effective in overcoming these challenges requires empirical evidence of any social or environmental gains made. Based on such evidence, a critical analysis of factors enabling or inhibiting CAs' ability to deliver promised environmental and social gains is important in understanding whether this type of PES approach may offer a useful way forward for improving rangeland SES in other communal areas.

1.6 Aims and objectives

This research aims to investigate whether the PES scheme instigated by CSA in the study area is effective in delivering ecological and social benefits.

As such, the research will focus on the following key objectives:

1) To identify whether Conservation Agreements are able to deliver the ecological benefits they are designed to provide via current institutional arrangements.
    a. To investigate whether CAs are currently delivering ecological benefits.
    b. To examine how current institutional arrangements affect the efficacy of CAs in delivering ecological benefits.
2) To understand the social benefits provided by CAs to local people and determine their impact.

Chapter 2: Methods

2.1 Introduction

This section will provide a brief overview of the environmental and social characteristics of the social-ecological systems present in the study area. Awareness of this local context is important for understanding findings in relation to the overall research aim, namely, whether Conservation Agreements have been effective in delivering benefits to the livelihoods of local people and to the local environment. This section will also detail the protocols used for data collection.

2.2 CV19 Limitations

A university-wide ban on travel due to CV19 prevented the lead researcher from travelling to South Africa to conduct fieldwork. A post-doctoral researcher (field researcher) who was already in the field undertook all biomass measurements, animal incursion monitoring and focus groups on behalf of the lead researcher.

2.3 Study area

2.3.1 Environmental characteristics

Location

The study was undertaken in three villages – Gwadane, Mabheleni and Magxeni – located in the Eastern Cape province of South Africa (see Figure 2.1). More specifically, the three villages fall within Ward 21 of Matatiele Local Municipality (MLM), seen in Figure 2.2. Figure 2.2 shows the precise location of the three villages.

Figure 2.1: Maps showing location of Matatiele Local Municipality, within Eastern Cape Province of South Africa (Wikipedia, 2022)

Figure 2.2: Map showing location of Ward 21 within Matatiele Local Municipality, and locations of three study villages within Ward 21 (Matatiele Local Municipality, 2018).

Climate

A typical summer rainfall pattern sees rains begin in October and continue until April (Matatiele Local Municipality, 2019). The mean rainfall for the area is 780 mm per year[1]. Temperatures range from freezing in the winter, to a maximum of 26 degrees Celsius in the summer (Matatiele Local Municipality, 2019).

Figure 2.3: Photo showing example of communal rangeland in Matatiele Local Municipality, demonstrating invasion by Acacia dealbata *(credit: Dr James Bennett).*

Veld condition

Rangeland within the study area is mostly characterised as sourveld, which grows vigorously during the summer, but declines in nutritional quality over winter (Ellery et al., 1995). Two main vegetation types dominate the study area, namely Drakensberg Foothill Moist Grassland and East Griqualand Grassland (Environment and Rural Solutions, 2011). Species that are typically present include *Themeda triandra, Aristida junciformis* and *Tristachya leucothrix.* The area is significantly affected by invasive plant species, in particular the invasive wattle species *Acacia mearnsii* and *Acacia dealbata*, to the extent that around 5,500 ha is impacted or about 50% of the total area, as shown in Figure 2.3 (Conservation South Africa, n.d. -b; Conservation South Africa, 2022).

2.3.2 Social characteristics

Demographics

Ward 21 of Matatiele has an estimated population of 7,143, spread across 12 villages (Statistics South Africa, 2011). More specific data on the population of each study community is presented in

[1] Calculated using 2009-2019 data from nearest weather station at Kokstad, 30km due east of Mvenyane. Drought year of 2020 omitted from calculation.

Table 2.1. 56% of people in the district are women and 44% are men; approximately 52% of households are women headed (Statistics South Africa, 2011). The preferred language of the majority of people (79%) in the ward is isiXhosa (Statistics South Africa, 2011). The population is dominated by children; 49% of people in Ward 21 are aged below 18 (Statistics South Africa, 2011). Am image of a typical settlement in Ward 21 is shown in Figure 2.4 below.

Table 2.1: Number of households and population of each study community.

Community	Number of households	Population
Gwadane	441	743
Mabheleni	152	398
Magxeni	257	625

Source: Matatiele Local Municipality (2018).

Whilst ward-level information on employment and finances was not always available, figures describing MLM as a whole give some indication of the situation in the study areas. These are mostly drawn from the 2011 census, with some figures coming from the 2016 Community Survey. There are high levels of poverty in MLM, with 47.7% of households receiving a monthly income of less than R1,600 in 2016 (Matatiele Local Municipality, 2020). More specifically, over half of the population in Ward 21 received an income of less than R501 per month in 2011 (Matatiele Local Municipality, 2018), identified as the Lower-bound Poverty Line for 2011 by the South African Government (Statistics South Africa, 2019). In 2011, the unemployment rate in MLM was high, 54.0%, and 31.1% of the population were dependent on social grants, mostly in the form of child support grants (Matatiele Local Municipality, 2020).

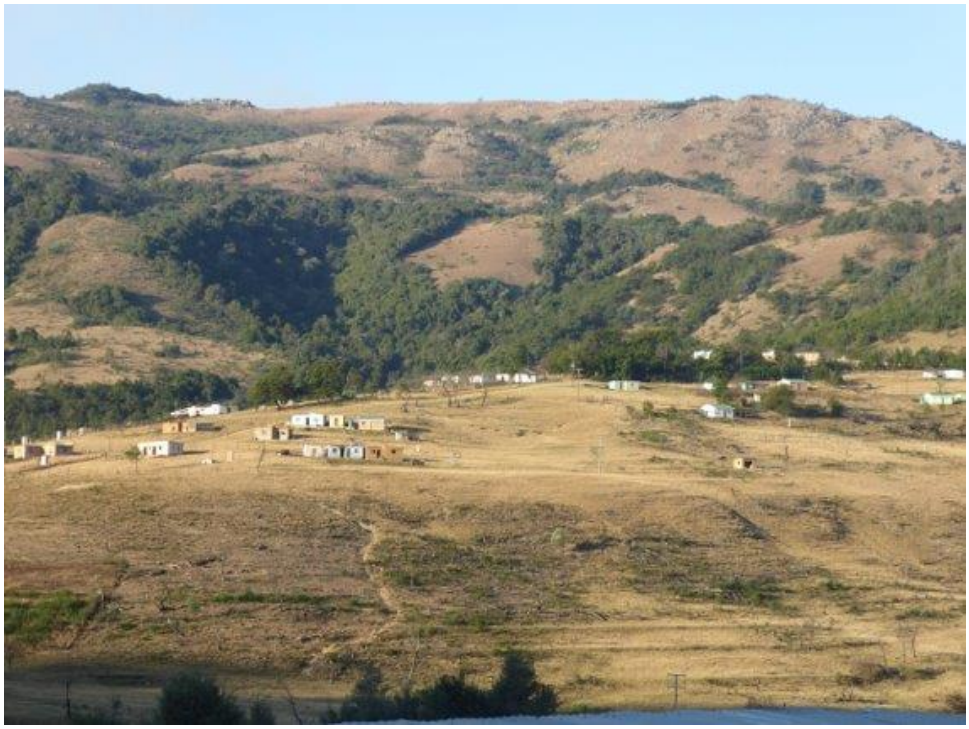


Figure 2.4: Photo showing typical settlement in Matatiele Local Municipality (credit: Dr James Bennett).

2.3.4 Livestock numbers and types

Cattle, goats and sheep are the main livestock that are kept in this area (Matatiele Local Municipality, 2019). Figure 2.5 depicts cattle typical of the types kept by local households. Using data gathered by a household survey from three of the Mvenyane villages (Trade-Offs in Communal Areas of South Africa, no date), the estimates of total livestock holdings displayed in Table 2.2 were generated.

Figure 2.5: Photo showing livestock on communal rangeland in Matatiele Local Municipality (credit: Dr James Bennett).

Table 2.2: Average Livestock Units (LSU)[2] per household in study area

Village	Cattle	Sheep	Goats	Horses	Donkeys	Total
Gwadane	2.5	0.8	1.2	0.6	0	5.1
Magxeni	9.5	1.4	1.6	0.9	0.1	13.5
Mabheleni	3.1	1.1	1.2	0.5	0.2	6.1
Average across all villages	5.0	1.1	1.3	0.7	0.1	8.2

Source: Trade-Offs in Communal Areas of South Africa (no date).

2.3.5 Site selection

The selection of study sites was pre-determined by previous activity between CSA and several communities in Matatiele Local Municipality. Six communities have been working with CSA for several years to set up Conservation Agreements. Three communities were selected for this study; these formed part of a funded research project (Trade-Offs in Communal Areas of South Africa, no date) from which the findings in this research are drawn. These particular communities were determined to be adequately representative of local rangeland conditions and also displayed sufficient socio-economic similarity to be broadly comparable.

[2] Here, one animal unit is equivalent to one cattle, horse or donkey, or six small stock (goats, sheep) (Vetter and Bond, 2012).

2.4 Data collection

2.4.1 Overview

Three strands of data collection took place: biomass monitoring, focus groups and a household survey. Results from the biomass monitoring (protocol detailed below) were used to address research objective 1a; results from focus groups and the household survey were used to address research objectives 1b and 2.

2.4.2 Biomass monitoring

Background

An experiment was designed to find out whether designated areas of rangeland were being rested in accordance with the protocols defined in the Conservation Agreements determined for each village; resting being the method by which ecological benefits accrue to the system. The definition of "rested" was taken from the Conservation Agreement signed by CSA and local communities; namely, that rested areas will not be grazed during the growing season (November to April), but will be available for grazing during the dry season (May to October).

The variable chosen as a proxy for rest was biomass accumulation. This is a straightforward to assess but effective measure of short-term ecological gain in grassland systems and enabled assessment of the effectiveness of the resting protocol based on the simple expectation that areas subject to grazing should contain less biomass overall than those under complete rest. To determine whether areas were rested in accordance with Conservation Agreements, available biomass was measured by setting up fenced exclosures within rested areas (see Dedekind, 2020). These provided data on how much biomass accumulated under zero grazing pressure (complete rest). Measurements were compared with data from paired sites within the rested area and also from the unrested area (Figure 2.6 summarises experimental design). This was necessary because prior information collected as part of the TOCASA project had suggested that rested areas were prone to significant animal incursions during the rested period at each community. Thus exclosures functioned as absolute controls which gave an indication of potential biomass accumulation under ideal management conditions compared with what was being achieved in reality. Each exclosure was constructed using a fence post at each corner of a square measuring five metres by five metres, connected using fencing wire.

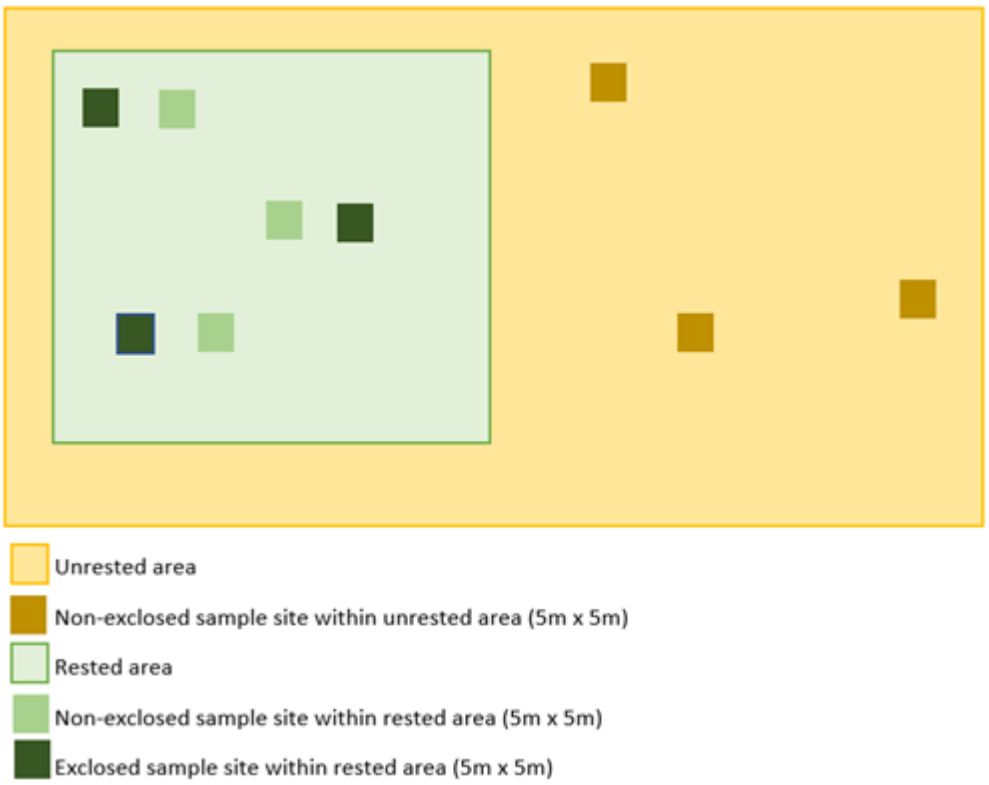


Figure 2.6: Biomass monitoring experimental design for each village.

Based on the accepted management protocol it was hypothesised that there should be no significant difference in biomass between exclosed and paired non-exclosed sample points within rested areas, assuming that resting was functioning as it was supposed to. In contrast, significantly greater biomass was hypothesised in non-exclosed plots in rested areas compared to plots in unrested areas of rangeland, assuming greater grazing occurring in the unrested areas. No native grazers were present.

Experimental design

Sampling

The experimental design was based on the protocol adopted by Dedekind et al (2020) for measuring resting performance in a very similar communal system in South Africa (see Figure 2.6). At each village, sampling was stratified according to treatment, namely grazing pressure. This resulted in two experimental units: the rested area and the unrested area. Within the rested area, a control was created by constructing a 5m x 5m grazing exclosure and in each case this was paired with a non-exclosed area of the same size. This was replicated three times, resulting in three sets of exclosures and paired plots at each community. Each paired plot in the rested area was located approximately 5m from a neighbouring exclosure to try and ensure similar sward conditions but minimize edge

effects around exclosures. Paired plots were demarcated using a wooden stake in each corner of the area. Three sample plots were also demarcated in the unrested area at each village, determined by consultation with local graziers as sites that reflected typical grassland and grazing pressure. Samples were taken from each plot at three points in time, to enable the identification of any trends in biomass production in each sample area. Specifically these time points were immediately prior to official closing of the resting areas to grazing at the beginning of November, just after the mid-point of the closed period in March to try and capture peak biomass accumulation and then at the end of the growing season immediately prior to rested areas being opened to grazing at the beginning of May. Sampling was undertaken between November 2020 and May 2021. Thus at each village there were three sample sites in each of the three grazing treatments with each being sampled at three points in the season giving 27 sets of plot samples per village.

Biomass sampling was undertaken using a mixture of non-destructive disc pasture meter (DPM) sampling combined with destructive sampling through biomass clipping. The DPM is a standard method of estimating plant biomass using standardised height-weight regressions (Bransby and Tainton, 1977). In this case the standard regression employed was that developed and published by Trollope and Potgieter (1986), also used locally by CSA for their assessment of biomass. At each time point 50 DPM readings were taken in each sample site, within each treatment in each village. This resulted in 450 DPM measurements being undertaken at each time point within each village. During the first time point (November) every tenth DPM sample taken was also clipped to ground level using hand shears and biomass placed in a labelled paper bag. It was intended that dry weight of clipped samples would be derived by drying in an oven for 48 hours at 60^{o}C. This would have provided a running check on the accuracy of the regressions being employed to derive estimates of biomass from DPM measurements. Due to lack of availability of a working oven at Kokstad experimental station (only local facility to do this), it was not possible to perform these checks and so complete trust has been placed in the published regression of Trollope and Potgeiter (1986)

The set up of the experimental design and sampling at the three time points was undertaken by a post-doctoral researcher employed through the TOCASA project.

Animal incursion monitoring

Incursion by livestock into rested areas was monitored as an additional line of evidence to determine whether areas were effectively rested. Counts of all cattle, sheep, goats, horses and donkeys present on rested areas at each village were undertaken by the same post-doctoral field researcher on a weekly basis. All three communities were monitored on the same day to ensure consistency.

Pseudoreplication

The experimental design is compromised to some degree by pseudoreplication, as outlined by Hurlbert (1984), as the plots do not represent true replicates. True replication would require replication of the entire rested area (the experimental unit) at each community, however, the scale of the experiment, natural variation across landscapes and the context of local communities designating only one area for resting, made true replication impossible. Within the treatments, conventional design of replication is adhered to (Hurlbert, 1984). Furthermore, the spatial and temporal scale of the experiment is such that the treatment effect of manipulating grazing pressure can be expected to be more significant than any background variation (Oksanen 2001). Nonetheless, statistical analysis was undertaken in a way that recognised pseudoreplication (see below).

2.4.3 Household survey

Data was also available from a comprehensive household survey questionnaire undertaken as part of the TOCASA project. A stratified sampling approach was employed based on gender, ownership of livestock and membership of the GA with purposive sampling within each stratum based on the understanding of a local field assistant from the village. The survey was administered by the post-doctoral field researcher to 50 households from each of the three villages. The key themes that the survey focused on were respondents' patterns of land use, participation in institutional management of local rangelands, and motivations for participation or non-participation. More specifically, the survey provided data on numbers of sales of cattle made by households through auctions provided by CSA and the amount of money realised as well as how frequently people benefitted from vaccinations provided by CSA for cattle. Importantly, it also provided an evaluation of people's main motivation for being part of the Grazing Agreements brokered by CSA and the degree to which they complied with the rules for accessing rested areas.

The questionnaire was pre-tested on 10 households in April 2021 to ensure validity. On this basis some small adjustments were made to some of the questions to address any ambiguity and confusion in responses. The full survey at each village was then administered face-to-face by the post-doctoral researcher, using a local translator from each village to translate the questions into Xhosa. This overcame any potential language or literacy barriers to a household's participation. Data collection took place between May and November 2021.

A copy of the questionnaire can be seen in Appendix 3.

2.4.4 Focus groups

Focus groups were conducted at each village by the post-doctoral researcher. Prompts were drafted based on the issues identified as most pertinent by the literature review and by previous project

activity (see Appendix 1 for focus group protocol). These included information about how the GA functioned, the relationship with CSA, and the GA's views on the effectiveness of the CAs. One focus group in each village was scheduled by approaching the Chair of each Grazing Association and arranging an appropriate date and place. Locations were chosen that offered a degree of privacy from the wider community and that were familiar to participants. A translator was used to translate prompts from English to Xhosa and discussion from Xhosa to English. Audio recordings were made of all focus groups, and English prompts and responses were transcribed by the lead researcher.

It is acknowledged that those currently excluded from formal grazing institutions were not included in these focus groups. A complementary method to gather data (household survey, see section 2.4.3) was employed to overcome this limitation.

2.5 Data analysis

Two factor Analysis of Variance (ANOVA) was undertaken on recorded biomass measurements to determine the effects of treatment and time on biomass production for each village. This revealed interaction effects; therefore a single factor ANOVA was conducted comparing treatments at each time point for each village. Due to issues with pseudoreplication, the three rested exclosed, rested non-exclosed and unrested sample sites in each treatment were not treated as separate replicates but rather data were pooled across all sites prior to analysis. Tukey's post-hoc tests were then used further investigate differences between different treatments at each community at each time point. Advice was obtained from Coventry University's Sigma statistics team when selecting methods of statistical analysis.

Basic statistical analysis was conducted on quantitative data obtained from the household survey, in order to summarise results.

With regard to qualitative data obtained from focus groups, the work of the New Institutionalist paradigm, explored in Chapter 1, was used to identify key themes. In particular, the framework presented by Swallow and Bromley (1995) and developed by Ostrom (1999, 2015) was used to structure analysis. This framework understands the following components to be the foundational elements of an effective common property regime:

- There must be clearly defined boundaries as to who is entitled to access commons
- All members of the user group should be involved in making decisions and setting rules about the use of commons
- Once created, rules must be monitored and sanctions (ideally graduated) must be enforced.
- There must be a method for dispute resolution.

- The institutions in which these decisions are made and enforced should be nested within a broader institutional framework.

2.6 Ethics

All participants gave fully informed consent in line with Coventry University ethics protocols: they were required to read a Participant Information Sheet (see Appendix 2), available in English and isiXhosa, and sign a consent form (see Appendix 4). Any participant who could not read had the form read aloud to them in Xhosa or English, according to their preference. Participants were informed that they could withdraw from the project at any time.

All data collected from participants was anonymised and stored on password-protected hardware. University procedures were followed for secure destruction of data.

2.7 Positionality statement

It is important to acknowledge the position of the researchers involved in data collection and analysis in relation to the subjects of the research. The field researcher involved in conducting focus groups with Grazing Associations and administering the household survey was not part of any of the communities involved, which may have affected the information that participants were prepared to share. However, they had been embedded at the communities for over a year by the time these data were collected, enabling good working relationships with each community to have been built up and trust to be created. Furthermore, the lead researcher who prepared the focus group protocol and analysed findings was not part of any of the communities involved. The cultural understanding of the lead researcher may therefore have resulted in an interpretation of focus group findings that differs from the interpretation of others, for example, members of the local community. To try and address this, wherever possible accuracy of qualitative data was triangulated through cross-referencing between different data sets (focus group discussions and household surveys) and against the quantitative ecological data generated in response to the first research question.

Chapter 3: Evaluating the ability of CAs to deliver ecological benefits and the effectiveness of current institutional arrangements to achieve this

3.1 Introduction

This chapter presents data gathered to answer research question 1. Firstly, it will present the results of biomass and animal incursion monitoring, to determine whether rules around rangeland resting were followed. These rules form the basis of the Conservation Agreement (CA) signed with Conservation South Africa (CSA) and are designed to deliver ecological benefits to the rangeland commons. The chapter will then present data gathered from focus groups with the Grazing Association (GA) at each of the three villages studied, and from household surveys. This data provides an understanding of current institutional arrangements for delivering the terms of the CA, and how these arrangements may link to its efficacy as a mechanism for delivering benefits to both the social and ecological components of rangeland systems under communal tenure.

3.2 Are CAs currently delivering ecological benefits?

3.2.1 Biomass monitoring

Monitoring changes in biomass at sample points under different experimental treatments, and monitoring livestock numbers on rested areas provides an indicator of whether rules around resting are being followed. The experimental protocol outlined in Chapter 3 was followed. Results are first presented for the overall findings from the one-way ANOVA (Table 3.1). At each time point at each site, there was a significant difference overall across the three treatments. However, this masked some differences between treatments.

Table 3.1: ANOVA results comparing the three treatments at different points in time at each village (n = 150)

Community	November 2020	March 2021	May 2021
Gwadane	F = 16.764, p = 0.000	F = 84.992, p = 0.000	F = 199.606, p = 0.000
Mabheleni	F = 3.322, p = 0.037	F = 40.598, p = 0.000	F = 65.021, p = 0.000
Magxeni	F = 26.918, p = 0.000	F = 128.232, p = 0.000	F = 107.817, p = 0.000

In order to explore the two hypotheses put forward in Chapter 2, Tukey's post hoc tests were employed to examine in more detail differences between treatments at each time point for each

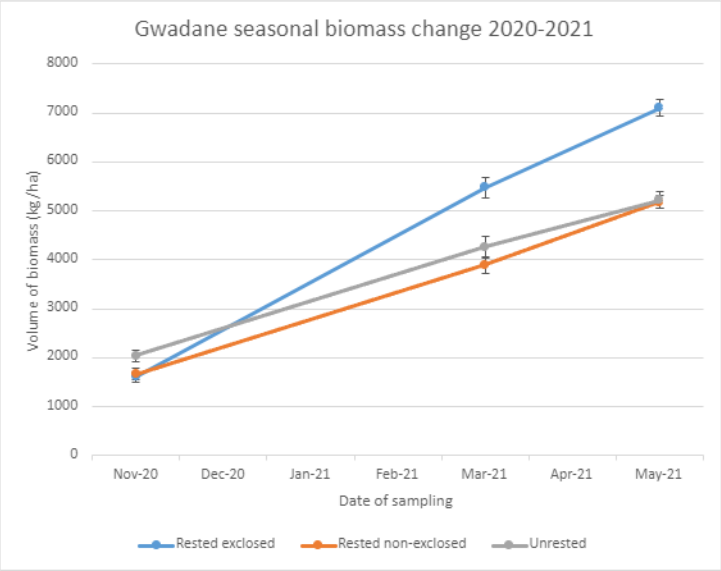
community. The first key issue that the grazing experiment aimed to explore at each community was whether uncontrolled grazing by livestock was preventing rested areas from accumulating their full potential of biomass, when they were officially closed to grazing during the growing season. This was evaluated by using Tukey's post hoc test to compare exclosed and non-exclosed sample sites on the rested area as per the protocol set out in section 2.3.1. In light of reported trespassing by livestock onto the rested areas at all communities during the growing season it was hypothesised that:

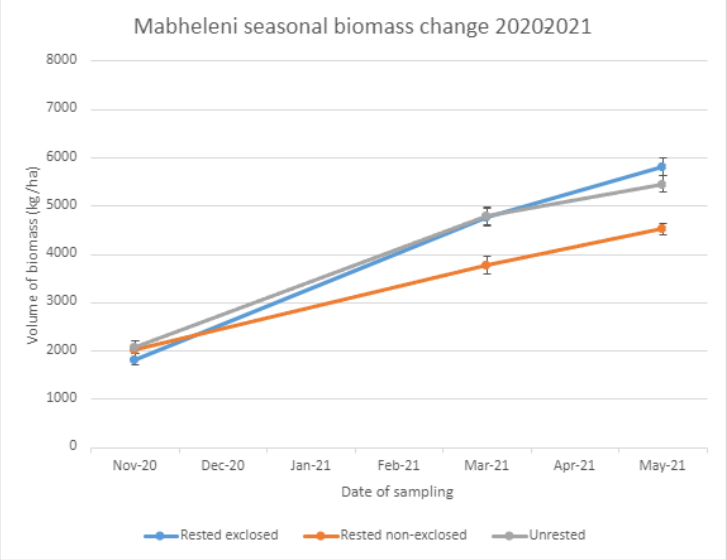
There should be no significant differences in biomass between rested exclosed and rested non-exclosed sample points within rested areas during the growing season.

This hypothesis was largely rejected at each of the three communities as demonstrated by Figure 3.1 and Table 3.2. These show that at all three villages, exclosed and non-exclosed sample areas recorded similar amounts of standing biomass at the start of the experiment in November. There was no significant difference ($p>0.05$) between exclosed and non-exclosed sample areas at this point at both Gwadane and Mabheleni. There was a significant difference at Magxeni ($p = 0.004$); interestingly the non-exclosed area had significantly more biomass than the exclosed area. However, the actual values remained quite similar: 1546 kg/ha and 1269 kg/ha respectively. Overall, this is a good baseline to work from in terms of measuring subsequent changes in biomass accumulation and suggests similar potential for growth in areas under different treatments.

Table 3.2: Difference (A-B) and associated significance (Tukey HSD) in standing biomass (kg/ha) between exclosed (A) and non-exclosed (B) sample points in rested areas at three time points during growing season (n=150).

	November 2020 (A-B)	March 2021 (A-B)	May 2021 (A-B)
Gwadane	-55.6 (NS, p=0.778)	+1581.5 (Sig, p<0.001)	+1925.1 (Sig, p<0.001)
Mabheleni	-202.6 (NS, p=0.133)	+982.6 (Sig, p<0.001)	+1284.5 (Sig, p<0.001)
Magxeni	-275.0 (Sig, p=0.004)	+860.9 (Sig, p<0.001)	+642.0 (Sig, p<0.001)


Gwadane seasonal biomass change 2020-2021
8000
7000
6000
5000
4000
3000
2000
1000
0
Volume of biomass (kg/ha)
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Date of sampling
Rested exclosed
Rested non-exclosed
Unrested


Mabheleni seasonal biomass change 20202021
8000
7000
6000
5000
4000
3000
2000
1000
0
Volume of biomass (kg/ha)
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Date of sampling
Rested exclosed
Rested non-exclosed
Unrested

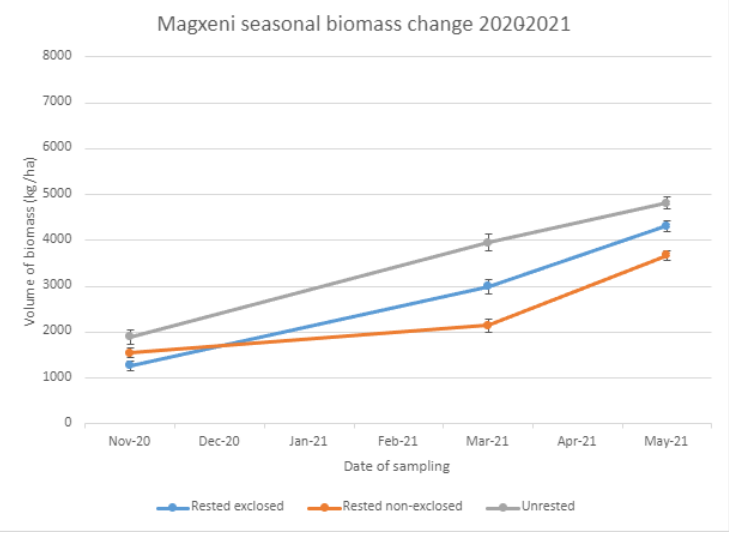

Magxeni seasonal biomass change 20202021
8000
7000
6000
5000
4000
3000
2000
1000
0
Volume of biomass (kg/ha)
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Date of sampling
Rested exclosed
Rested non-exclosed
Unrested

Figure 3.1: Graphs showing seasonal variation in recorded biomass at each study community.

Subsequent samples taken in March and May, after time for biomass accumulation during the growing season, presented a completely different story. At both time points at all three communities there was significantly more ($p<0.001$) biomass in the exclosed compared to non-exclosed sample points of the rested area. (see Table 3.2 for actual values).

Having established that the rested areas at all communities were not accumulating biomass to their potential due to grazing transgressions, it was also important to determine if the amount of biomass being removed from the rested areas was similar or not to that being removed from unrested areas. Assuming a relatively uniform distribution of grazing pressure in the rested area and the immediate surrounding area where the sample sites were situated in the unrested rangeland, it was hypothesised that:

There would be significantly more biomass in rested non-exclosed sample sites compared to sample points in the unrested area.

The post-hoc tests that explore this are summarised in Table 3.3. This hypothesis was rejected at all three communities, with results at Gwadane demonstrating a different trend to those at Mabheleni and Magxeni.

Table 3.3: Difference (B-C) and associated significance (Tukey HSD) in standing biomass (kg/ha) between non-exclosed (B) sample points and sample points in unrested areas (C) at three time points during growing season (n=150).

	November 2020 (B-C)	March 2021 (B-C)	May 2021 (B-C)
Gwadane	-382.5 (sig, p<0.000)	-165.9 (NS, p=0.428)	-50.2 (NS, p=0.891)
Mabheleni	-45.3 (NS, p=0.903)	-1013.1 (Sig, p<0.000)	-934.2 (Sig, p<0.000)
Magxeni	-349.3 (Sig, p<0.000)	-1812.1 (Sig, p<0.000)	-1147.1 (Sig, p<0.000)

At Gwadane, results came closest to upholding the hypothesis. Although there was significantly more biomass in unrested areas initially (November), there was no significant difference between the standing biomass measured in rested non-exclosed and unrested areas both in March and at the end of the growing season in May (see Figure 3.1 and Table 3.3).

However, in contrast to what was hypothesised, at both Mabheleni (see Figure 3.1) and Magxeni (see Figure 3.1), significantly more standing biomass was measured in the unrested areas of rangeland than in the rested non-exclosed area in March 2021 and at the end of the growing season in May 2021 (see Table 3.3).

The significant difference in productivity between rested non-exclosed and unrested sites at Mabheleni and Magxeni was unexpected. Rather than hypothesised treatment effects, it most likely reflects, inherent differences in productivity of the sample sites selected for the rested and unrested areas. It had been assumed that this would not been pronounced over such relatively short distances and that the selection of three separate plots might at least help to account for some of this spatial variability; this does not seem to have been the case. Certainly, it would be important to separate this from the other possibility of rested areas being subject to higher levels of grazing pressure than unrested areas. The introduction of paired exclosures onto the unrested areas would help to determine this. It also underlines the limitations of using fixed exclosures to monitor biomass accumulation.

Overall conclusions from biomass monitoring

This data is contrary to the hypothesis, stated in the Methods chapter, that there should be no significant differences in biomass between rested exclosed and rested non-exclosed parts of rested areas. This indicates non-compliance with rules regarding the rested area.

The data is more mixed regarding the hypothesis that there would be little or no difference between rested non-exclosed areas and unrested areas. At Gwadane, the data support this hypothesis, suggesting that rested areas at Gwadane experience similar levels of grazing to unrested areas. However at Mabheleni and Magxeni, significantly more biomass was recorded in the unrested than the rested non-exclosed area. It was unclear as to whether sample sites in the unrested area were typical of grazing pressure experienced here, and whether there were differences in the inherent productivity of sample sites in the rested vs unrested area. Adding paired exclosed sample plots to the unrested area would have provided useful data to confirm these findings.

3.2.2 Animal incursion monitoring

The results of animal incursion monitoring are presented in Figure 3.2. Observations of as many as 98 animal units in the designated rested area during the time it was officially closed to grazing provides evidence of non-compliance with rules regarding the rested area. The particularly high numbers of animal units observed on the rested areas at Mabheleni and Magxeni confirm the finding above that rested non-exclosed areas were subject to considerable grazing pressure, despite rules forbidding the use of this area for grazing.

A decline in animal incursions towards the end of the growing season is observed at all three villages; this is likely due to a documented increase in livestock theft around this time, particularly at Gwadane.

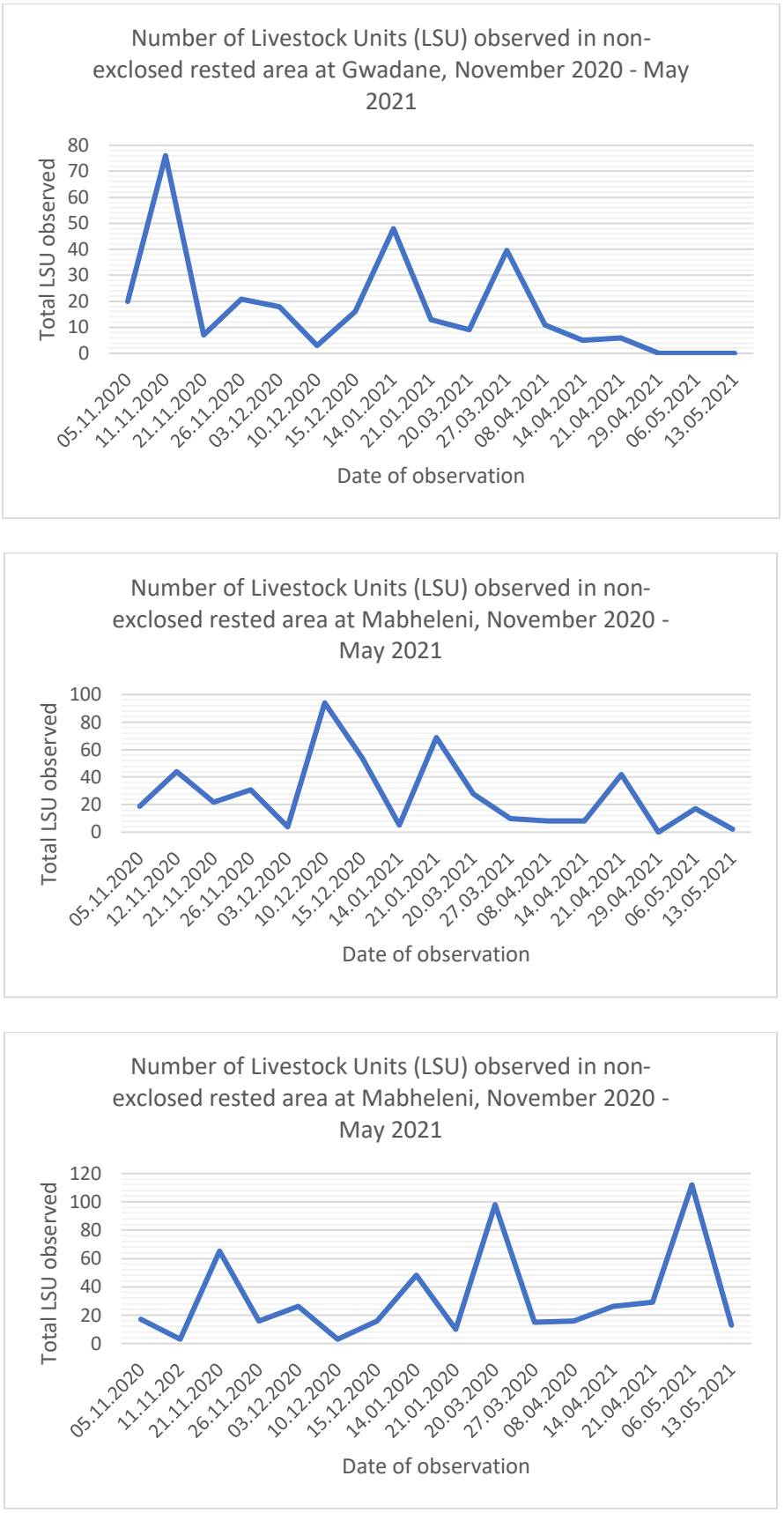


Figure 3.2: Livestock Units (LSU) observed on non-exclosed rested areas at each community.

3.2.3 Interim conclusion: Are CAs able to deliver ecological benefits?

Results from biomass monitoring and animal incursion monitoring demonstrate non-compliance with rules set out in the CA regarding resting. Exclosed areas within rested areas accumulated significantly more biomass than non-exclosed paired sites within rested areas. Furthermore, livestock (belonging to GA members and non-GA members) were regularly observed in rested areas during the period when CA rules forbade this. This means that the areas were *de facto* not rested. The continuous grazing of ostensibly 'rested' areas of rangeland during the growing season and associated lack of biomass accumulation is potentially problematic in two ways. Firstly, not allowing the rangeland any rest depletes nutrient reserves in grasses; over time this will make them less vigorous (reducing production) and also more vulnerable to dying (reducing grassland cover). It may also reduce the proportion of high quality (here defined as species with high protein content) species in the sward, as these are preferentially grazed by livestock (Tainton, 1985). Secondly, although the rested areas are still accumulating considerable amounts of biomass during the growing season even when subject to grazing, the reduction compared to ungrazed exclosures is as much as 30% at Gwadane, which may impact on the ability of these areas to provide forage for community livestock throughout the dry season, as intended.

However, the data also revealed considerable biomass was accumulation across all three treatments (see Table 3.3). This offers a reminder of the productivity of the study sites, even when subjected to grazing pressure.

Examining the institutions tasked by the CA with delivering its terms provides important evidence as to why CAs failed to deliver ecological benefits during the year they were monitored.

3.3 How do current institutional arrangements affect the efficacy of CAs in delivering ecological benefits?

As outlined in Chapter 1, the work of the New Institutionalist paradigm was used to frame analysis of data from focus groups and from a household survey in order to answer this research question.

3.3.1 Boundaries of membership

The boundaries of each Conservation Agreement did not match the boundaries of the user group of each commons. Conservation Agreements (CAs) were constituted at separate villages. However, the user groups of the rangelands under the jurisdiction of some CAs – particularly at Mabheleni – extended beyond the village where the Grazing Association was based. For example, the rangeland under the jurisdiction of Mabheleni's CA was grazed by livestock from at least two other

neighbouring villages, neither of which were part of a separate grazing agreement. Indeed, respondents from all focus groups reported that livestock from other communities came onto the rested area at their communities. This created a very difficult situation for the GAs as they were expected to provide exclusive jurisdiction over areas of rangeland that were historically shared with other communities, without these communities being part of these new, formalised arrangements. Although it remains unclear as to whether such rangeland users were technically eligible for membership, this is somewhat immaterial given that in practice, none of the three GAs reported having non-resident members. It is clear from this that in cases where rangeland is shared, constituting GAs based only on single village communities, rather than by the user group arising from use of shared rangeland, weakens GA's ability to deliver the terms of the CA.

In each village, a Grazing Association was constituted to sign and deliver the CA. There was some variety in the structure and membership of these institutions, as seen in Table 3.4. Investigation of how membership fees were spent did not form part of this investigation.

Table 3.4: Details of the Grazing Association at each study community.

Village	**Membership fees**	**Structure**	**Total membership**	**Number of households that own livestock**	**Proportion of livestock-owning households that are members of the GA**
Gwadane	R10/month	A committee composed of 3 men and 3 women is elected every year by the wider GA membership to lead the GA.	45	351	7.8%
Mabheleni	R200 joining fee, plus R30/month	A committee leads the GA. Selection method unknown.	14	96	6.9%
Magxeni	Unknown	A committee with Chair, Secretary and Treasurer. Selection method unknown.	35	178	5.1%

3.3.2 User group

It is notable that only a small proportion of the user group associated with each area of rangeland were members of the GAs. This clearly has implications for GAs' ability to exercise authority over rested areas on a collective basis; the New Institutionalist paradigm posits that all those who make

use of a common resource must be involved in creating and enforcing rules in order for these to be effective (Swallow and Bromley, 1995; Ostrom, 2015). Reasons for this lack of participation in the GA at each community are explored below.

Communication around membership of the GA

Amongst those households involved in the household survey, many did not know that the GA existed; as many as 37% of households surveyed at Mabheleni. Of those that were aware of the GA, many understood that membership was only open to livestock owners, or to owners of large numbers of livestock. This is indeed implied by the term "Grazing Association". This understanding is contrary to the information provided by GAs during focus groups; at all three villages, GAs confirmed that membership was "open, even for those who doesn't have livestock" (Magxeni FG). Poor communication regarding the GA and terms of membership is thus evident, particularly at Mabheleni. It is possible that this poor communication represents a deliberate strategy adopted by some GA members to retain control of grazing and/or benefits of the CA amongst a certain or small group of people.

Deciding not to participate in the GA

Amongst those who were eligible for membership of the GA, and who were aware of it, several reasons were identified for non-participation. In immediate terms, the requirement to pay fees (see Table 1) made membership inaccessible or undesirable to many people. Indeed, amongst respondents to household surveys in Gwadane and Magxeni, the requirement to pay membership fees was reported by 26% and 29% respectively of those who were not members of the GA as the main reason for not joining the GA.

A key benefit to membership of the GA was access to vaccination for cattle and to mobile auctions. Therefore for those who did not own cattle, an estimated 50% of the local population, there was less incentive to join the GA, even if they were aware that they were eligible to join.

Understanding more about the demographics of GA membership may provide further explanation for why people chose not to participate. Whilst the focus group at Gwadane reported the inclusion of several youth members, a participant in the Magxeni focus group stated "*the young ones are running away*". This was corroborated by results from the household survey; at Magxeni, the average age amongst those respondents who were members of the GA was 63, 15 years older than the average age amongst non-members. A similar nine year difference was found at Mabheleni, where none of the respondents who were members of the GA were youths according to the South African government's definition of "youth" as someone of 14 to 35 years of age (South African

Government, 2009). At Gwadane, one member of the GA was below 35, although the average age of GA members remained 6 years higher than amongst non-members.

There was greater variation between villages with regard to the participation of women: during a focus group with the GA at Gwadane, members stated that "*everyone was allowed... it [the GA] does include all*", with a balance of men and women, including three men and two women at committee level. By contrast, GAs at Mabheleni and Magxeni included few women; amongst those respondents to a household survey who were members of the GA at Magxeni, only 13% were women.

Using average household income as a proxy for the overall economic status of the respondent, it was found that the average household income of respondents to the household survey who were GA members at Mabheleni was 10,230 Rand per year higher than non-members. Similarly, the average household income for GA members at Gwadane was 7,085 Rand per year higher than non-members. This indicates that wealthier households were more likely to participate in the GA. The opposite was observed at Magxeni, where the average household income of respondents who were GA members was 38,520 Rand per year lower than non-members. It is important to note the context of political divisions at Magxeni; these resulted in local elites boycotting the GA (see below), which may explain why the difference in average household income between GA members and non-GA members is so large and in the opposite direction to the pattern observed at the other villages.

These findings suggest either that GAs were a space that was inaccessible or unsafe for members of marginalised groups, or that there were other reasons leading to non-participation from such groups. These may include the lack of material benefits, given that youth and women are less likely to own livestock; indeed, a third of women who participated in the household survey at Magxeni and were not members of the GA stated that not owning livestock was their main reason for not joining the GA. Equally, amongst the women surveyed at Mabheleni, 91% of those who were aware of the GA but had not joined reported that the main reason for this was not owning livestock.

Local political differences also played out in GA membership. A clear example of this is at Magxeni, where 18% of respondents to the household survey indicated that conflicts were a factor in their decision not to become involved with the GA; for two respondents, it was the main reason preventing their participation. Furthermore, at Magxeni, the former mayor stated in a household survey response that he did not wish to be part of the GA because of the involvement in the institution by an active supporter of the political opposition. The possibility of more self-serving motivations for the decision not to join the GA cannot be discounted, particularly given repeated observations of the former Mayor's own livestock within the rested area. This situation is important evidence for the need to consider the GA as embedded in a broader political context.

Choosing not to join a GA could also represent an individual's political values. Survey responses indicated that some people wanted individual control over grazing and their livestock. Again, to what extend this relates to personal political ideology, or simply expediency and personal interest, remains a question for consideration.

3.3.3 Ability to make and enforce rules

It is important to note the ways in which the above issues around membership affect the GAs authority to make and enforce decisions around rangeland management that are contained in the CA. Such rule making and enforcement abilities are a crucial element of Ostrom's (2015) definition of an effective common property regime. The degree to which GAs had the autonomy to select which rangeland management practices to include in the CA, whether resting or another practice such as wattle clearance, is explored in the next section. However, within the parameters of the CAs that were actually signed, focus group responses indicated that GAs did indeed have the ability to make specific rules around resting. Each focus group explained the rules around the rested area, for example what activities were permitted: "*people are allowed. Only closed for grazing, other activities* [eg., gathering traditional medicines] *are OK*" (Gwadane FG); who was involved in choosing the rested area: "i*t's not the GA who chooses the rested area, it's the whole community*" (Magxeni GA) and when the rested area was closed for grazing: "*November until autumn*" (Mabheleni GA). Responses varied between GAs, indicating that these decisions had come from within GAs, and that GAs were indeed able to make rules about the use of the common resource.

Results from section 3.2 indicate however, that rules were not always followed. It is possible that not all rangeland users were aware of the rules. Each GA stated during focus groups that decisions around resting were clearly communicated, usually via a headman, and that "*everyone knows that he must comply and follow the rules*" (Magxeni FG). Indeed at Mabheleni the GA stated that the headmen of surrounding villages were also asked to inform their local residents, meaning that all members of the user group should have been aware of the rules around resting. However, at Magxeni, 12% of respondents to a household survey were not even aware that the GA existed; at Mabheleni, this figure was as high as 37%. It thus appears that rules were ineffectively communicated to all members of the rangeland user group.

However, ignorance of the rules links to the central problem of low GA membership. It was apparent that transgression of grazing rules was undertaken by livestock owners from within communities who were not members of the GA and those from outside the communities. During focus groups, GA members admitted that livestock trespassing on the rested area were owned by "*both community members and [people from] outside*" (Gwadane FG). As outlined above, GA membership included

only a small proportion of the user group associated with the shared resource (whether users lived in the village associated with each GA, or elsewhere). The majority of the user group were not involved in setting rules around resting and were thus less likely to be invested in or committed to complying. Further, user group members who are not members of a GA are also excluded from the PES benefits scheme that GAs are part of and thus have no short-term incentive to comply with the rules. Furthermore, at Magxeni, the former Mayor was not a member of the GA, but benefitted from GA activities by grazing his livestock on the rested area. This constitutes an example of the free-rider problem as theorised by Ostrom et al. (1999), whereby those who are not involved in collective decision-making prioritise self-interest, and may even stand to gain from the collective efforts of others.

Interestingly, the GA at Gwadane admitted that some of trespassing livestock in fact belonged to GA members. Such infringements from those who were responsible for rule setting indicates weaknesses in enforcement, and a lack of genuine commitment to the aims of the CA. The inability of the GA at Magxeni to exclude the cattle of the former Mayor, a powerful member of the local community, demonstrates further constraints on the ability of the CA to enforce rules.

Monitoring was the responsibility of all GA members, with focus groups reporting that no specific people were responsible for or paid to complete this work. Members of the GA at Mabheleni reported that they had previously worked with community rangers trained by CSA on this, but that they were no longer there. The lack of effective monitoring and enforcement indicates that GAs were not strong enough to collectively hold this responsibility.

On the rare occasion that an infringement of the rules was brought to the attention of the GA, each GA described their own system, usually involving warnings and fines, for enforcing rules on resting and responding to livestock incursions in the rested area. The GA at Gwadane described the following response to an animal being found in the rested area: *"if it was a short period of time for that cattle to be there they can point you* [sic] *and say no, and then they can give you a warning that for a second time it is 25 rand. They sit as a committee and decide*" (Gwadane FG). However, the GAs indicated that these were rarely used, because to do so would create conflict, either within the village or with neighbouring communities. Concerns were expressed at focus groups that people herding cattle away from rested areas may be accused of stealing. This reveals a key point: GAs lack authority (or at least they perceive that they lack authority) over the issue at the core of the CAs, grazing. Although the system of sanctions that exists corresponds to models of best practice as advocated by New Institutionalist theory, these are rendered useless by the user group's lack of power or authority.

A perennial issue, lack of fencing was seen as an obstacle to rule enforcement by GAs at Gwadane and Mabheleni, where grazing areas were unfenced. During a focus group with the GA at Gwadane, a participant said: "*if the place is not fenced, the people just put their cattle in. So without fencing, there is nothing they can actually do... It's difficult to control because there's no fence around it"* (Gwadane FG). However, at Magxeni, where the rested area was fenced, livestock were regularly observed within the rested area. The field researcher was informed that these livestock belonged to a family member of a local politician who was not a member of the GA, making it difficult for the GA to remove the livestock. This perhaps illustrates the point that the efficacy of physical infrastructure in controlling grazing is somewhat dependent upon the authority of those making decisions about it, and provides further evidence that GAs lack such authority. Certainly, these findings demonstrate that fencing remains a contentious issue and is still seen by local communities as important to rule enforcement. This reflects findings in other parts of Eastern Cape (see Bennett et al., 2010).

3.3.4 Institutional nesting

This speaks to the relationships between GAs and other local institutions such as traditional authorities, municipal councillors, producers' associations or women's groups. Whilst the precise nature of these relationships remains unclear, it appears that there is something of an institutional vacuum around rangeland management. Thus, rules around resting and the GAs role in enforcing them are not effectively nested within a broader institutional framework, identified by Ostrom (1999) as a key component of an effective common property regime. Without support from other local sources of power, GAs lack the authority to enforce the decisions they are constituted to make around rangeland management.

3.3.5 Relationship with Conservation South Africa

Brokerage of CAs and the ongoing relationships between GAs and CSA was discussed in focus groups. CSA claims to have brokered CAs through co-construction in partnership with local communities. This study certainly found scope for local agency within CAs. At focus groups, it emerged that each GA was able to determine its structure as an institution. Such variations emerged as: how committees were elected at each GA; variation in the rules applied and methods of monitoring used; and variation in the membership fees charged.

Each community had a different reason for choosing to rest a particular area of rangeland. At Gwadane, the GA reported choosing an area that was close to village homesteads in order to enable regular monitoring. Mabheleni's GA chose to rest "*the place where there is the quality of grass*" (Mabheleni FG). At Magxeni, the GA chose to rest an area had previously been fenced by the

government. GA's abilities to state distinct reasons for choosing their respective rested areas suggests that they had agency in this process, rather than having the site dictated by CSA.

Whilst these variations indicate a notable degree of local autonomy within CAs, the broader context is that actual written CAs at all three communities were identical. Although communities were able to make some decisions as to how the CA was implemented, application of the same terms to each community indicates a generalised approach. Had communities had meaningful opportunities to input into the construction of CAs, variation between communities would be observed, reflecting varying local circumstances and needs. CAs can thus be seen as an externally introduced mechanism, for facilitating a generic PES approach to trying to protect ecosystem services. This is at odds with any notion that CAs represent a strategy originating from within the community in response to local needs or motivations.

In terms of ongoing relationships with CSA, a mixed picture emerged. None of the GAs were satisfied with their relationship with CSA. All three GAs reported poor communication with CSA; the GA at Gwadane stated that they had tried to get in touch with CSA in order to receive certificates that they had been promised from a completed training, but that they had no way of contacting the local office. The GA at Magxeni also stated *"there's no communication with those [CSA] people*" (Magxeni GA), and for the GA at Mabheleni, CSA "*didn't meet their expectations*" (Mabheleni FG). It must be acknowledged that CV19 restrictions may have had an impact on recent communications with CSA.

Conversely, strong evidence was found that CSA had delivered the benefits promised to communities in the CAs. Although at focus groups, GAs indicated that they would like more regular vaccines, "*at least twice in one year*" (Gwadane GA), they agreed that the amount of vaccines promised had been provided by CSA in line with the CA. Therefore whilst communication was unsatisfactory, the material terms of the CA were met by CSA.

There was some ambiguity with regard to CSA's monitoring activities, promised in the CA. Conversations between local CSA staff and the post-doctoral field researcher indicated that staff saw compliance monitoring as the responsibility of the local community, with CSA only monitoring rangeland condition. This lack of monitoring of the GAs activities from CSA removes any conditionality from the PES scheme at the centre of the GA, thus weakening it as a mechanism to incentivise compliance.

3.3. Summary of findings on the ability of institutions to deliver the terms of the CA

The success of the CAs in delivering environmental and social benefits hinges on the ability of GAs to make and enforce rules around resting, thereby moving the rangeland commons at these

communities from an open access to a common property regime. Results indicate that whilst GAs were able to successfully set rules on resting, they were unable to enforce these, stemming from their lack of authority over rangeland users.

Rather than being effectively nested within a broader institutional framework, as emphasised by Ostrom (1999), it appears that GAs' authority did not receive any reinforcement from other local institutions. Understanding the nuance of these relationships between local institutions is beyond the scope of this research (see Hoepfl, forthcoming). However, the reticence of GAs to use their own monitoring and enforcement mechanisms suggests that their authority over grazing is not sufficiently supported by other local sources of power (including project partner CSA) for these mechanisms to be acceptable or effective. Indeed, the extent to which any single institution can exert authority over grazing in these communities is questionable.

Neither was the authority nor value of the GAs recognised amongst the broader rangeland user group: only a minority of the user group were GA members. Low membership was found to be due to poor communication of the existence of the GA and the terms of membership; lack of inclusivity for marginalised groups; local political differences amongst potential members; perceived connections between the GA and apartheid systems, and desire by some individuals to retain control of their affairs, whether motivated by libertarian politics or personal interest. There was also disparity between composition of the community of rangeland users, which included people from multiple villages, and membership of the GA, which was based around the unit of the village.

Ultimately, disparity between the aims of the CAs and the priorities of local people must be acknowledged. The GAs raison d'etre - conserving the rangeland – was something that only a minority of rangeland users saw value in and thus felt motivated to join (explored further in Chapter 4.2.4). As demonstrated by New Institutionalist theory (Ostrom, 2015), an effective common property regime is dependent upon the engagement of the majority of resource users.

3.4 Conclusion: are CAs able to deliver the ecological benefits they are designed to provide via current institutional arrangements?

Monitoring seasonal biomass accumulation and incursions of livestock into designated rested areas found evidence that rules around resting were not followed at any of the three villages involved in the study. Thus, biomass has not accumulated in rested areas at the rate it would have done if not grazed; as a proxy measure, this indicates that wider ecological benefits of resting are likely not accruing to rangeland systems. Information (gathered from a household survey and focus groups

with GAs) about the current institutional arrangements constituted by CAs to create and enforce rules on resting suggests that these institutions lack the authority to enforce these rules. A variety of reasons contribute to this lack of authority; limited membership and ineffective nesting within a broader institutional regime are especially significant.

Chapter 4: Evaluating the social benefits provided by CAs to local communities

4.1 Introduction

This chapter examines the benefits provided to local communities via the CAs, which form the basis of a Payments for Ecosystem Services (PES) scheme. A local community is defined as inhabitants of each village involved in the study, including both members and non-members of the GA. Data from focus groups and a household survey are presented to show what benefits were offered, equitability in distribution, and how benefits were perceived by local people.

4.2 What benefits were offered?

4.2.1 Vaccinations

CAs offered "*one round of livestock vaccinations (delivered to the Association membership team to distribute according to their compliance records) during the period of this agreement based on receipt of livestock owners list and livestock numbers list as per Grazing Association commitments*" (CA, Gwadane/Mabheleni/Magxeni).

There was a strong uptake of this benefit across all three GAs. Table 4.1 compares numbers of cattle as reported by GA members against numbers of cattle vaccinations CSA report carrying out. Almost all livestock owned by GA members were vaccinated, indicating that GA members were keen to benefit from this offer. In addition, other livestock owners who were not members of the GA were also able to make a discrete payment to have their livestock vaccinated as required. They received no discount on vaccinations. Disaggregated data based on gender of GA members was not available, making it difficult to analyse equitability of benefit distribution between men and women.

Table 4.1: Numbers of cattle owned and vaccinated at study sites.

Village	Number of cattle owned by GA members in 2020	Number of cattle vaccinated in 2020
Mabheleni	118	150
Gwadane	130	189
Magxeni and Upper Mvenyane[3]	464	578

In the household survey, vaccinations were consistently reported as the main reason for becoming a member of the GA. Amongst respondents at Magxeni who were members of the GA, 80% ranked vaccination provision as the most important factor in their decision to join. At Mabheleni, all

[3] Data for Magxeni alone was not available.

respondents who were GA members cited vaccinations as a reason for becoming involved; for 6% this was the most important reason for their involvement. At Gwadane, all respondents to the household survey who were members of the GA reported vaccination provision as a factor motivating them to join, and for 87% it was the main reason for joining.

In focus groups, GAs identified provision of vaccines as the main reason for becoming involved with CSA or continuing to be involved in the future. At Gwadane, the GA indicated that it wanted vaccines to be delivered more regularly (twice a year) and for vaccines to also be provided for sheep and goats, rather than only cattle.

The cost to CSA of providing vaccines should be noted. In addition to the cost of the vaccinations themselves, a member of staff is employed on a full time basis in order to administer vaccines. This represents a direct cost to CSA, which is not recovered elsewhere in the programme.

4.2.2 Auctions

The CAs also offered access to mobile auctions, with "*access to livestock branding and ownership certificates prior to mobile auction*" (CA, Gwadane/Mabheleni/Magxeni). GA members were eligible to pay lower commission rates (5% if CA signed, 3% if compliance with the terms of the CA proven) than the default 6%. The extent to which these lower commission rates served to incentivise compliance is explored below.

Relatively few respondents to the household survey identified access to auctions as a factor motivating them to participate in the GA. Although some of the GA members who participated in household surveys at Magxeni and Gwadane reported that access to auctions was a factor in their decision to become a member, none ranked this as the most important reason. The picture at Mabheleni was slightly different, where 33% of respondents who were members of the GA identified auction access as the most important reason for joining.

Data for three sales between 2017 and 2019 was available; this included villages from across Mvenyane, but gives an indication of the typical situation at each of the villages studied (See Table 4.2). Across the three auctions, a mean of 6.89 households per village sold livestock at each auction. Given that the villages studied contained between 152 and 441 households (see Table 2.1), this demonstrates that very few people are benefitting from the provision of mobile auctions. This is further demonstrated by the number of livestock sold: on average, 18 livestock per village (a mean of 2.64 head of cattle per seller) were sold at each auction – again, very few given that the numbers of cattle owned in total by members of the GAs at the villages included in this study was between 118 and 464 (see Table 4.1). The household survey confirmed this, finding that relatively few people

benefit from mobile auctions; just 5%, 10% and 12% of respondents at Gwadane, Mabheleni and Magxeni respectively had sold at a mobile auction. Sales data disaggregated by gender was available. On average, across all auctions at all villages only 20% of sellers were women, this figure was as low as 9% at one auction.

Table 4.2: Summary of sales data from mobile auctions in Mvenyane, 2017-2019.

Date of sale	Head of cattle sold	Number of villages	Number of sellers	Average price paid per head of cattle (Rand)	Average number of sellers per village	Percentage of sellers who were women
30.08.17	132	6	50	6,163.88	8.33	9
25.10.17	147	8	54	5,926.19	6.75	15
22.08.19	70	5	28	5,558.57	5.60	36
Average across all sales	116	6.33	44	5,882.55	6.89	20

The household survey revealed further information about who was able to access mobile auctions; those with larger herds. For example, the average herd size of those who sold at auction at Magxeni was 27 head of cattle, whereas amongst those who owned cattle, but didn't sell at auction, the average herd size was 14. Amongst household survey responses from Gwadane, having low numbers of livestock was the second most commonly ranked main reason for not selling at auction.

Further investigation reveals several reasons for low uptake of this benefit. Firstly, only cattle could be sold at auction, immediately excluding owners of smaller stock such as sheep and goats. This disproportionately affects women, as seen in Table 4.3. The clear exception to this was at Gwadane, where women were more likely to own cattle than men; contextualising this result within the literature on livestock ownership in South Africa/Eastern Cape indicates that this is highly unusual, perhaps suggesting either greater gender equality at this community than in other areas, or an unrepresentative sample. At all three villages, not owning eligible types of stock (cattle) was by far the most common reason ranked by respondents to the household survey as their main reason for not selling at auction. The next most important reason for respondents from Magxeni was not achieving fair prices; even amongst those who did sell at auction, very few stated that they did so in order to realise good prices. Whilst not the only factor determining an individual's decision to participate in an auction, price data provides important context for this. A recent survey indicated that the average price for one head of cattle on the informal market in Eastern Cape is around R8612 (Gwiriri et al., 2019). The average price paid for one head of cattle at the Mvenyane auctions in 2017 and 2019 was just R5883. This means that the auction price was around 68% of the price sellers

could achieve in the informal market, disincentivising participation. Indeed, selling at auction may only represent a rational economic choice for those in need of immediate cash, or those livestock owners looking to sell larger quantities of livestock than can be absorbed by local markets. Indeed, all respondents to the household survey at Magxeni who had sold through mobile auctions stated that the readily available market was a reason they chose this sales route; for 75% of these people, it was the most important reason.

Table 4.3: Cattle ownership disaggregated by gender at each community, as reported in the household survey.

	Gwadane			Mabheleni			Magxeni		
	Number of respondents of this gender that owned cattle	% of all respondents of this gender that owned cattle	Mean herd size	Number of respondents of this gender that owned cattle	% of all respondents of this gender that owned cattle	Mean herd size	Number of respondents of this gender that owned cattle	% of respondents that owned cattle	Mean herd size
Women	9	52	1.7	12	22	1.9	11	18	1.1
Men	14	31	2.3	21	38	2.8	23	63	13.7

4.2.3 Training

CAs promised "access to training programmes where possible to assist the Grazing Association (e.g. business skills, record keeping, animal health" (CA, Gwadane/Mabheleni/Magxeni). At focus groups, GA members at all three villages reported that some training had been received, although members at Gwadane expressed frustration that they had not received certificates for participants that they had been promised or were expecting.

4.2.4 Accumulation of biomass and improved rangeland condition

Whilst the accumulation of biomass does not represent a payment in the sense of a conventional PES scheme, this was another benefit promoted to GA members. This was partly on the grounds of creating a "winter fodder bank" (CA, Gwadane/Mabheleni/Magxeni). Only the GA at Mabheleni referred to "*dry season grazing*" (Mabheleni FG) as being useful or important to them during focus groups.

Improved rangeland condition also represents a broader benefit of "*sustainable livestock and rangeland management*" (CA, Magxeni) promised by the CA. GAs at Gwadane and Magxeni both specified that "protect[ing] the environment" (Gwadane FG) and reducing the deterioration of rangeland were important to them. However, in discussing whether they intended to continue to work with CSA, none of the GAs mentioned improved rangeland condition as a factor motivating them to continue. A similar trend was observed in household survey responses; whilst 56% of respondents who were GA members at Mabheleni mentioned improving rangeland condition as a

factor motivating them to join, none cited this as the most important factor. At Gwadane, although 78% of respondents who were GA members cited improving rangeland condition as a factor motivating them to join, only 4% cited this as the most important factor.

4.3 How equitable was the distribution of benefits?

As discussed above, relatively few households (9%-14%) at each community were members of the GAs and thus eligible to receive benefits. It should be noted that decisions around what benefits to offer as part of the CAs were made independently by CSA, rather than by the community, or by CSA in consultation with the community. Further, the benefits offered were only of relevance to livestock owners, meaning that any members of the GAs who did not own livestock received no direct benefits from membership. This is likely to exclude many women and households on lower incomes, who are less likely to own livestock.

Although disaggregated data for the receipt of vaccines was not available, vaccines were only provided for cattle; given that women were more likely to own sheep or goats, they were again largely excluded from this benefit.

The provision of access to auctions was more likely to be taken up by owners of large numbers of livestock, who in turn are more likely to be men. This reflects findings in other parts of Eastern Cape (Gwiriri et al., 2019). Indeed, disaggregated data demonstrated that women made up only 20% of sellers at auction.

Overall, these findings indicate that, in both structure and in practice, the benefits provided by CAs serve the interests of those who already own significant quantities of livestock. Poorer households and women-headed households are much less likely to benefit directly from the CAs.

4.4 How were benefits offered by CAs perceived by local people?

Data from the household survey and the focus groups showed that vaccines were popular amongst participants and were the main reason for their involvement with the CA (see section 4.2.1 above). It was found that access to mobile auctions was taken up by relatively few participants, with negative perceptions of this as a benefit (see section 4.2.2 above).

Discussions at focus groups also indicated elements of dissatisfaction with the benefits on offer and delivery of these. The GA at Gwadane had clear ideas about further benefits and services they would like from CSA; namely, more regular vaccinations, more regular clearance of wattle, and provision of supplementary feed during the winter. GAs at Gwadane and Mabheleni each requested support to provide fencing for the rested area. All three GAs expressed dissatisfaction with training delivery.

4.5 What issues remain unaddressed?

Clearly, one project cannot seek to address all issues relating to livestock production on communal rangelands. However, findings from the household survey showed that rangeland users saw two key factors as constraining their livestock production (see Table 4.4). These were theft of livestock and wattle invasion. Indeed, 80% of respondents at Gwadane, 61% of respondents at Mabheleni and 37% of respondents at Magxeni ranked theft as a significant factor constraining livestock production. As stated above, the GA at Gwadane was explicit in requesting more regular wattle clearance in order to improve the rangeland. Offering benefits that tackle these issues could represent an opportunity for further engagement with a broader section of the community, who are not motivated by the benefits currently on offer.

By contrast, lack of sales opportunities, or lack of forage, were almost never mentioned as factors constraining livestock production. The provision of mobile auctions and development of a winter fodder bank, two key purported benefits of the CAs, thus do not meet local need as captured in this snapshot survey. However, many respondents identified disease and parasites as a key constraint, corroborating the earlier finding that vaccinations were seen as an important benefit to being a member of a GA.

Table 4.4: Percentage of household survey respondents who identify different factors as constraining livestock production.

Community	Gwadane	Mabheleni	Magxeni
Livestock theft	80%	61%	67%
Wattle invasion	43%	61%	59%
Disease and parasites	78%	61%	49%
Lack of sales opportunities	0%	0%	4%
Lack of forage	4%	0%	6%

4.6 Overall: what were the impacts of social benefits provided by CSA?

Of the benefits offered by CSA, vaccinations were arguably the most successful. This is both in terms of meeting the needs of local people, and through motivating GAs to continue with the scheme, meeting CSA's goal of long term rangeland improvement. There are two important caveats to this: firstly, vaccinations were largely of benefit to men, as they were more likely to own eligible stock (cattle). Secondly, based on the findings of the previous chapter, despite their uptake and popularity provision of vaccines has not been sufficient to incentivise community participation in resting and thus improve rangeland condition.

Furthermore, this chapter has identified that key benefits are unlikely to serve the interests of marginalised groups and are targeted towards those who already own large numbers of livestock.

Chapter 5: Discussion

5.1 Introduction

The previous two chapters presented the results of biomass and animal incursion monitoring, focus groups with Grazing Associations (GAs) and a household survey, to understand the implementation of Conservation Agreements (CAs), whether the terms of the Agreements had been met, and the distribution of social benefits. It was found that terms were largely not met, and therefore most of the intended environmental outcomes were not being achieved. Furthermore, it was found that the social benefits linked to the CAs through a PES scheme were either inaccessible or unsuited to many rangeland users. This chapter uses insights from the literature review to situate these results within a broader context and to understand whether CAs can be a useful model to achieve pro environmental and pro social outcomes moving forwards.

5.2 Grazing Associations as institutions

Central to the success of the CAs are the GAs, which must implement the key terms of the agreement and which have the closest contact with the common resource under management and its user group. The work of the New Institutionalist paradigm provides an important lens through which to analyse GAs. This paradigm identifies several conditions which must be met in order for a commons to be effectively managed for the good of all. Most importantly, users must be able to communicate, and make and enforce rules, with strong institutions the mechanism to enable this (Ostrom et al., 1999; Swallow and Bromley, 1995).

5.2.1 Membership

Examining GAs in these terms casts doubt on their efficacy as institutions for achieving their intended goals. Limitations to the scope of their membership prevent GAs from serving as forums enabling all livestock owners to communicate; this will be explored in more detail below. Only a small percentage of the local population were members of the GAs, with participation especially low amongst marginalised groups such as women, poorer households and youth. Whilst several reasons were identified for this, including inadequate attempts by both CSA and the GAs to communicate the terms and benefits of membership, such exclusion is inherent to the design of GAs. Despite being open to all rangeland users, the entire focus of the institution – in its name, the focus of its rule-setting and the benefits offered for participation – was on grazing, particularly of cattle. Given that marginalised groups are less likely to own cattle, structuring the institution around cattle grazing effectively designs out these voices. Equally, there is an implicit expectation that marginalised groups are able to participate in the GA on an equal footing to more powerful members. Such power differentials can stem from cattle ownership, political connections, gender, age or wealth (Kleinbooi,

2013), and it must be acknowledged that these have tangible impacts on individuals' abilities to participate in collective discussion and decision making at GAs (Ostrom, 1999). Strategies to enable more meaningful participation from marginalised groups – for example, nesting autonomous spaces for women and for youth within the broader GA (Agarwal, 2000) - were neither included in the CA drafted by CSA, nor developed by GAs themselves. This provides further evidence of inadequate attempts to structure institutions to enable effective participation by all members of the user group.

Another factor preventing participation by all rangeland users was pre-existing local political differences. Such differences did not have a determinable impact on GA participation at either Gwadane or Mabheleni; however, at Magxeni, the participation of key figures from the political opposition led to a boycott of the GA from the resident former ANC local mayor and his supporters. The impact of complex local political tensions on collective resource management – particularly those between traditional and elected governance which characterise rural South Africa (Bennett et al., 2013; Weinberg, 2015) - is well documented (Bennett et al., 2010). Certainly, lack of support from Magxeni's former mayor had a significant impact on the GA's ability to enforce rules around the rested area. The situation at Magxeni offers a clear reminder of the degree to which institutions such as the GA are nested in local political contexts, explored further below.

Furthermore, GAs were instituted at the level of individual villages. This does not match the boundaries of the socio-ecological rangeland systems present in Mvenyane, where areas of common rangeland are often shared between or accessed by multiple communities. Indeed, GAs commented at focus groups that incursion by livestock from other communities was a problem, over which they had no authority. Users from other communities were thus excluded from both the rule setting process and the social benefits available to members of the GAs. It should be noted that, in practice, the siting of the rested area influenced the degree to which access by other communities was problematic. At Mabheleni, the rested area was positioned close to a boundary with two other communities, rendering it more vulnerable to trespass from these communities than if it had been located elsewhere.

It can therefore be seen that the design of GAs created a theoretical user group that went beyond the boundaries of GA membership. Further, participation in GAs was often impossible for user group members, whether due to political affiliation, gender, age or wealth. Given Ostrom et al.'s (1999) emphasis on the importance of communication between all members of the user group, this should be seen as a key factor in the failure of CAs to deliver pro-environmental benefits through improving rangeland management.

5.2.2 Ability to make rules

Central to the GA's role as the institution enabling collective management of communal rangeland is its ability to make the rules which determine individuals' use of this shared resource. As identified above, failing to include rangeland users from all communities sharing a particular area of rangeland within membership renders GAs ineffective at enabling all rangeland users to contribute to setting rules for rangeland management. Indeed, GAs' abilities to serve as forums for their own members to make rules merits further exploration below.

Despite CSA's claims that CAs were co-created with communities, similarity between all three agreements, and feedback from GAs during focus groups, indicates that rangeland users had minimal participation in deciding on rules. Whilst deciding to partner with CSA and establish a GA does in itself represent a decision to create the rules contained within the CA, this leaves little room for local agency. Although GAs selected a rested area, had unique structures and enforcement mechanisms, the signing of template agreements significantly curtails GAs' power to make bespoke rules about rangeland management, which Ostrom (1999) finds vital to the eventual success of such rules in managing common resources.

During focus groups, several GAs discussed a variety of rangeland management strategies to improve the delivery of provisioning services. This included wattle clearance and protection of cultivated areas. This confirms that alternatives to focussing on resting do exist and that rangeland users are aware of them. Further, key issues (such as livestock theft) preventing rangelands from meeting local needs were identified in the household survey. Indeed, issues around wattle invasion and livestock theft were perceived as far more significant constraints to livestock production than either lack of forage or lack of sales opportunities (see Chapter 5.5, Table 5.4). This further demonstrates disparity between local needs and the goals of CSA, and the prioritisation of CSA goals in the design of CAs. Insufficient accounting for local priorities in designing the trade-off at the heart of CAs is therefore a key reason for their ultimate failure: the strategy preferred by CSA to achieve their goals (resting) did not meet local priorities, and was not bundled with other complementary approaches to rangeland management – such as more regular wattle clearance, fencing of cultivated areas or herding – that did meet these priorities. The fact that such strategies are only marginal to the work of the GA suggests that this institution may be neither a space where local people can effectively participate in setting rules, nor one which centres their agency. Failure to centre local perspectives in the design of CAs meant that they did not achieve the local buy in that was necessary in order to achieve CSA goals.

This also offers a reminder that CAs were designed to implement a specific management goal rather than to create a strong institution for managing rangeland commons, the best practice identified by the New Institutionalist paradigm. Certainly, this study has found that local communities did not instrumentalise GAs as a basis from which to develop broader institutional management of the rangeland commons. None of the GAs took steps to address self-identified key issues of theft or wattle encroachment; indeed, they were not even able to enforce the basic terms of the CAs. This prompts two interesting reflections: firstly, whether single-issue agreements can succeed in a multi-stakeholder environment; secondly, the difficulty of introducing collective management strategies into an institutional vacuum.

5.2.3 Ability to monitor and enforce rules

Chapter 4 provided evidence that rules around resting were not followed. This is despite CAs specification that the provision of social benefits be conditional upon effective resting, and GAs reporting systems of warnings and fines that satisfy Ostrom's (2015) recommendation of graduated sanctions as the most effective method of rule enforcement. Several factors contribute to the disparity between the rules that were set, and actual practice.

Firstly, whilst GAs created sanctions systems, methods of operationalising these systems were not provided for in the terms of the CA. GAs at Gwadane and Mabheleni reported that monitoring the rested area was the responsibility of all GA members; they did not report any formalised systems for doing so, or any regular monitoring. The GA at Mabheleni reported that monitoring had previously been the role of ecorangers trained by CSA, but that ecorangers were no longer present. Further, whilst these GAs reported that they would remove livestock found in rested areas, they also raised issues around the legitimacy of doing this, especially if trespassing livestock belonged to people who were not GA members. The possibility of being accused of livestock theft clearly made any monitoring activities profoundly political, particularly given that in some communities (notably Magxeni), membership of the GA reflected wider political divides. Whilst GAs at Gwadane and Mabheleni with unfenced rested areas argued that fencing would offer a (politically neutral) aide to monitoring rested areas, fencing certainly failed to prevent rule transgression by the politically powerful at Magxeni.

Secondly, despite CAs representing a conditional partnership between GAs and CSA, no monitoring was carried out by CSA, and GAs reporting having minimal communication with CSA during the term of the CA. Therefore despite CSA establishing a clear mechanism for enforcing rules – withholding social benefits – the lack of monitoring meant that this was not used. Creating a pattern whereby

transgression of the terms of the CA had no consequences undermined the terms of the CA, both within GAs and amongst the wider community.

5.2.4 Nesting local institutions within a broader institutional picture

Whilst self-management within user groups has been demonstrated by Ostrom (1999, 2015) to be possible without external monitoring, this did not occur in the communities studied in Mvenyane. Arguably, a key reason for this was a lack of wider authority for GAs within local communities. This was evident in the GA at Magxeni, who reported that punishing those who broke rules around resting would cause conflict in the community. Partially, this demonstrates ineffective nesting of GAs within a broader local institutional context; local institutions which would issue sanctions for transgression of other rules, such as state or customary law, were not necessarily supportive of the GA or involved in its development. It is also important to recognise the weakness of this existing institutional context, symptomatic of the post-Apartheid institutional vacuum in much of rural South Africa. Following Apartheid, the power of traditional institutions has waned as citizens have increasing ability to challenge these forms of authority, without the parallel development of other effective institutions of local authority (Bennett et al., 2013). Launching the CAs into this institutional vacuum presented a greater challenge than in an environment where building blocks of trust and co-operation were pre-established.

5.2.5 Considering participants as rational individuals

It must be recognised that when considering the motivations of those who chose to participate or remain outside of GAs, assumptions around behavioural theory are made. Ostrom (1999, p.496) posits that resource users should be considered “fallible, boundedly rational, and norm-using". Interrogating the application of “boundedly rational” in this context generates two key questions.

Rational choice theory posits that individuals make choices that will lead to the achievement of personal objectives (Jones et al., 2020; Ostrom, 1999). Traditionally, this has been associated with self-interest and, increasingly under neoliberal analysis, individual financial gain (Buscher, 2010). However, the extent to which such paradigms can or should be applied to the context studied is debatable (Ostrom, 1999). Previous studies have found that sustaining existing herds as a form of investment or savings is the rationale that drives most livestock owners in Eastern Cape, rather than goals of production for profit maximisation (Vetter and Bond, 2012). Given that the current condition of rangeland largely satisfies this aim (keeping animals alive), it can therefore be regarded as rational to choose not to put time and money into an institution (the GA) aimed at improving rangeland condition. Findings revealed that local livestock owners had greater concerns, such as

theft, and choosing to focus their efforts on addressing this issue would appear to be entirely rational.

Further, Ostrom (1999) emphasises the importance of a range of forms of knowledge in making rational decisions about common resources. This includes higher level scientific knowledge, and local or traditional knowledge. Especially in a globalised context, where global issues such as climate change increasingly impact on Eastern Cape's rangeland environment, the ability of local graziers to make rational long-term decisions over the management of local resources may be compromised. In this increasingly precarious scenario, local knowledge alone may not provide sufficient awareness of the impact of short-term prioritisation of provisioning services on longer term, bigger picture ecosystem services that approaches such as resting are designed to protect.

Therefore, the design of CAs attempt to unite rationales of profit maximisation and of sustaining the rangelands in the long term. This indeed reflects CSAs broader raison d'etre, namely conservation, and it's chosen approach to conservation: using market based systems and increased marketisation to incentivise pro-conservation behaviours. Increased marketisation within rural communities is indeed supported by South African policy (Marandure et al., 2020). Neither of these rationales chime with the user group, most of whom are neither seeking profit, nor have the knowledge that rangelands are degraded, and vulnerable to changes elsewhere in global social-ecological systems. Akin to the failure to account for local motivations as described above, this failure to account for user group rationale can be seen as a further cause of the lack of buy in that has contributed to the failure of CAs.

5.3 Conservation Agreements as a Payments for Ecosystem Services scheme

The CAs at the centre of this study are one example of the PES model. In this case, offering payments to local stewards has not resulted in the enhancement of ecosystem services. This section will thus use a framework based on that developed by Ola et al. (2019) to provide insight as to which elements of the PES approach have been implemented effectively through CAs, and whether the model has potential for success in this context.

5.3.1 Brokerage

Careful brokerage of an agreement is seen by Jones et al. (2020) as key to the ultimate success of a PES scheme, with Ola et al. (2019) specifying the importance of signing a formal contract. Indeed, Ola et al. (2019, p.63) argue that "the overarching task for PES program [sic] managers is active prior engagements with ES providers to recognize their needs and design the program [sic] accordingly". Whilst the CAs are indeed a formal contract, the extent to which they were brokered in partnership with local communities remains in doubt, as discussed above. The ramifications of this are explored

fully in the following sections; in general terms, it would appear that a more careful and collaborative approach to brokering the CAs has potential to yield greater commitment from local participants.

Lack of effective brokerage was also demonstrated by the lack of variation between the three CAs studied. This is significant, given the variation in social and ecological circumstances between the three communities. Whilst Magxeni had an area of rangeland that had previously been fenced by the government, Mabheleni's rangeland was entirely unfenced and shared with several other communities. As the partner initiating the PES scheme, CSA has not adapted its approach to create bespoke agreements to meet these different circumstances. Specifically, the CA capturing the PES scheme for the area of rangeland close to Mabheleni was only brokered with Mabheleni residents, rather than with all rangeland users. Further, the main benefits of the PES scheme applied only to cattle owners, casting doubt on the inclusion of non-cattle owners during brokerage.

5.3.2 Payments that cover cost

Whilst the CA may appear to present no upfront costs to communities, this belies the true picture. The GA at Mabheleni expressed a lack of capacity for completing monitoring work, particularly without salaried CSA community rangers. Further, GAs at both Gwadane and Mabheleni expressed the need for fencing to ensure the rested area was not intruded upon; the costs of fencing were certainly not covered by CSA. There were also significant social costs associated with monitoring and compliance work, particularly with regard to challenging powerful members of the community, and the risk of being perceived as a thief. The lack of adequate payments to cover the varying costs of monitoring likely contributed to GAs failure to enforce the terms of the CAs.

Equally, it must be acknowledged that trespass on the rested area also occurred at Magxeni, which already had a fenced area. This demonstrates that increased payments for infrastructure are unlikely to be a silver bullet to guaranteeing compliance.

5.3.3 Payments that match local need

Evidence indicated mixed results on this point. Certainly, vaccinations were well received, likely because they supported a clearly articulated local need to maintain livestock. Indeed, vaccine provision formed the primary reason expressed by individuals and communities for continuing with the programme. In this sense, CSA has filled a gap left by the withdrawal of state agricultural extension services.

However, low uptake of the other key benefit, access to mobile auctions, demonstrated the alienation of this payment from local need. In promoting sales to the formal market in this way, it

appears that CSA are pushing a broader political agenda of incorporating smallholders into the formal market, rather than supporting the existing informal market. This has been guided by government policies such as the National Red Meat Development Programme (Gwiriri et al., 2019). Such focus on neoliberal solutions to rural poverty – unrecognised as solutions by local people – is not only problematic in terms of eliding the agency and knowledge of rural stakeholders; it fails to incentivise compliance with the CA and thus does not generate pro environmental outcomes. Given that most local people prefer to sell to the informal market due to often higher prices, convenience and conviviality (Vetter, 2013; Marandure et al., 2020), they do not perceive auction access as a benefit and it is therefore not an adequate form of payment to overcome the costs of participating in the scheme. Certainly some people sold at auction, with data from this study showing that formal markets provided a useful outlet for those needing a quick sale. Delving into what the data reveals about the type of people selling at auction in this study area, it can be seen that sellers were most often male, and average herd sizes amongst those who sold at auction were almost double that of those who didn't access auctions. This indicates that, as a form of payment for ecosystem services, provision of mobile auctions only serves the need of an already dominant group.

A significant question is the identification of a form of payment that would meet the needs of a wider group and thus may enable participation in the scheme from all rangeland users. Within GAs, other useful forms of payment, such as increased wattle clearance, building on the Working for Water programme, were identified. Indeed, wattle invasion and livestock theft were identified in household surveys as key constraints to livestock production, and could inform choice of payment. It is useful to note the advantages of offering diverse forms of payment, as this increases the likelihood that at least one form of payment is useful to participants

5.3.4 Monitoring and conditionality

Ola et al. (2019) identify that monitoring the terms of an agreement and subsequent conditionality of payments on the basis of compliance are essential to effective PES schemes. Although it has periodically conducted rangeland condition assessments in the communities, CSA did not conduct any monitoring of the rested areas to assess compliance. Instead, they regarded monitoring activities as the responsibility of the GAs. Not only does this break the terms of the GA, which stipulates that CSA will conduct monthly monitoring, but this is unrealistic, given the infancy and weakness of the incipient GAs. This lack of external monitoring also leaves the GA somewhat isolated, where it could have been bolstered by the presence of external checks. Failing to monitor compliance removes any notion of conditionality from the scheme, weakening it if assessed by Ola et al.'s (2019) terms.

5.3.5 Length of scheme/time since inception

Ola et al. (2019) found that PES schemes tended to be most effective between 10 and 30 years from inception. CSA began work in these communities circa 2013, when a baseline report was published; thus, the scheme has not yet entered the window of ultimate efficacy. It is worth noting that no changes have yet been observed in the CAs signed between one year and the next at each village. This suggests that CSA has not implemented any learnings from previous years to improve the scheme. No technical reports were available from the funder to corroborate this.

5.3.6 Rational choice theory

As described above in the context of an individual's choice to participate in a common property regime, ideas around rational choice theory are also relevant to understanding participation in a PES scheme. Jones et al. (2020) found that a variety of factors beyond rational choice theory inform decisions to participate or not, and tended to be neglected in the design of PES schemes. This was certainly the case in this study, with one key example being local political differences. Particularly in Magxeni, divisions around GA membership reflected local political factions. In this scenario, joining the GA to the displeasure of locally powerful people thus represents an irrational choice; equally, commitment to a particular set of politics may be more important than the material rewards available through joining the GA. The difficulty of accounting for this in any PES scheme must be acknowledged.

It can be difficult to determine whether transgression of rules regarding rested areas is rooted in ideological opposition, or simply an example of free-riding. However, it is important to consider the role of a range of motivations beyond simple economic decision making.

5.4 To what extent can Conservation Agreements be seen as a useful model for creating strong institutions to manage rangeland commons?

A purported aim of the CAs was to create strong institutions in the form of GAs to actively manage rangeland commons to improve the ecosystem services delivered by these rangelands. The results of this study have shown that CAs have not done this effectively. Focus groups and household surveys revealed that GAs did not have a broad membership base including all rangeland users and thus lacked the authority to enforce rules on the use of the rangeland. Evidence of rule infringement from biomass and animal incursion monitoring confirmed the GAs lack of authority over rangeland use.

This section examines CAs in the broader context of institutional governance and priorities in South Africa, and compares this to studies of other PES schemes.

5.4.1 Pre-existing institutional context

The lack of any effective pre-existing institutional governance of rangeland use in these areas must be emphasized. As outlined in Chapter Two, something of an institutional vacuum has existed regarding governance of communal rangelands in South Africa since the removal of centralised apartheid structures of control, which had replaced traditional practices. Mvenyane is no exception to this (further research by Hoepfl forthcoming). Ostrom (1999) identifies that contexts of minimal existing institutional management are challenging environments in which to establish common property regimes; Clements et al.'s (2010) study of PES schemes in Cambodia confirms this. More specifically, Hayes et al.'s (2017) study of Programa Socio Bosque (PSB), a PES scheme in Ecuador, offers useful insight into the relationship between levels of organisation in a community, and the success of a PES scheme. PSB provided payments to community governing bodies who sign a contract agreeing to take certain measures (such as cessation of burning and hunting, and reduction in grazing) in order to conserve highland grassland ecosystems; a comparable scheme to the one at the centre of this study. Hayes et al. (2017) are resolute in their finding that PSB was most successful in achieving intended changes to land use behaviours in communities that were already practicing effective self-governance. Indeed, they argue that effective collective governance was more important in changing behaviours than participation in PSB (Hayes et al., 2017). Ostrom (1999) concurs that pre-established institutions are important in transmitting norms. Further, Hayes et al. (2017) found that, amongst communities participating in PSB, households in more organised communities were more likely to have knowledge of the PSB contract conditions. The reverse of this was seen in Mvenyane, where as many as 37% of respondents to a household survey at Mabheleni were unaware that GAs existed. Therefore it must be acknowledged that the lack of effective institutions already in place in the three communities created a challenging context to begin to work within.

In slightly broader terms, Bennett et al.'s (2010) study of common property regimes at three communities in a different part of Eastern Cape analysed the socio-economic characteristics of a community that lend themselves to successful collective organisation. A village being constituted by a single settlement, and political unification amongst inhabitants, were found to be key to effective co-operation within and between institutions (Bennett et al., 2010). Data from this study concurs with these findings; political differences at Magxeni, and the rested area at Mabheleni being shared with multiple dispersed settlements, contributed to significant transgressions on the rested area.

Introducing a PES scheme into communal governance contexts has been perceived by some scholars as risking the thwarting of pre-established systems (Hayes et al., 2017). Whilst this debate is less relevant to the context of this study, given the general lack of collective governance structures, a

pertinent insight from Hayes et al. (2017, p.439) is that PSB "increased the legitimacy and clarity of the local governance institutions". This indicates the potential for PES to build on pre-colonial forms of governance which were recalled in focus groups at the three villages, and which Bennett et al. (2010) found to be possible in appropriate conditions at comparable communities in other parts of Eastern Cape (see also Bennett and Barrett, 2007; Bennett et al., 2012).

Ineffective nesting within existing, if weak, institutional frameworks arguably contributed to GAs overall weakness. GAs were somewhat parachuted into an institutional vacuum with regard to rangeland governance, with apparently little consideration of how they would interact with other forms of local governance such as elected or traditional authorities, which Ostrom (2015) indicates is crucial. Certainly, Bennett et al.'s (2010) study of common property regimes in another part of Eastern Cape found this to be the case: the most effective institution governing agricultural issues was nested within a broader Residents Association, lending it sufficient democratic legitimacy to avoid the formation of separate, ad hoc committees. Neither do GAs appear to have been nested within higher level forms of institutional governance regarding conservation; all three GAs reported poor communication with CSA, and no evidence was found of any formal mechanism for the representation of GAs' views within the broader Umzimvubu partnership.

5.4.2 Consultation

As described in the section above on brokerage, the views of local communities were inadequately represented in the formation of CAs. This concurs with Buscher and Dressler's (2012) study of a PES scheme in KwaZulu-Natal, where visions of effective conservation were provided for local people, rather than created by local people. Indeed, returning to focus groups conducted at the start of the TOCASA project, local people identified several key priorities in terms of managing the rangeland; these included greater wattle clearance and fencing of areas for crop production and production of thatch grass. Whilst production of thatch grass was enabled through the creation of rested areas, this and other locally identified concerns were not prioritised in CAs, which were largely determined from above by CSA. Not only can this be considered problematic in terms of the disempowerment of local people, but this study has shown this approach to be ineffective at achieving its own targets. Clements et al. (2010) emphasise that, amongst the PES programmes they studied in Cambodia, those where rules were set endogenously were more likely to be successful. By contrast, terms of CAs were not rooted in local knowledge, needs and opinions, a key factor in GAs not achieving the (near universal) buy in from local resource users required for a successful common property regime (Ostrom, 1999).

Conversely, where the type of payment was chosen in response to a locally identified need (vaccinations), much higher uptake was recorded. This demonstrates the potential for greater success when centring the needs and agency of those with lived experience of the issues under consideration.

5.4.3 Conservation Agreements as a neoliberal approach to collective rangeland management

The above sections reveal a dichotomy at the heart of this programme, lending support to the interpretation that CAs are not necessarily designed to create strong, user-led institutions, but to achieve a specific set of aims, determined from the top down by CSA. CSA's ultimate priority is to improve rangeland condition, in service to its mission and funders. Therefore, this PES scheme is structured to achieve specific goals dictated by CSA, rather than to build appropriate institutions capable of the effective collective governance needed for self-determination of a rangeland management strategy at the local level, as recommended by Clements et al. (2010).

Compounding this dichotomy is that CSA's operation within neoliberal paradigms differs vastly to the lived experience of local people. CAs are designed on the basis of increased production and offtake being the ultimate goal of rangeland users; this is evident from the use of auctions as an incentive for compliance. In contrast, the literature emphasises that local people are more likely to regard their livestock as an investment (Goqwana et al., 2008; Vetter and Bond, 2012), and are not motivated by sales into the formal market (Gwiriri et al., 2019). For most owners, the priority is to keep animals alive, rather than fatten them for sale; as long as the rangeland can keep their animals alive, many local owners have little interest in improving its condition, even when this is presented to them as increasing livestock productivity (Allsopp, 2013). CAs are rooted in an extractive neoliberal paradigm that does not chime with local priorities and therefore CAs are unsuccessful in securing the local buy in required for their success.

This speaks to CSA's situation within a broader framework of established institutions – including other NGOs and the South African government – promoting commodity production and sale into formal markets as anti-poverty measures (Marandure et al., 2020). This disparity with local priorities lends evidence to the argument that PES is a tool to encourage communities towards neoliberal forms of livelihood reproduction and modes of being (Fletcher and Buscher, 2017).

Further, it has been outlined above that the design of CAs means that, in effect, relatively wealthy men are most likely to be able and incentivised to participate. Whilst there is no evidence to suggest that this is the outcome intended by CSA, the very premise of the CA around grazing, and the benefits offered, mean this is effectively designed into the scheme. Cattle tend to be owned

exclusively by men, and it is those with larger herd sizes who tend to sell at auction. Certainly this study found that, on average, only 20% of sellers at local auctions were women, and that the average herd size of those selling at auction was almost double the average herd size of those who owned cattle but did not sell at auction (see Chapter 4, section 4.2.2). This exclusion of poorer and women members of local resource user groups is thus a somewhat inevitable consequence of prioritising sales into the formal market in the design of CAs, and belies a neoliberal logic underlying such design.

5.5 Conclusion

This section has found that CAs fail to meet the terms of both Ostrom's (1999) framework for effective Common Property Regimes, and Ola et al.'s (2019) suggestions for best practice in design and implementation of PES. The reason for this is that CSA is not actually trying to set up strong institutions, and is instead driven by neoliberal logic. The neoliberal logic underlying CSAs design of CAs does not chime with local knowledge, priorities or rationale, so has not received the required buy in from the user group to achieve pro-environmental outcomes. Equally, CA design largely excludes traditionally marginalised groups from decision making spaces and from receipt of material benefits, therefore failing to deliver pro-social outcomes. It must be acknowledged that the weakness of pre-existing institutional governance in the local area compounded the difficulties in setting up effective GAs, able to deliver these outcomes. Reflections on these outcomes, and recommendations for further research and practice will be presented in the next chapter.

Chapter 6: Conclusions

This chapter will present conclusions from the study, offering reflections and recommendations for policy and for further research.

6.1 Conclusions to research questions

The research questions originally stated at the end of Chapter 2 are presented below:

1) Are Conservation Agreements able to deliver the ecological benefits they are designed to provide via current institutional arrangements?

A) Are CAs currently delivering ecological benefits?

B) How do current institutional arrangements affect the efficacy of CAs in delivering ecological benefits?

2) To understand the social benefits provided by CAs to local people and determine their impact.

In response to question 1a, this study has found that CAs are not currently delivering ecological benefits. It was found that current institutional arrangements (question 1b) were inadequate to deliver the terms of the CA and thus generate ecological benefits. Using insights from New Institutionalist theory, it is suggested that many rangeland users were in effect designed out of Grazing Associations, preventing GAs from serving as forums where all members of the resource user group could communicate, and set and monitor rules. CAs shored up existing power imbalances, with marginalised groups less able to participate. It is also noted that GAs were not nested within a broader context of local institutional governance, partly due to the design of CAs, and partly due to the weakness of this broader institutional picture.

The study found that certain benefits provided by CAs – namely vaccines – were seen as highly positive by recipients and can thus be judged successful. Vaccines met a local need to maintain livestock condition and herd size. However, other key social benefits offered – training and in particular access to mobile auctions – had only a minimal impact. Any benefit from selling at auction or need to sell at auction was rarely perceived by local people, and only a small section of the community owned livestock (cattle) that was eligible for auction.

Taking a broader perspective, the reasons for the above failures would appear to stem from a failure to root the terms of CA in the knowledge and priorities of the resource user group. CSA's lack of local consultation and co-creation – as especially evidenced by the identical agreements signed with each community – indicate that centring the opinions and agency of local people was not a priority for the project. Arguably, this was a key reason for the failure of the CAs to deliver either ecological or social

benefits: because they were not based on locally identified need, they did not secure the local buy in upon which they depended for success.

Further, as discussed in detail in Chapter 5, this approach to constructing the project is indicative of an attempt by CSA to achieve pre-determined conservation goals pertinent to the organisation's broader agenda. This research has highlighted the disparity between these goals, and establishment of a strong common property regime to enable users to effectively manage the rangeland commons, based around users' aims. Another key distinction is between the paradigms within which these two approaches reside. CAs essentially tie into CSA's wider strategy of following South African policy and using market-based approaches to achieve apparently pro-environmental and pro-social outcomes; this did not resonate with the place of rangelands in the livelihood strategies of many local users. By contrast, development of a strong common property regime enables users to set the goals of their approach to resource management, without assuming that improved ability to participate in the formal market is the ultimate aim.

6.2 Recommendations for further research and for policy

6.2.1 Recommendations for further research

- Biomass monitoring conducted during this research should be continued, with the addition of exclosures in the unrested area. This additional treatment would act as a control, enabling firmer conclusions to be drawn regarding whether differences in biomass measured between rested and unrested areas are due to inherent differences in productivity, or preferential grazing by livestock.
- Further research into non-participation: what are the reasons for non-participation, particularly amongst marginalised groups such as women and youth. Understanding the arrangements that marginalised groups regard as enabling their participation in management of the rangeland commons is a key condition for developing equitable institutions.
- Investigation of other key issues affecting rangeland use (for example, livestock theft and wattle management), and possible roles for institutions in managing these.
- An issue revealed by the study was the difficulty GAs had in operating in isolation from other institutions of local power. Further research into these institutions, and how they may be linked to rangeland management, may inform and enable the design of more effective CAs.
- Options for developing institutional management of the commons without PES should be investigated; some work on this is being done by Environmental and Rural Solutions in Matatiele.

- Further research should draw from agroecological principles and insights from critical theory to further define the parameters of "success" in CAs impact on rangelands in both social and ecological terms.

6.2.2 Policy recommendations

- The importance and potential of current patterns of rangeland use to rural livelihoods must be recognised in policy. With regard to the focus of this study (livestock), recognising the role of existing informal markets, and the conditions needed for local participants to succeed in such markets, should be prioritised. For example, vaccines were well received by GA members, because they helped to maintain livestock condition and herd size, thus enabling local people to participate in local markets according to their need. Therefore, developing rural agricultural services, which previously provided such veterinary services as vaccines, should be a key policy objective.
- Further institutional management of rangelands should ensure schemes are co-constructed between multiple communities where rangeland is shared.
- The results of this study emphasise the importance of adequate consultation with local communities at all stages of project design and delivery. These results also highlight differences between the worldview and value system of different groups and communities, questioning the ethics of expecting local communities to participate in projects based on neoliberal values and motivations. Future schemes require genuine co-construction with all rangeland users, centring participants' concerns and suggestions, rather than purely those of an external organisation. Beyond the basic recognition of participants' agency that this represents, such an approach also increases the likelihood of local buy in, which is in turn required for schemes to succeed.
- Future PES schemes should include an element of external monitoring in order to ensure compliance.
- In partnership with communities, arrangement to recognise the marginalised position of groups such as women and youth should be considered. This may include autonomous spaces for these groups.

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Appendix 1: Focus Group Protocol

Introductions

- Introduction from interviewer (Tawanda Marandure) explaining who he is and why he is here.
- Invite participants to introduce themselves, their interests in taking part in the research and their involvement with Grazing Association (GA)
- Begin by explaining in more detail (with respect to participant information sheets), what the interview[4] is trying to achieve.

Participant's involvement with grazing association

- Why did you want to have a GA in this village?
- Before the Conservation agreement with CSA, were there any rules in this village about how to use the rangeland? Who set these rules?
- What were your expectations/hopes for the Conservation Agreement (CA)? In relation to yourselves, the community, CSA and other local communities?
- How do people become a member of the GA? Are there any particular requirements to be a member?
- What is membership of GA in terms gender, livestock owners (large/small herds) and youth?
- Is it only open to people from within your community (name)?
- What is expected of them when they are a member?
- What are the main benefits of being a member?
- What is the composition of the Grazing Committee (what roles are there)?
- Who is responsible for fulfilling these roles?
- Do you have to be elected to the committee?
- What is the process and how long does each member serve for?
- What are the main responsibilities?

Participants' views on CA:

Explain that interviewer has read the CA. It says that the GA will create a "rested area".

- Have you, the GA, done this? What are the boundaries of the rested area? How did you determine which area to rest – what was the process and what were the key factors which determined where the area should be?
- Is the area fenced in part?
- Have all the people who use the rangeland for grazing agreed to rest this area (i.e. does the CA extend to all of them)?
- If not, are the people who have not agreed to rest the area from within the community, outside it or both?
- If from outside the community, which communities are they from?
- How did people (either from within the community or outside) know about the rested area?
- What are the rules regarding the rested area? For example, when is it opened to grazing and when is it closed? Is this the same date every year or can it vary depending on circumstances? If so what are these? Who determines when the rested area is opened and closed (CSA/GC etc)? Can people use the area for purposes other than grazing? Can permission ever be granted to put animals in the rested area when it is officially closed to grazing? Can other activities occur then when it is closed to grazing (e.g. harvesting of grass for thatching etc).
- The GA says that the GC will enforce compliance:

[4] This is an error in the original text and should read "focus group"

- How do you make sure no animals get access to the rested areas when they are closed? E.g. fences, herding? If area is fenced then are gates, for example, padlocked during the period the area is rested?
- How effective is compliance with the resting decision – are animals found in the rested area when it is supposed to be closed?
- If so, are these animals from within the community or from outside the community (or both)?
- How do people within the GA view non-compliance?
- Do people who are members of the Grazing Association ever break the rules about resting or is it only non-members?
- Is there any way to try and enforce compliance amongst those who break the rules e.g. remove trespassing animals from the rested area?
- Is there any way of punishing people who break the rules? Is it possible to punish people who are not members of the GA?
- Who is responsible for enforcing the rules and punishing people for non-compliance?
- Do traditional leaders have any role in this or is it simply the job of the GA? Did you do any checks to see if the rules were being followed? Who is responsible for this monitoring – is there a single designated person or is it a collective responsibility?
- What are the main problems you face in monitoring and enforcement of the rested area?
- What is the single biggest issue the Grazing Association faces in trying to comply with the Conservation Agreement?

- Do you think that the GA is managing to comply with the conservation agreement? Has the area actually been rested? Why do you think this?
- Overall, what do you think are the benefits or drawbacks to resting?

Relationship with CSA

CA also says that CSA will provide "training programmes….Market Access ...Vaccinations".

- If CSA were not offering these services, do you think members would have agreed to the CA?
- Has the provision of these services been as you expected?
- If not, in what way has it differed? Has CSA ever withheld these services (no vaccinations, full 6% commission on sales)? If so, do you think this was reasonable?

Earlier, we discussed what you were expecting from/hoping for from the GA. Do you think your expectations/hopes have been realised?

Thinking about the future

- Do you think your community will remain involved with CSA through the conservation agreement? Why?
- If yes to above, are there any changes you would make to how the conservation agreement is structured? Prompt if slow response: Eg, with respect to the area rested, the membership of the GA (where rested areas are used by more than one community is it possible to include everybody in one joint GA), the rules, the way benefits are provided by CSA?
- Are there any other changes you would like to make to how your community uses its rangeland for grazing and how these decisions are made?

Is there anything else you would like to talk about?

Thank participants

Appendix 2: Participant Information Sheet

Evaluating the effectiveness of rangeland resting initiatives in communal rangelands in South Africa

PARTICIPANT INFORMATION SHEET (Focus groups)

You are being invited to take part in this research, which aims to understand the role of grazing agreements in the management of communal rangelands in South Africa. My name is Tawanda Marandure, I am a researcher working with my colleagues from Coventry University in the UK, Rhian Williams and Dr James Bennett. Due to COVID-19, they are unable to be here to talk to you themselves, so I will be sharing findings with them. Before you decide to take part, it is important that you understand why the research is being conducted and what it will involve. Please take time to read the following information carefully. If any participant cannot read, the form will be read to them.

What is the purpose of the study?
We want to evaluate the operation of the grazing agreement that has been set up between Conservation South Africa and the Grazing Association in your community. Through this agreement, your Grazing Association has agreed to rest certain areas of rangeland in return for training, vaccinations and mobile auctions access. We are interested in understanding your thoughts and opinions on which aspects of this agreement are working, which are not and why. By understanding the views of everyone who uses the rangeland, for grazing or for other purposes, we hope to understand which approaches to rangeland management work best in this local area.

Why have I been chosen to take part?
You are invited to participate in this study because you are a member of the Grazing Association and/or currently make use of the local rangeland as part of your livelihood and are concerned with how the land is used and managed.

What are the benefits of taking part?
By sharing your experiences with us, you will be helping everyone involved in this project to better understand the practical operation of grazing agreements, in order to achieve better environmental and livelihood outcomes for as many local people as possible. By participating in this project your voice will be heard on how the grazing agreement affects you and your local rangeland.

Are there any risks associated with taking part?
This study has been reviewed and approved through Coventry University's formal research ethics procedure and has been discussed with all project partners involved. There are no (significant) risks associated with participation. If you are unsure about anything, you can talk to us and ask questions at any time.

Do I have to take part?
No – it is entirely up to you. If you do decide to take part, please keep this Information Sheet and complete the Informed Consent Form to show that you understand your rights in relation to the research, and that you are happy to participate. Please note down your participant

number (which is on the Consent Form) and provide this to the lead researcher (Rhian Williams) if you seek to withdraw from the study at a later date. You are free to withdraw your information from the project data set at any time until the data are destroyed on 31/03/2031. This date is determined by the formal procedures at Coventry University. You should note that your data may be used in the production of formal research outputs (e.g. journal articles, conference papers, theses and reports) prior to this date and so you are advised to contact the university at the earliest opportunity should you wish to withdraw from the study. To withdraw, please contact the lead researcher Rhian Williams (contact details are provided below). Please also contact the Ethics Lead, Stefanie Lemke (ac0447@coventry.ac.uk), so that your request can be dealt with promptly in the event of the lead researcher's absence. You do not need to give a reason. A decision to withdraw, or not to take part, will not affect you in any way.

What will happen if I decide to take part?

You will be invited to participate in a focus group facilitated by Tawanda Marandure. There will be other people at the focus group, mostly members of the Grazing Association. We will discuss the grazing agreement, for example how it has been implemented and whether or not you think it has been successful. The focus group will be informal and if there are any discussions that you do not want to participate in, you are welcome to remain silent. The focus group will take place in a quiet and private environment at a time that is convenient to the group. Ideally, we would like to audio record your responses (and will require your consent for this), so the location should be in a fairly quiet area. The focus group will probably last for 1-2 hours.

Data Protection and Confidentiality

Your data will be processed in accordance with the General Data Protection Regulation 2016 (GDPR) and the Data Protection Act 2018. All information collected about you will be kept strictly confidential. Unless they are fully anonymised in our records, your data will be referred to by a unique participant number rather than by name. If you consent to being audio recorded, all recordings will be destroyed once they have been transcribed. Your data will only be viewed by the researcher/research team. All electronic data will be stored on a password-protected computer file on the laptop of the onsite researcher (Tawanda Marandure) and the lead researcher (Rhian Williams). All paper records will be stored in a locked filing cabinet at the Centre for Agroecology, Water and Resilience, Coventry, UK. Your consent information will be kept separately from your responses in order to minimise risk in the event of a data breach. The lead researcher will take responsibility for data destruction and all collected data will be destroyed on or before 31/03/2031.

Data Protection Rights

Coventry University is a Data Controller for the information you provide. You have the right to access information held about you. Your right of access can be exercised in accordance with the General Data Protection Regulation and the Data Protection Act 2018. You also have other rights including rights of correction, erasure, objection, and data portability. For more details, including the right to lodge a complaint with the Information Commissioner's Office, please visit www.ico.org.uk. Questions, comments and requests about your personal data can also be sent to the University Data Protection Officer - enquiry.ipu@coventry.ac.uk

What will happen with the results of this study?
The results of this study may be summarised in published articles, reports and presentations. Quotes or key findings will always be made anonymous in any formal outputs unless we have your prior and explicit written permission to attribute them to you by name.

Making a Complaint
If you are unhappy with any aspect of this research, please first contact Rhian Williams (william37@uni.coventry.ac.uk), Centre for Agroecology, Water and Resilience (CAWR), Coventry University, Ryton Gardens, Wolston Lane, Coventry, CV8 3LG. If you still have concerns and wish to make a formal complaint, please write to:

Stefanie Lemke
Ethics Lead
Centre for Agroecology, Water and Resilience (CAWR)
Ryton Gardens
Coventry University
Coventry
CV8 3LG
Email: ac0447@coventry.ac.uk

In your communication, please provide information about the research project, specify the name of the researcher and detail the nature of your complaint.

Appendix 3: Household Survey

Coventry University

BBSRC-GCRF Project: Trade-offs in communal areas of South Africa (TOCASA)

Baseline survey questionnaire for rangeland use in Mvenyane

Village name:

Respondent number*:

*Cross reference with informed consent form

1. General information

1.1 Village:

1.2. Name of respondent:

1.3. Gender: M/F

1.4. Age:

1.5. Household head name (if different from above):

1.6. Gender of household head: M/F

1.7. Age of household head:

1.8. Number of people in household:

1.9. Indicative annual household income from different sources:

Income source	Tick if applies	Estimated amount (ZAR)
Salaries from employment		
Pension(s)		
State grants		
Remittances (money sent by relatives)		
Income from informal local business		
Livestock sales (see also later p6)		
Other:		

2. Livestock production

2.1. Does your household own livestock? (Y/N) Need to be careful in defining this as livestock that make use of rangeland (cattle, goats, sheep, horses, donkeys – not pigs or poultry). Be careful to include juvenile animals (calves, lambs etc) as sometimes not counted.

2.2 If yes, document how many of each livestock type owned including juveniles.

Species	Number mature	Number juveniles
Cattle		
Sheep		
Goats		
Horses		
Donkeys		

Livestock grazing

2.3. Are animals herded (explain that this means somebody staying with animals for most of the day – not just checking or collecting)? (Y/N)

2.4. If YES, check which livestock are herded:

Species	Tick which applies
Cattle	
Sheep	
Goats	

2.5. Is herding paid for? (Y/N)

2.6. If YES, document how much is paid per week/month:

2.7. Why is herding undertaken?

Reason	Tick as many as apply	Rank top 3 by importance
Prevent theft		
Comply with grazing management rules		
Minimise chance of injury/attack		
Prevent damage to crops		
Other:		

2.8. If herding is not undertaken, why?

Reason	Tick as many as apply	Rank by importance
Cannot afford the time		
Cannot afford cost of paying herder		
Animals are fine on their own		
Other:		

2.9. If livestock are not herded, are livestock whereabouts checked periodically? (Y/N)

2.10. If YES, how regularly (e.g. daily, weekly or monthly)?

Species	Daily	Weekly	Monthly	Less than monthly
Oxen/bulls				
Cows				

Sheep				
Goats				

2.11. Do you corral livestock? (Y/N)

2.12. If YES, then which species and when (may differ between wet and dry season)?

	Wet season (summer)			Dry Season (winter)		
Species	Daily	Monthly	Never	Daily	Monthly	Never
Oxen/bulls						
Cows (no calves)						
Cows with calves						
Sheep						
Goats						

2.13. Why do you corral livestock?

Reason	Tick if applies	Importance (rank top 3)
Prevent theft		
Collect dung for manure		
Enable supplementary feeding		
Livestock husbandry (care and maintenance)		
Other:		

2.14. Are you aware of any local community grazing system for livestock that is currently practised at your village? (Y/N)

2.15. If yes, what system and do you manage your livestock in compliance with this or let them free-range (tick which applies)?

Grazing system	Practice (Y/N)*
Community grazing via Conservation grazing agreement (CGA)	
Community grazing via traditional management (explain: e.g. summer and winter pastures)	
No community grazing system followed – use own management system	
Leave animals to free-range (no management)	
Other:	

*They may practice more than one of these (e.g. winter grazing of rested area with community or individual decisions about where to graze livestock on unrested area in summer) but this should be explained.

2.16. If traditional management indicated, specify basic approach:

2.17. Do your livestock comply with the CGA rested area of rangeland when it is closed i.e. do not graze the rested area it when it is officially closed (ask regardless of system used)? (Y/N)

2.18. Do your livestock make use of the rested area for grazing when it is open? (Y/N)

2.19. If community grazing (CGA or traditional) system is complied with, why?

Reason for compliance	Tick if applies	Importance (rank top 3)
Improves rangeland condition		
Improves livestock condition		
Better for livestock health		
Other		

2.20. If community grazing system not followed, determine why:

Reason	Tick if applies	Importance (rank top 3)
Not aware of system or how it works		
Don't feel system benefits rangeland		
Don't feel system is beneficial for livestock		
Don't have capacity to herd/check animals		
Don't want to join the grazing association		
Don't want to comply with community leadership/rules		
Other		

2.21. Are you a member of the Grazing Association? (Y/N)

2.22. If yes, determine main motivation for membership

Reason	Tick if applies	Importance (rank all responses)
Access to mobile auctions at reduced commission		
Livestock vaccination		
Enables community approach to grazing management		
Helps fund livestock initiatives		
Improved livestock condition		
Improved rangeland condition		
Other		

2.23. If not a member, determine why:

Reason	Tick if applies	Importance (rank all responses)
Didn't know about it		
Don't have any livestock		
Doesn't support activities I am interested in		
Don't want to pay membership		
Can't afford membership		
Other		

Livestock husbandry

2.24. Are your livestock vaccinated? (Y/N)

2.25. Which ones?

Species	Tick if vaccinated
Cattle	
Sheep	
Goats	

2.26. Who is mostly responsible for doing this (rank but only for those people involved)?

Responsibility	Cattle	Sheep	Goats
Owner			
NGO (e.g. CSA)			
Government vets			
Other (state)			

2.27. What is approximate annual cost to owner of vaccinations (think about previous year)?

2.28. Do you buy supplementary feed for livestock? (Y/N)

If yes, what, for which species and what is estimated annual cost?

Species	Feed type	Annual cost
Cattle		
Sheep		
Goats		

2.29. Do you use any natural fodder for livestock (e.g. tree branches)? (Y/N)

2.30. If Y, determine which tree species used and when:

Species used	Winter	Summer
Wattle		
Other (state)		

2.31. Determine method of provision (tick which apply)

Method	Cattle	Sheep	Goats
Graze *in situ*			
Cut and carry to homestead			
Mix with animal feed (e.g. crop residues or bought feed)			
Other (state)			

2.32. Why do you feed fodder to livestock?

Reason	Tick which apply
Helps maintain livestock condition	
Improves livestock health	

Other	

Livestock uses/sales/offtake

2.33. What is the most important value to you of different livestock (**rank** for species held and appropriate uses)?

Use	Cattle	Sheep	Goats
Income from animal sales			
Meat (household consumption)			
Milk (household use or sale)			
Wool			
For cultural purposes (e.g. ritual slaughter)			
Manure			
Draught			
Other (state)			

2.34. Do you sell livestock? (Y/N)

2.35. If yes, document how many cattle, sheep and goats sold in past 3 years and income realised from sales.

Species	Number	Income (ZAR)
Cattle		
Sheep		
Goats		

2.36. Also document how many cattle, sheep, goats sold in past year and income realised.

Species	Number	Income (ZAR)
Cattle		
Sheep		
Goats		

2.37. Have any cattle been sold at mobile auctions provided locally? (Y/N)

2.38. If YES, when were last sales made (year)?

2.39. How many cattle were sold at last mobile auction and what income was realised?

Cattle type	Number	Income (ZAR)
Bulls		
Oxen		
Cows		

2.40. Why do you chose to sell at mobile auctions?

Reason	Tick which applies	Rank by importance
Readily available market		
Realise good prices		
Other		

2.41. If NO, need to determine reasons for not participating in mobile auctions.

Reason	Tick all relevant	Rank 3 most important
No cattle		
Not part of GA (check with Q 2.19 above)		
Was not aware of auctions occurring		
Don't feel I achieve fair prices		
Am not empowered to sell cattle		
Other:		

2.42. Markets for livestock not sold through mobile auctions (cross reference to Q 2.35 and try to include numbers of animals sold via each route)?

Source of sales	Cattle	Sheep	Goats
Informal sales within community			
Local abattoir			
Speculator			
Commercial farmer			
Other			

2.43 With reference to the most frequently used sales route identified in 2.42, determine why this is preferred:

Reason	Tick which applies	Rank by importance
Readily available local market		
Realise best prices		
Understand this market best		
Other		

2.44. What are the main constraints you experience to livestock production?

Constraint	Tick which apply	Importance (rank top 3)
Wattle invasion		
Insufficient amount of forage		
Lack of forage quality		
Lack of grazing management		
Theft of livestock		
Disease and parasites		
Lack of livestock water points		
Drought		
Lack of sales opportunities		
Lack of labour		
Other		

3. <u>Use of arable land/home gardens?</u>

3.1. Do you have access to arable land? (Y/N)

If N, then move straight to Qs about home gardens.

3.2. If Y, then, if possible, determine approximate size of plot (acres or hectares):

3.3. Is the perimeter of the arable land allocation where your plot is locate fenced? (Y/N)

3.4. Is your individual plot fenced? (Y/N)

3.5. How frequently do you make use of your arable land (tick relevant response)?

Every year	Every two years	Every 3-5 years	>than 5 years	No longer crop

3.6. If cultivation occurred within past 5 years, quantify what was grown on last occasion, amount and any income realised from sales (if sharecropping quantify amount that went to respondent only):

Crop	Amount (bags*)	Home consumption (bags)	Sales (bags) and value (ZAR)
Maize			
Pulses (peas/beans)			
Vegetables (e.g. pumpkins, potatoes)			
Fruit (e.g. watermelons)			
Animal feed crop (e.g. Lucerne)			
Other:			

*Assuming that one bag = approx. 50kgs

3.7. What are the constraints/disincentives you face in engaging in crop production on arable land (ask to all respondents who have arable land)?

Constraint	Tick if applicable	Rank importance (top 3)
Lack of money to pay for inputs		
Lack of equipment to plough, sow etc		
Lack of production knowledge		
Lands are too far from homestead		
Crops are vulnerable to damage (e.g. from livestock)		
Crops are vulnerable to disease		
Lack of labour		
Drought/lack of water		
Other:		

3.8. Are crop residues utilised by livestock as fodder? (Y/N)

3.9. How are residues used?

Method of use	Tick which applies
Grazed on field by all community livestock	
Grazed on field by owner's livestock only	
Carried back to homestead for own livestock	
Other:	

3.10. Do you have a home garden? (Y/N)

3.11. If Y, then, if possible, determine approximate size of garden (acres or hectares):

3.12. Is your individual plot fenced? (Y/N)

3.13. How frequently do you make use of your home garden (tick relevant response)?

Every year	Every two years	Every 3-5 years	>than 5 years	No longer use

3.14. If cultivation occurred within past 5 years, quantify what was grown on last occasion, amount and any income realised from sales:

Crop	Amount (bags*)	Home consumption (bags)	Sales (bags) and value (ZAR)
Grain crop (e.g. maize)			
Pulses (peas/beans)			
Vegetables (e.g. pumpkins, potatoes)			
Fruit (e.g. watermelons)			
Feed crop (e.g. Lucerne)			
Other:			

*Assuming that one bag = approx. 50kgs

3.15. Do your livestock make use of crop residues from home garden? (Y/N)

4. Collection/Use of timber products

Timber for construction

4.1. Do you make use of timber from local rangeland (either collected in person or purchased within community) for construction (e.g. fences, corrals or houses)? (Y/N)

4.2. If Y, document the following:

Trees species used:

Species	Tick those used
Wattle	
Gum	
Indigenous tree species	

4.3. Document collection and sales and purchase of timber from local rangeland

	Used?	Frequency			
Source/use	Y/N	Weekly	Monthly	>Monthly	Value (ZAR)
Rangeland – for home use					NA
Rangeland - for sales					
Local purchase of timber					

4.4. If N, then determine why not.

Reason	Tick which apply
All timber purchases are from outside the community	
Other	

Fuelwood

4.5. Do you make use of fuelwood from local rangeland (either collected in person or purchased within community)? (Y/N)

4.6. If Y, document:

Trees species used:

Species	Tick those used
Wattle	
Gum	
Indigenous tree species	

4.7. Document collection and sales and purchase of fuelwood from local rangeland

	Used?	Frequency			
Source/use	Y/N	Weekly	Monthly	>monthly	Value (ZAR)
Rangeland – for home use					NA
Rangeland – for sales					
Local purchase					

4.8. If N, then determine why not.

Reason	Tick which apply
Don't use wood as a fuel in household	
Only purchase fuelwood externally	
Other	

Charcoal

4.9. Do you use charcoal? (Y/N)

4.10. Source of charcoal?

Use/source of charcoal	Y/N	Amount	Value (ZAR)
Make for home use			
Make for sale			
Purchase for home use			

4.11. If respondent makes charcoal, how are they engaging in making charcoal?

Make independently	
Make as part of a collective (name of collective)	

4.12. What species are used to make charcoal?

Species	Y/N

Wattle	
Other (specify)	

5. Collection and use of non-timber rangeland products

5.1. Do you collect locally any of the following?:

		Frequency of collection (tick)			Use/source (tick)		
Product	Y/N	Weekly	Monthly	>Monthly	Home use	Sales	Purchase
Thatching grass							
Medicinal herbs							
Wild foods							
Soil/aggregate (for building)							
Dung							
Other:							

5.2. If NO answered to any of the above, establish why (tick applicable):

Reason	Thatch grass	Herbs	Wild foods	Dung
Don't use it				
Not available locally				
Easier to buy				
Other:				

6. Manufacture of rangeland-based items

Do you make and use/sell any of the following items:

Product	Y/N	Home use?	Sales (ZAR)
Bricks			
Furniture			
Brushes/brooms			
Fence poles (see above)*			
Others:			

*Do not count twice if already included under timber products (Q4.3)

7. Water provision for household

7.1. Where does household water come from?

Source	Y/N	Importance (rank 1-3)
Natural springs		
River/stream		
Pond/lake		
Standpipe		
Rainwater storage at home		
Other:		

7.2. Do you have any problems/constraints with these water sources? (Y/N)

7.3. If, yes identify what a

Problem	Y/N	Importance (rank 1-3)
Intermittent supply		
Long way to travel		
Lack of accessibility		
Contamination/poor quality		
Other:		

8. Cultural values of rangeland/forests

What are the cultural importance of rangelands/forests for local people?

Use	Y/N	Importance (rank)
Spiritual engagement with sacred places		
Initiation ceremonies		
Feeling generally connected with nature		
Other		

9. Overall importance of different rangeland uses

9.1. At end rank most important uses of rangeland for local people

Use	Rank all applicable
Livestock production	
Crop production	
Provision of fuel/timber	
Provision of non-timber products	
Water provision	
Cultural values	
Other	

9.2. What are the biggest overall threats/constraints to your use of rangeland for the purposes you identified?:

Threat/constraint	Y/N	Rank all applicable
Personal safety		
Wattle invasion		
Overharvesting of resources		
Insecure rights of access		
No clear rules for resource use		
Inadequate enforcement of rules of use		
Other:		

10. Relative importance of rangeland in overall household livelihood strategy

What are the most important income or production streams in your overall household livelihood?

Livelihood strategy	Rank importance (all applicable)
External income (salary, pension, grant, remittances etc)	
Local business (e.g. shop or brick manufacture)	
Livestock production	
Crop production (including from home gardens)	

Collection and use/sale of rangeland products	
Other:	

Participant No.

Appendix 4: Informed Consent Form

INFORMED CONSENT FORM:

Evaluating the effectiveness of rangeland resting initiatives in communal rangelands in South Africa

You are being invited to take part in this research to understand the needs of both local people and the environment in the management of communal rangelands in South Africa.

Before you decide to take part, please **read the accompanying Participant Information Sheet, or we will read it together.**

Please do not hesitate to ask questions if anything is unclear or if you would like more information about any aspect of this research. It is important that you feel able to take the necessary time to decide whether or not you wish to take part. You can ask questions at any time.

If you are happy to participate, please confirm your consent by circling YES against each of the below statements and then signing and dating the form as participant. If you do not agree to some of the below statements, for example if you do not want your photo to be taken, you can of course circle NO.

1	**I confirm that I have read and understood the Participant Information Sheet for the above study and have had the opportunity to ask questions**	**YES**	**NO**
2	**I understand my participation is voluntary and that I am free to withdraw myself and my data, without giving a reason, by contacting the lead researcher Rhian Williams and the Research Support Office at any time until the date specified in the Participant Information Sheet**	**YES**	**NO**
3	**I have noted down my participant number (top left of this Consent Form) which may be required by the lead researcher if I wish to withdraw from the study**	**YES**	**NO**
4	**I understand that all the information I provide will be held securely and treated confidentially**	**YES**	**NO**
5	**I am happy for the information I provide to be used (anonymously) in academic papers and other formal research outputs**	**YES**	**NO**
6	**I am happy for the interview and focus group discussions to be audio recorded**	**YES**	**NO**
7	**I am happy for my photograph to be taken and to be used in reports and presentations related to the project.**	**YES**	**NO**
7	**I agree to take part in the above study**	**YES**	**NO**

Thank you for your participation in this study. Your help is very much appreciated.

Participant's Name	Date	Signature
Researcher	**Date**	**Signature**