

**THE IMPACT OF CONSTITUENCY BUILDING ON
DEVELOPMENT AND CONSERVATION SENTIMENT IN THE
KRUGER TO CANYONS BIOSPHERE**

A Dissertation

by

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ABSTRACT

Protected conservation areas are increasingly threatened as the need for land and resources grows. South Africa has a storied past of wildlife conservation and its protected areas continue to be popular nature tourism destinations. However, legacies of colonization and apartheid policies remain. There is an imbalance in power, resource ownership, and protected area access between white and black South Africans, particularly within private nature reserves (PNRs). The history of conflict in these areas is exacerbated by the militarized response to rhino poaching over the last decade. To help ameliorate this conflict, communities surrounding nature reserves should receive benefits from conservation to partially address environmental injustices. Still, PNR capacity to sufficiently and appropriately address benefit needs is a challenge. Stakeholders need to better understand how to effectively share benefits with appropriate consideration of both community and conservation groups.

This dissertation addresses this need by exploring conflict and benefit sharing between PNRs and nearby communities in the Kruger to Canyons (K2C) Biosphere, South Africa. We present a review of: 1) relevant literature and the dissertation work; 2) PNR stakeholders' motivations and deterrents to engage in benefit sharing; 3) how benefit sharing influences community members' perceptions of development outcomes, conservation sentiment, and conflict with reserves; and 4) recommendations on the most effective benefit sharing strategy design and administration. To achieve this, two complementary surveys were administered to stakeholders from five PNRs and three

communities in the K2C. Simple descriptive analyses were used to determine community and PNR stakeholder perceptions, and associations between stakeholder groups were explored to determine similarities and differences.

After income through employment, a benefit sharing strategy that provides diffuse benefits and has a limited focus was found to be most effective to promote development satisfaction and positive perceptions of the reserve within communities. To support this strategy, PNRs should work to centralize the administration of benefit sharing within and across reserves. Centralization will allow for improved access to resources, and the coordination of benefit programs to maximize efficiency and impact. New and strengthened collaboration networks developed in the response to rhino poaching can be leveraged to improve benefit sharing administration.

This work is dedicated to my Dad, who taught me to keep my balance,
and my Paul, who taught me to “be cool.”

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NOMENCLATURE

APNR	Association of Private Nature Reserves
GLTP	Great Limpopo Transfrontier Park
K2C	Kruger to Canyons Biosphere Reserve
KNP	Kruger National Park
NGO	Non-governmental Organization
PNR	Private Nature Reserve
SANDF	South African National Defense Force
SANParks	South African National Parks
SAPS	South African Police Service
SES	Social Ecological Systems
SSPT	Sabi Sand Pfunanani Trust
TFCA	Transfrontier Conservation Areas

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CHAPTER I

INTRODUCTION AND LITERATURE REVIEW

INTRODUCTION

Protected areas managed for conservation are increasingly seen as residual islands within progressively developed landscapes consisting of agricultural, industrial, mining, and urban developments. As encroachment of development on protected areas is growing, so too is the urgency to protect their future integrity. Since protected areas are incorporated in larger social-ecological systems, it is fundamentally important to consider not only their biophysical aspects, but also the human dimensions that influence their existence and management. The Kruger to Canyons Biosphere (K2C) in South Africa is one such area that aims to consider both biophysical conservation and human well-being. This dissertation examines how members of communities and private nature reserve (PNR) stakeholders perceive benefit sharing strategies, conflict, and conservation activities within the K2C.

A lack of community engagement in, and benefit from, protected areas is inherently concerning and is additionally problematic for protected areas. This is because one of the greatest determinants of the continued integrity of protected areas, especially PNRs, is support from the surrounding communities (Anthony, 2007; Kreuter et al., 2010). Elevated pressures on the natural resources within protected areas has led to an increased focus on security, which causes a hardening of borders between communities and protected areas. As such, protected area stakeholders need to devote a growing proportion of human and

financial resources to wildlife protection. Protected area stakeholders also feel increasingly threatened by surrounding communities, whereas community members often feel they are unfairly blamed for the poaching activities. Increased security efforts cause communities to experience real and perceived restricted access to resources and other benefits provided by protected areas, including livelihood opportunities. Furthermore, there is some evidence that the hardened-border approach to wildlife protection has deteriorated community members' perceptions of protected areas and could amplify tensions and wildlife poaching pressure (Duffy et al., 2015; Hübschle, 2016).

These undesirable outcomes may be best addressed by benefit sharing programs that engage communities, increase involvement, and share the benefits from PNRs and nature tourism. Effective benefit sharing strategies can contribute to achieving community development goals and encouraging a conservation constituency in the region (Anthony, 2007; Balint, 2006; King, 2007; Swemmer et al., 2014). In this way, benefit sharing can partially remedy the costs incurred by local communities from the formation and continued existence of the protected areas. However, protected area stakeholders are often unsure how to most effectively aid local communities. These stakeholders often hesitate to initiate programs, given limited human and financial resources and increased investment in security measures. Likewise, there is a need to understand community members' expectations from protected spaces, as well as their development priorities and how various benefit sharing programs are perceived within the communities. Understanding these dynamics is critical in fostering constituency building, which decreases tension and conflict and supports both conservation and development goals.

The K2C is a region that exemplifies the tension and conflict between protected area and community stakeholder groups. This region has been designated by the UNESCO Man and the Biosphere Programme as an area of both high conservation and development importance. It consists of a mosaic of human settlements, various land use areas, and protected areas collectively establish the necessity for strong community support for protected area management strategies and effective protected area support of community rights and development. The K2C covers approximately 2.5 million hectares and incorporates the central portion of the Kruger National Park (KNP), the Blyde River Canyon Nature Reserve, privately owned protected areas, mining operations, agriculture operations, and over 1.5 million people who mostly live in rapidly urbanizing areas (K2C, n.d.).

The population in the K2C consists predominantly of black South Africans living in poor-rural conditions with limited options for employment and few resources for development (Blalock, 2014; Ramutsindela, 2015). Because of the historical and current inequalities, as well as differing stakeholder priorities for development and conservation, the social climate in the K2C is fraught with tension. Under the apartheid policies of the former nationalist government, black South Africans endured a long history of exclusion and forced relocations throughout the country, even in the establishment of protected areas such as the KNP and other protected areas in the K2C (Baldwin, 1975; Ramutsindela, 2003; Savage, 1986; Venter et al., 2008). Additionally, historical socio-economic inequalities have persisted in part because of lack of access to benefits generated by

protected areas and the associated tourism sector, which perpetuates environmental justice concerns for local black South Africans (Blalock, 2014; Venter et al., 2008).

Environmental justice includes equal access to tangible benefits from natural resources and also intangible elements of participation, cultural recognition, and the capacity of communities and individuals to succeed in their society (Schlosberg, 2013). A lack of community engagement in, and benefits from, protected areas is fundamentally concerning, and is additionally problematic for protected areas. This is because one of the greatest determinants of the continued integrity of PNRs and other protected areas is support from the surrounding communities (Anthony, 2007; Kreuter et al., 2010).

Recently, elevated rhinoceros poaching has amplified tension in the social climate of the K2C and led to a hardening of borders between communities and protected areas that are trying to protect rhinos. The KNP and the K2C region have long been major international tourist destinations and a hallmark of protected spaces on the continent. However, without the support of surrounding populations, the integrity of biodiversity conservation in the area can quickly be diminished. It is therefore necessary to understand how PNR stakeholders can most effectively aid local communities, in the context of limited resources and poaching threats. Likewise, there is a need to understand community members' expectations from protected spaces and their development priorities, as well as how various benefit sharing programs are perceived within the communities. Understanding these dynamics is critical in fostering constituency building, decreasing conflict, and supporting both development and conservation goals. There is often a gap between concept and reality in the Biosphere Reserve Program's aim to increase people's ability to

sustainably manage natural resources, particularly because of the increasing pressure on protected areas due to an unsustainable development footprint (Coetzer et al., 2014). The hardening of borders between protected and developed areas underscores the importance of examining community and PNR stakeholders' perceptions of benefit sharing to aid in the management of the K2C and other areas of both conservation and development importance.

This research explores perceptions within both key stakeholder groups and can offer insight and guidance on how to best contribute to development of and garner support for conservation activities within very real limitations. Specifically, this dissertation investigates 1) the motivations and deterrents for stakeholders of private protected spaces within the K2C to initiate and engage in benefit sharing programs, 2) the communities' perceptions of various programs, and 3) recommendations for beneficiation strategies that are most effective at positively influencing community members' perceptions and reducing conflict between them and the private reserves.

Examining community and PNR stakeholders' perceptions of benefit sharing and conservation activities will aid in the management of the K2C and other areas of both conservation and development importance. There is often a gap between concept and reality in the Biosphere Reserve Program's aim to increase people's ability to sustainably manage natural resources, particularly because of the increasing pressure on protected areas due to an unsustainable development footprint (Coetzer et al., 2014). This research explores perceptions within both key stakeholder groups and can offer insight and

guidance on how to best contribute to development and garner support for conservation activities within very real limitations.

LITERATURE REVIEW

Disenfranchisement and Conflict

Worldwide, protected areas are frequently points of contention for surrounding populations. Many areas of greatest conservation concern coincide with community areas with pressing development needs, placing greater pressure on the resources within protected spaces (CBD, 2010; Mittermeier et al., 2011; Roe et al., 2015; Turner et al., 2012). Furthermore, the very creation of many protected areas saw the expulsion of human populations (Brockington & Igoe, 2006). Differing land use values, conservation-over-development priorities, unequal access to natural resources and the tourism economy, and unbalanced power dynamics between stakeholder groups all contribute to a social environment surrounding protected spaces that is frequently rife with conflict (McShane et al., 2011; Pullin et al., 2013). These challenges are all present within the K2C study areas, and lessons learned within this research are applicable to sites elsewhere.

Because of the history of exclusion and expulsion of black South Africans, racial inequity and lack of access to protected spaces, their benefits, and their resources has continued. Identity pass laws in various forms existed in South Africa since the late 1700's, while policies of apartheid and the institutional framework for "Separate Development" were enacted and strongly enforced after the National Party came to power in 1948 (Baldwin, 1975; Savage, 1986). The primary effect of this policy position was the increased rate of

migration of black South Africans to urban areas following the expansion and modernization of privately (generally white) owned farms in rural areas and growing poverty in black rural settlements (Baldwin, 1975; Lipton, 1972; Savage, 1986). The aims of Separate Development were to firstly separate the races (especially white and black) throughout the country and in urban areas particularly, and secondly to fully remove the segments of the black populations from urban areas that were “superfluous” to the white economy (Baldwin, 1975; Savage, 1986).

Separate Development policies and removal of segments of black populations precipitated the development of Bantustans or “homelands.” The intention was to create independent territories, each with a homogenous racial and ethnic population and sovereignty over economic development, cultural preservation, provision of social services, and taxation (Lipton, 1972). Black South Africans were forced to relocate en masse to reside in the Bantustans. Only those who were employed could reside in urban areas, and those who could commute to places of employment or were unemployed stayed in the Bantustans. This policy legalized and entrenched an exploitative circular migrant labor system by restricting access of black South Africans to white areas and the white economy, and consolidating about 53% of the black population in about 13% of the country’s surface area (Baldwin, 1975; Lipton, 1972; Savage, 1986).

The high population density of black South Africans in Bantustans further eroded the potential for traditional agriculture based livelihoods and exacerbated the pressure on natural resources in rural areas. This is a problem that persists in settlements within former

Bantustans, such as those in the K2C region (Lipton, 1972; Maylam, 1990). Rural communities in the K2C are greatly dependent on access to and use of natural resources as a buffer against poverty by supplementing or replacing utilities, tools, food, or other resources that would otherwise be purchased (Giannecchini et al., 2007; Twine et al., 2003). Continued reduction of the capacity of rural settlements to provide these natural resources and lack of access to privatized natural resource areas is problematic for sustaining residents' livelihoods and well-being.

The lingering livelihood and well-being effects of the racially-based spatial inequalities imposed by apartheid continue to have a marked impact on the black population in the K2C (Blalock, 2014; Ramutsindela, 2015). Unequal access to employment continues to be a primary determinant of economic inequality in the country, and black South Africans continue to be the most burdened by unemployment (Blalock, 2014; Stats SA, 2014). With the history of expulsion from rural areas to make way for privately owned white farmland and lingering racially-based economic disparity, PNRs in South Africa are often at the nexus of conflict between advocates for biodiversity conservation and advocates for social justice and economic development (Langholz & Lassoie, 2001). After the African National Congress was voted into national leadership in 1994, land redistribution schemes were enacted by the government of South Africa to make reparations to black South Africans affected by homeland policy redistributions. In response to this and the increased viability of conservation as a land-use option, many white South Africans declared their land to be conservation areas to avoid reclamation of their properties (Langholz & Lassoie, 2001).

While legitimate cases may be made that these privately owned lands are important conservation areas, the continued ownership of large acreages of land owned by relatively few—often white South Africans and foreigners—limits access to these natural resources for the local rural poor and perpetuates apartheid legacies (Langholz & Krug, 2004). Access to these spaces through tourism is restricted by the limited financial means of the majority of the local black population. Based on legitimate ecological and wildlife security concerns, PNR stakeholders are unwilling to allow local communities to use natural resources within the private protected areas.

Compounding the issues from lack of access to PNRs is that community members frequently have high expectations of receiving benefits from them. Private reserves are broadly perceived to represent great wealth and community members often expect the reserves and lodges within them to provide employment, infrastructure development, and other benefits stemming from the nature tourism economy. However, these expectations are often not being met (Anthony, 2007; Mehta & Kellert, 1998; Metcalfe, 2003; Sirakaya et al., 2002; West et al., 2006). Lack of access to conservation spaces and industries coupled with unmet benefit expectations leads to disenfranchisement of local community members and often their disillusionment with the conservation sector.

Strong arguments can be made for a transformative devolution of conservation spaces and industries to fully address historical injustices and allow for complete enfranchisement of communities. However, even within the current land ownership structure and socioeconomic setting, efforts can and should be made to improve development initiatives, environmental justice, and conservation constituency building. Unmet benefit expectations

and potential disillusionment with the conservation sector undermines the primary goal of the K2C to integrate development and conservation objectives within the region (K2C, n.d.). Ideally, development goals can be at least partially realized through benefit sharing programs. And thus, the integrity of the conservation areas could be secured. To mitigate tension surrounding benefit expectations and encourage community support, it is crucial for the PNRs to develop meaningful connections to local communities through benefit sharing strategies that are desired by communities and amenable to PNR stakeholders.

Rhinoceros Poaching

Conflicting priorities as well as historical and current economic inequalities resulting from racially based exclusion provide fertile ground for conflict, and these factors are all exacerbated by the rise of rhino poaching in the region. Rhino poaching has particularly threatened the KNP and PNRs in the north east of South Africa during the past eight years. South Africa contains 1,893 of Africa's remaining 5,250 black rhinos (*Diceros bicornis*) and 18,413 of Africa's remaining 20,378 white rhinos (*Ceratotherium simum*), constituting 79% of the world's remaining black and white rhino populations (Emslie et al., 2016). About one quarter of South Africa's rhinos are found on private land, which is equivalent to the combined rhino population of the rest of Africa (Duffy, 2014). Due to the high proportion of remaining rhino populations in South Africa, it has borne the brunt of recent rhino poaching pressure; 89.6% of reported rhino poaching incidents between 2013 and 2015 have occurred in South Africa predominantly in the Greater Kruger area (Annecke & Masubelele, 2016; Emslie et al., 2016). Data from South African Department of

Environmental Affairs (DEA) report that poaching numbers rose from 13 in 2007 to a high of 1,215 in 2014, but have since slightly declined (DEA, 2018).

Reduced poaching has been credited to the Integrated Strategic Management of Rhinoceros plan implemented by the DEA (DEA, 2016). Key pillars of this strategy include compulsory interventions, managing rhino populations, and long-term sustainability interventions (DEA, 2016; PPF, 2014). Sustainability interventions are intended to make the wildlife economy more inclusive for communities bordering protected areas and PNRs, which experience poacher recruitment by crime syndicates (PPF, 2014). Objectives of the Strategy include capacity building within communities and developing small businesses to foster alternative economic options for communities (DEA, 2016; PPF, 2014). However, the precipitous rise in rhino poaching and threat to the species' survival has resulted in a strong militarized response to protect wildlife assets. These "green militarization" tactics are being employed in imperiled conservation areas across the world (Duffy, 2014; Lunstrum, 2014).

Green Militarization

The rise in green militarization tactics and, more broadly, the resurgence in protectionist conservation strategies, exacerbates existing tensions surrounding protected spaces (Annecke & Masubelele, 2016; Benjaminsen & Svarstad, 2010; Duffy et al., 2015; Lunstrum, 2014). Green militarization is the use of military and paramilitary actors, techniques, technologies, and discourse in the pursuit of conservation (Annecke & Masubelele, 2016; Duffy, 2014; Lunstrum, 2014). Activities include border patrols, covert

intelligence operations, and tracking of poachers. The individuals and organizations carrying out many of these activities are often heavily armed and aided by use of tracking dogs, electric fences, cameras, drones, and helicopters. In South Africa, these organizations include South African National Parks (SANParks), South African National Defense Force (SANDF), South African Police Service (SAPS), and private anti-poaching units that are trained in military field and intelligence techniques. Funded by governments, non-governmental organizations (NGOs), and wealthy individuals (Annecke & Masubelele, 2016), this emphasis on militarized anti-poaching techniques and technologies is showing some promise, as demonstrated by the slight decrease in number of poaching incidents since 2015 that suggest rhino population stabilization (DEA, 2018; Emslie et al., 2016).

A militarized response to the precipitous rise of rhino poaching in the Greater Kruger is understandable and is now showing moderate success in curbing rhino deaths, but these short-term gains need to be weighed against longer-term costs and consequences. Studies of the effects of green militarization have identified negative outcomes that in many ways are exacerbating historically rooted conflict (Annecke & Masubelele, 2016; Duffy et al., 2015; Lunstrum, 2014). For example, some analyses illuminate second-order effects and unintended consequences, such as human rights violations, erosion of trust, and intimidation (Annecke & Masubelele, 2016; Duffy et al., 2015). In this way, increased militarization has further hardened borders between protected areas and adjacent communities.

These second-order effects between PNR and community stakeholders inhibit or preclude community engagement in, and often support for, conservation initiatives. Community disenfranchisement perpetuates conflict in the region, which necessitates investigation into successful constituency building techniques to ameliorate this tension and ensure the continuation of conservation activity in the area. In addition to negative social consequences, the high cost of these security operations is financially unsustainable (Anneck & Masubelele, 2016; Duffy et al., 2015; Hübschle, 2016; Neumann, 2004). Thus, there is a great need to explore and understand alternative approaches to social sustainability for conservation management in the region.

Conservation Constituency

Constituency building between stakeholder groups in the K2C is important to mitigate conflict and work toward goals of both conservation and development in a way that is socially sustainable. One of the greatest determinants of the continued integrity of PNRs and other protected areas is support from the surrounding communities (Anthony, 2007; Kreuter et al., 2010). This support can be fostered through various schemes for benefit sharing, economic development, and involvement in management (Anthony, 2007; Balint, 2006; King, 2007; Swemmer et al., 2014). Sharing the benefits—both tangible and intangible—from conservation and the nature tourism economy may best address development goals and in turn, ensure the continued support for, and integrity of, conservation endeavors. Involving communities in the development and implementation of benefit sharing efforts is needed to incorporate information on their expectations from

protected spaces, as well as their development priorities and how the various benefit sharing programs and strategies are perceived within the communities.

Managers of protected areas in the region are aware of their position to meet both conservation and development goals. The mission of South African National Parks (SANParks) is to manage and promote national parks for the just and equitable benefit of current and future generations (SANParks, 2017a). As such, SANParks has an obligation to ensure benefits of biodiversity conservation are accessible to broader society, often through social investment and development interventions (Swemmer & Taljaard, 2011). PNR stakeholders should similarly acknowledge this obligation as a vital component to the integrity of their biodiversity conservation actions. Moreover, they operate with different human resources and financial structures than state parks, which may provide PNRs with additional opportunities to engage in effective and beneficial partnership programs (Langholz & Kerley, 2006; Langholz & Lassoie, 2001; Spenceley & Goodwin, 2007).

As protected areas within the Greater Kruger have transitioned to landscape-scale management of their ecological resources (Biggs et al., 2014; Swemmer et al., 2014; Swemmer & Taljaard, 2011), they must also investigate their capacity for improving social support and community development in the K2C. PNR landowners may be unsure how to effectively aid local communities and hesitate to allow access for community members to the reserve, particularly in light of increased poaching pressure in the region. However, for the sake of long term integrity of their reserves, they are motivated to analyze the

effectiveness of benefit sharing programs on economic development and fostering a regional conservation constituency (Hutton, Adams, & Murombedzi, 2005).

STUDY AREA

National and International Protected Areas Associated with the K2C

The study area for this dissertation work is within the K2C Biosphere (Figure 1.1), which contains private and provincial protected areas, and also includes portions of a larger national park and an international Transfrontier Park. The western portion of the K2C Biosphere incorporates the Blyde River Canyon Nature Reserve, which includes one of the largest canyons in the world and sections of the Ohrigstad and Blyde Rivers (K2C, n.d.). To the east, the K2C Biosphere overlaps the central portion of South Africa's flagship park, the KNP. This is a 1,963,300 ha (19,633 km²; 7,580 mi²) world-renowned national park in the northeast of South Africa that borders Zimbabwe to the north and Mozambique to the east (SANParks, 2017b). The park was first declared in 1898 by the president of the Transvaal Republic, Paul Kruger (South African National Parks, 2017c). It consisted of an area of restricted hunting between the Sabi and Crocodile Rivers and was called the Sabi Game Reserve (SANParks, 2017c). The Sabi Game Reserve merged with the Shingwedzi Game Reserve in 1926 with the proclamation of the National Parks Act, Act No. 56 to form KNP (SANParks, 2017c).

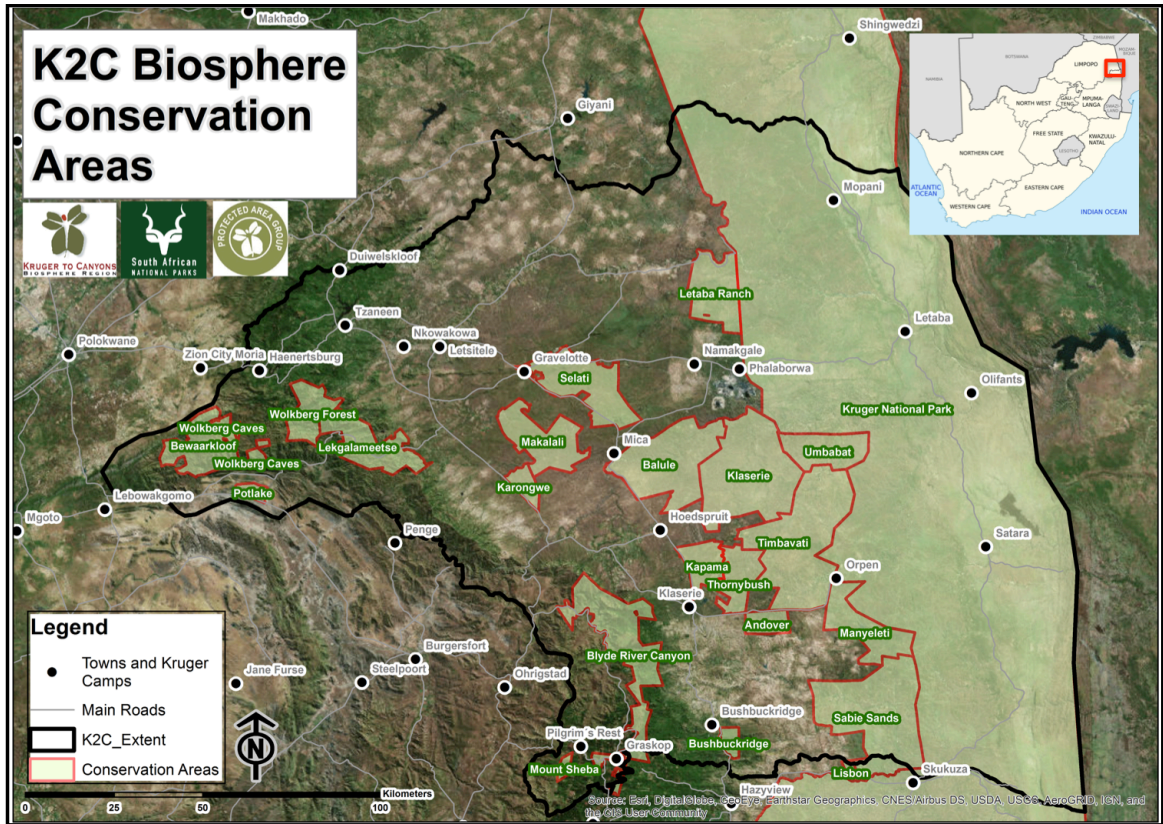


Figure 1.1: Location and extent of the Kruger to Canyons (K2C) Biosphere (adapted and used with permission from K2C Biosphere Region, 2017).

Throughout this formation and the early history of the KNP, indigenous people were removed from the protected area, and some public hostility toward the KNP and park management remains despite relatively recent attempts to improve relationships with local and historically dispossessed black South Africans (Venter et al., 2008). Somewhat in response to this antipathy, the Protected Areas Act of 2003 promoted social considerations for biodiversity conservation, particularly for local communities. Objectives of the Act include: “to promote sustainable utilization of protected areas for the benefit of people, in a manner that would preserve the ecological character of such areas” and “to promote participation of local communities in the management of protected areas, where appropriate” (RSA, 2004). This official policy position has supported and guided the KNP

in appropriate consideration of social pressures to provide natural resources and other benefits to local communities, and in the handling of land claims by indigenous people who were relocated during establishment of the park (Venter et al., 2008).

This time period also brought regional park expansion through removal of fences within the Great Limpopo Transfrontier Park (GLTP) (PPF, 2017; Spenceley, 2006; van Amerom & Büscher, 2005; Venter et al., 2008). The GLTP is a 3,757,200 ha (37,572 km²; 14,507 mi²) Peace Park incorporating a system of five national parks and protected corridors between them in South Africa, Zimbabwe, and Mozambique (Figure 1.2) (PPF, 2017). These three nations signed an international treaty to formally proclaim the GLTP in 2002 (GLTP, n.d.; PPF, 2017; *Treaty*, 2002).

environmental management procedures across international boundaries and striving to remove artificial barriers impeding the natural movement of wildlife” and “facilitate the establishment and maintenance of a sustainable sub-regional economic base through appropriate development frameworks, strategies and work plans” (*Treaty*, 2002).

Kruger to Canyons Biosphere

The GLTP objective of ecological conservation and economic development to be complimentary is echoed in the aims of the K2C Biosphere Region. However, as in the GLTP and the KNP, there are criticisms of the equitable and successful consideration and distribution of benefits to local black South Africans within this large outcome-ambitious conservation area (Coetzer et al., 2014; Dressler & Büscher, 2008; Duffy, 2006; Ferreira, 2004; van Amerom & Büscher, 2005). Biosphere reserves are regions designated by the UNESCO Man and the Biosphere Programme as internationally important ecosystems and protected areas that lie adjacent to human settlements, and are established to promote solutions to reconcile the conservation of biodiversity and its sustainable use (UNESCO, 1996). Globally there are 669 marine and terrestrial biosphere sites within 120 countries (MAB, 2007)

The K2C Biosphere Reserve was established in September 2001 in northeast South Africa (Figure 1.1), and is the third largest Biosphere in the world (MAB, 2007). K2C spans a total of 2,474,700 ha (24,747 km²; 9,555 mi²) and is named after the two main features in the western and eastern portions of the Biosphere—the Blyde River Canyon Nature Reserve and Kruger National Park. In between the Kruger and the Canyon is a patchwork

of conservation areas, mining operations, commercial agriculture, and over 1.5 million people mostly living in relatively high-density rural communities (MAB, 2007). The survey populations for this study include stakeholders of five private nature reserves and three communities within the K2C.

Private Nature Reserves within the K2C

Within the K2C, South Africa, and the GLTP, PNRs make an important contribution to conservation efforts. PNRs are composed of adjoining private properties ('farms') that dropped boundary fences, agreed to formal rules and management guidelines to increase the effective size of their individual protected area, and may have also combined other resources (e.g. finances, materials, or human) (Kreuter et al., 2010; Langholz & Krug, 2004). In South Africa, many of these properties were formerly used for agriculture and domestic livestock production. Conversion of land use to wildlife conservation and game ranching was predicated by legislative changes allowing private landowners to utilize and manage wildlife on their properties without government permits, economic changes of declining profitability of agriculture production, and growing interest in nature tourism in the area (Kreuter et al., 2010). In this way, conservation as a land use became viable for private landowners, and facilitated protecting South African natural resources without the government paying to acquire and manage these lands (Langholz & Krug, 2004).

As a result of the trend of land use conversion, about 14% of South Africa's land area is now private land supporting wildlife for some form of consumptive or non-consumptive use, while a smaller 6% has been declared as formal conservation area (Kreuter et al.,

2010). In addition to the ecological benefits of all forms of protected areas in South Africa, the tourism industry—of which ecological and cultural tourism are the major components—contributes substantially to South Africa’s economy. In 2009 the industry contributed about R189 billion (~8% of GDP) and its contribution is projected to increase to R499 billion by 2020 (DoT, 2011). The KNP and surrounding protected areas is a hub of the tourism industry in the country.

Adjacent to the western border of the KNP is a network of adjacent PNRs that have removed border fences that separated them and the KNP to form a contiguous protected area known as the Greater Kruger. These reserves include: Balule Private Nature Reserve, Klaserie Private Nature Reserve, Sabi Sand Wildtuin, Timbavati Private Nature and Game Reserve, and Umbabat Private Nature Reserve. Of these, the Balule, Klaserie, Timbavati, and Umbabat form the Association of Private Nature Reserves (APNR), and collectively total about 172,000 ha (1,720 km²; 664 mi²) of land dedicated to conservation and nature tourism. The Sabi Sand is south of the APNR cluster of reserves and separated from it by settlements and the Manyeleti Game Reserve, a provincial park. Stakeholders of the APNR reserves and Sabi Sand constituted the population for the survey of PNR stakeholders in the study (Figure 1.3).

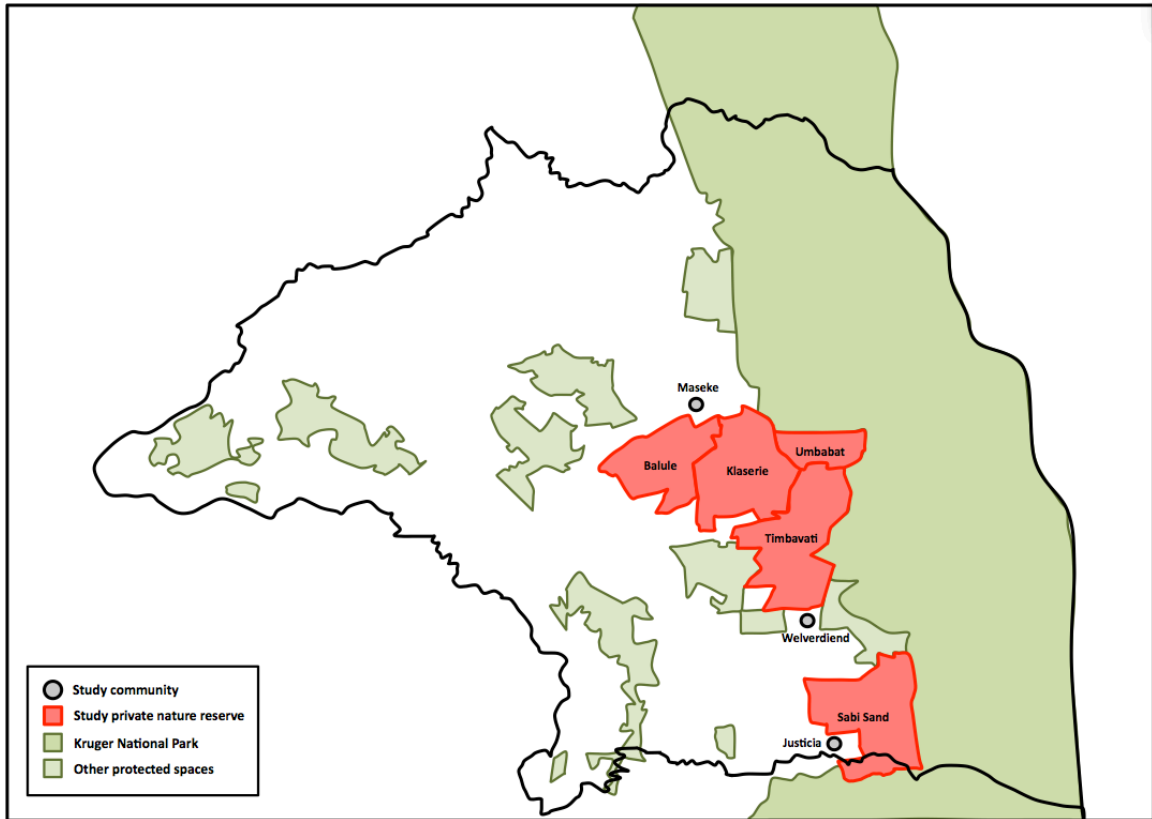


Figure 1.3: Locations of the five private reserves and three communities included in the study survey population. The PNRs are labeled and shaded in red and the communities are labeled.

Communities within the K2C

National, provincial, and private protected areas managed for conservation make up about half of the available land in the K2C Biosphere, and the remaining land consists of mining operations, commercial agriculture, forestry operations, and over 1.5 million people mostly living in relatively high-density rural communities (Coetzer et al., 2014; MAB, 2007). The K2C straddles the Limpopo and Mpumalanga provinces and includes portions of the BaPhalaborwa, Maruleng, and Bushbuckridge municipalities. Across the entirety of these three municipalities, the population is on average 96% black with an unemployment rate average of 43% and an average 15% of households report no income (Stats SA, 2011a; 2011b; 2011d). The options for local employment are minimal and largely limited to the

mining, agriculture, and tourism sectors and their supporting services (Coetzer et al., 2014; K2C, n.d.).

Communities included in the study population are Justicia and Welverdiend in Bushbuckridge municipality, and Maseke in Ba-Phalaborwa (Figure 1.4). Traditional settlements such as these typically have higher population densities and more extreme economic hardships. For example, the average population density of Welverdiend and Maseke is 904 people per square kilometer compared to an average of 36.5 people per square kilometer throughout all of Bushbuckridge and Ba-Phalaborwa municipalities (Stats SA, 2011e; 2011f; 2011a; 2011b). Unemployment data is not available from Statistics South Africa (statssa.gov.za), but an average of 19% of households in the two communities report no income at all—whether from employment or social grants (Stats SA, 2011e; 2011f). On average only 20% of the population over the age of 20 has completed high school and 25% have received no formal schooling (Stats SA, 2011e; 2011f). Census data were not available from Statistics South Africa for Justicia, but the findings for adjacent Lillydale are representative of Justicia and are similar to demographic data from Welverdiend and Maseke with regard to population density, household income, and schooling (Stats SA, 2011c). The boundaries of K2C cross the areas that are the former homeland regions of Lebowa, Gazankulu, and KaNgwane (Coetzer et al., 2014). These former homelands are now included in the municipalities of Bushbuckridge and Maruleng.

GOAL AND OBJECTIVES

Due to conflicting goals and interests among community members and PNR stakeholders, development of an integrated development-conservation strategy within the K2C necessitates a comprehensive analysis of the components of and relationships between 1) benefit sharing programs, 2) K2C stakeholder perceptions, and 3) conflict between PNRs and communities in the K2C Biosphere. The relationship between PNRs and communities can be improved through effective constituency building, which will impact both community members' perceptions of the reserve and natural resource security (Biggs et al., 2014). Lack of positive relationships with and benefits from PNRs through benefit sharing *programs* may negatively impact the *perceptions* of community members regarding development outcomes, the value of conservation, and wildlife protection methods. Negative community member perceptions may increase *conflict* between PNRs and communities, and potentially even elevate tolerance of and support for poaching (Anthony, 2007; Duffy, 2014). Increased conflict may in turn affect PNR stakeholder *perceptions* of their willingness and ability to invest in benefit sharing programs. Without effectively applying benefit sharing programs to address development needs, reduce conflict, and develop a conservation constituency in the K2C, the desired aim of militarized protection of natural resources (and ultimately the sustainability of PNRs) will be undermined (Balint, 2006; Duffy, 2014; Lunstrum, 2014).

It is hypothesized that the interaction of the four elements highlighted above—benefit sharing programs, community member perceptions, conflict, and PNR stakeholder perceptions—is circular (Figure 1.4). In this hypothesized circular interaction a change in

the availability and type of benefit sharing programs is associated with changes in perceptions held by community members regarding development and conservation. These changed perceptions are in turn associated with poaching and other conflicts. Conflict levels and poaching pressure influence PNR stakeholder willingness and ability to initiate benefit sharing programs, and thus, affect the availability of these programs.

Characteristics and measures of these four elements and their relationships may be very different for community members and PNR stakeholders. This disconnect between the two stakeholder groups may yield conflict and prevent effective delivery of benefits and fostering of a conservation constituency.

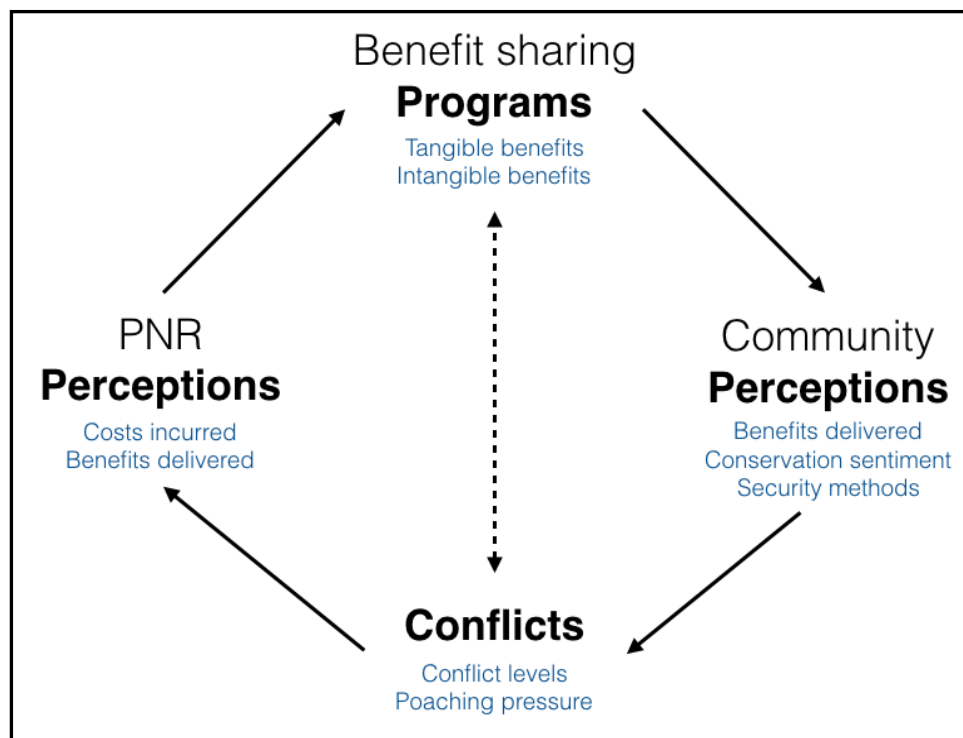


Figure 1.4: Conceptual diagram of the proposed circular relationship between benefit sharing programs, community member perceptions, conflict, and PNR stakeholder perceptions (PPPC). These elements and relationships between them are explored in this dissertation work.

Goal and Contribution

The key issue in this dissertation is the lack of knowledge regarding the characteristics of and relationships between PNR stakeholder perceptions, benefit sharing programs, community member perceptions, and conflicts (PPPC) (Figure 1.4). A better understanding of these four elements will support efforts to foster a conservation constituency that is based on more effective and equitable distribution of conservation and tourism-related benefits. Benefit sharing does not fully address historical injustices or completely remedy current disenfranchisement and environmental justice concerns. However, it is important to improve benefit sharing and constituency building efforts even within the current local land ownership and socioeconomic realities to advance development and justice in the region. The overarching purpose of this dissertation research is to provide PNR stakeholders and community members with information to reduce conflict and support constituency-building efforts through benefit sharing programs. Specifically, the study aims to provide PNR managers and beneficitation organizations with information to design benefit sharing strategies that enhance conservation constituency building and support development goals to protect the integrity of private conservation spaces. Equally importantly, the study also aims to provide communities with information that will support active participation in the benefit sharing and constituency building process.

The goal of this research is, therefore:

To understand the relationships between PNR stakeholder perceptions of conflicts and benefit sharing programs, benefit sharing programs, community member perceptions of development outcomes and conservation activities, and how these

programs and perceptions are affected by and affect poaching pressure and other conflict in the Kruger to Canyons Biosphere.

Objectives

To achieve the research goal, this dissertation research seeks to address three primary objectives:

O₁. Identify and describe private reserve stakeholder's motivations and deterrents to engage in benefit sharing programs.

O₂. Understand how benefit sharing programs influence perceptions regarding conservation efforts in the protected area, conflict, acceptability of poaching and anti-poaching initiatives, and development outcomes in communities adjacent to the private reserves.

O₃. Make recommendations for benefit sharing strategies that best decrease conflict, encourage a conservation constituency, and address development goals.

The first objective (O₁) is to determine the conditions and perceptions that motivate or deter PNR stakeholders to initiate and participate in benefit sharing programs. Reserves and lodges within PNRs often have more financial and human capacity to initiate and sponsor development programs than nearby communities. As such, there is a need to understand the factors that influence PNR stakeholders' decisions to engage in the establishment and ongoing support of benefit sharing programs. These factors may be tangible, such as financial resources and conflict levels, or intangible, such as perception of the efficacy of benefit sharing programs.

The second objective (O₂) investigates the impact of benefit sharing programs on adjacent community members' perceptions of conservation and security efforts in protected areas, poaching activities and anti-poaching initiatives, and development outcomes in their community. This study categorizes benefit sharing programs into tangible and intangible benefit programs. Tangible benefits include income through employment within or affiliation with the reserve (e.g. selling arts and crafts to tourists), acquiring natural resources from the reserve, and building infrastructure or facilitating water projects in the community. Intangible benefits include conservation education for children, job skills training or other education for adults, and tours in the reserve for community members. Benefit sharing programs may occur within the PNR (*in-reach*) or outside the reserve in the community (*out-reach*). For example, income may be earned through employment in one of the lodges in the PNR or through selling arts and crafts to reserve guests at an entrance to the reserve; similarly conservation education programs may occur either within PNRs or in the community.

The third objective (O₃) is to synthesize the findings from the preceding two objectives so recommendations can be made for benefit sharing strategies that best decrease conflict, encourage a broader conservation constituency, and address conservation and development goals. Beyond the poaching of rhinos and other species, other indicators of conflict between PNRs and communities include: reported complaints, fence breaches, illegal harvest of natural resources, demonstrations, theft of property of reserves or reserve guests, and arson or other willful damage of reserve property. It is important to consider real and

perceived motivators and deterrents for PNR stakeholders as well as perceptions of community members when designing a constituency building and beneficiation strategy. This is critical to ensure support of benefit sharing programs, constituency building, and decreased conflict between stakeholder groups within the K2C Biosphere.

This research addresses the need for consideration of community member perspectives in the design and evaluation of benefit sharing programs (Bennett, 2016; Spenceley, 2001; Spenceley & Seif, 2003). It explores and compares both quantitatively and qualitatively how community members perceive the outcomes of different approaches to benefit sharing. Findings reviewed here also help to address a lack of understanding on how to best motivate support for effective benefit sharing programs amongst conservation stakeholders (Kreuter et al., 2010; Pullin et al., 2013). This lack of understanding is particularly evident within privately owned conservation areas (Ramutsindela, 2015; Spenceley, 2001; Spenceley, 2003). The stakeholders within which may have very different goals, expectations, and capital for their properties than stakeholders within state owned conservation areas or environmental NGOs.

Findings from this study are not only applicable for PNRs and communities within the K2C region, but also more broadly. The tension and conflict between conservation and development focused stakeholder groups is not unique to this region (McShane et al., 2001; Pullin et al., 2013). Furthermore, growing criticisms underscore the need to improve the outcomes of “win-win” solutions in various settings (Benjaminsen & Svarstad, 2010; McShane et al., 2011; Ramutsindela, 2015; Turner et al., 2012). The findings and insights

provided in this research on community and protected area stakeholder perspectives surrounding benefit sharing programs can be applied to other areas and programs with both conservation and development goals. This will provide guidance on how to design a benefit sharing strategy that can be tailored to the region to improve development outcomes and support the sustainability of conservation work.

Methodology

To achieve each of the three objectives, both community and PNR stakeholder groups were surveyed between July 2015 and November 2016. Questionnaires for both surveys were semi-structured, with primarily yes/no and Likert-scaled question response options and also opportunities for open-ended responses.

The PNR stakeholder survey was preceded by a census interview conducted in-person or over the phone with reserve managers. This census interview functioned to introduce the study, receive permission to conduct the study, and also to gather more information on the areas of inquiry to develop the following PNR stakeholder survey. The comprehensive PNR survey was an online questionnaire electronically distributed via an emailed link to each of the PNR stakeholders. Areas of inquiry included: PNR communication and collaboration, conflict between the reserve and community, reserve security and wildlife asset protection, reserve participation in benefit sharing programs, and the perceptions of these programs.

The elements of the community member survey were similarly informed by responses from PNR stakeholders regarding existing benefit sharing programs. The survey was conducted via in-person interviews with the survey respondent, through the aid of an interpreter when needed. Areas of inquiry included: community and household participation in benefit sharing programs, perceptions of development opportunities related to the reserve, conflict between the reserve and community, and conservation sentiment.

THEORETICAL FRAMEWORK

Theoretical frameworks help organize the design, methods, and analysis of research. This dissertation is shaped by and contributes primarily to the theory of social capital. The theory of social capital encompasses the idea that there are economic and collective benefits that come from cooperation, which are facilitated by the lowered transaction costs of working together (Coleman, 1988; Pretty, 2003; Pretty & Smith, 2004). Enhanced trust and cooperation ensure that people have the confidence to invest in collective activities, and are less likely to engage in unrestrained private actions that maximize individual good at the expense of broader society (Pretty, 2003; Pretty & Smith, 2004). Unfettered private actions are often the cause of resource degradation in natural resource use systems. For this reason, bonds are important for equitable and sustainable use of natural resources (Wagner et al., 2007). Socio-economic achievements and quality of life are also heavily influenced by social capital, with disadvantaged groups limited by less access to social capital (Lin, 2000).

The theory of social capital holds that there are four aspects of social structure that function as resources for individuals within the social system that allow them to achieve their personal aims (Coleman, 1988; Pretty, 2003; Pretty & Smith, 2004). These aspects are: trust, reciprocity, rules, and connectedness (Pretty, 2003; Pretty & Smith, 2004). Trusting relationships between people reduce the transaction costs during interactions and, therefore, catalyze and facilitate cooperation. Reciprocity and exchanges fortify trust and enhance long-term obligations between people. Common rules, norms, and sanctions ensure that the interests of groups and individuals are complimentary. Lastly, connectedness in networks and groups include bonding, bridging, and linking social capital. Bonding social capital indicates links between similar people within groups at the local level, while bridging social capital represents horizontal linkages between such groups—often with more disparate views or aims—at the local level. Linking social capital is even wider in scope, and describes the capacity of local groups to link vertically with external groups or agencies with the aim of acquiring resources or affecting policy.

Collectively managing large SESs, such as those in the K2C, can be difficult as there are generally multiple stakeholder groups that are characterized by different resources, assets, and interests. To ensure equitable and sustainable use and management of the natural resources within large SESs, it is necessary to clearly understand the key elements of social capital that characterize these SESs. Establishing and engaging in benefit sharing programs could increase intra-group bonding social capital and inter-group bridging social capital for both PNRs and adjacent communities through shared involvement in one or more programs. By promoting better community relationships with PNRs, benefit sharing

programs and the connections they create can facilitate the flow of information, finances, or natural resources to the community and thereby foster linking social capital. These cross-group ties facilitate access to better resources and assets for disadvantaged community members (Lin, 2000). The research reported in this dissertation attempts to determine if these benefit sharing strategies are an appropriate form of social organization that suits conservation and development in the K2C, the impact of connectedness on social capital, and its broader impact on the efficient and equitable use of natural resources.

DISSERTATION ORGANIZATION

This dissertation is organized in four chapters. The first chapter includes an introduction, background, and literature review as well as description of the goals and objectives of the dissertation research and the theories that provide the framework for addressing them. The next three chapters address each of the stated objectives. The final section provides a summary of the objectives and goals addressed in the dissertation as well as concluding remarks.

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CHAPTER II
MOTIVATIONS AND DETERRENENTS FOR
PRIVATE RESERVE STAKEHOLDERS TO ENGAGE IN BENEFIT SHARING

INTRODUCTION

Protected conservation areas are increasingly threatened by encroachment from infrastructure and agricultural development and from a lack of support from surrounding communities (Hansen & DeFries, 2007). Historical and current disenfranchisement from access to the resources and benefits from protected areas, coupled with competing resource needs of growing human settlements, erode community support for conservation activities in those areas (Spenceley & Goodwin, 2007; West et al., 2006). For the long-term success of protected areas, it is vital to understand both the strategies to best garner support of communities for these spaces, and also how to motivate and support conservation management stakeholders to engage in these initiatives (Anthony, 2007; Bennett, 2003; Metcalfe, 2003). In other words, in order to motivate support for conservation management, it is necessary to understand how to best engage with surrounding communities in the delivery of conservation-related benefits. It is equally important to understand how conservation stakeholders can be motivated to support effective benefit sharing programs. There are significant knowledge gaps regarding both of these issues relating to effective conservation in private nature reserves (PNRs) in South Africa (Kreuter et al., 2010). This chapter provides insight into deterrents and motivations for protected area stakeholders to engage in various benefit sharing programs.

Many of the largest and longest established PNRs in South Africa occur in the Kruger to Canyons Biosphere (K2C). This Biosphere is located in northeast South Africa and consists of relatively dense human settlements surrounding protected conservation areas (Figure 2.1). The UNESCO Man and the Biosphere Program designated the area as a region of high conservation and development importance (MAB, 2007). The K2C covers nearly 2.5 million hectares and incorporates the central portion of the Kruger National Park (KNP) in the east and the Blyde River Canyon Nature Reserve in the west. In between the Kruger and the Canyon are private and provincial protected areas, mining and agricultural operations, and densely populated rural areas (villages and communal rangelands). Over 1.6 million people live in the K2C, mostly residing in large areas of communal land (K2C, n.d.; MAB, 2007). The residents are mainly black South Africans living in poor rural conditions, with employment options limited to those few regional industries and access to development opportunities similarly restricted (K2C, n.d.; Stats SA, 2011).

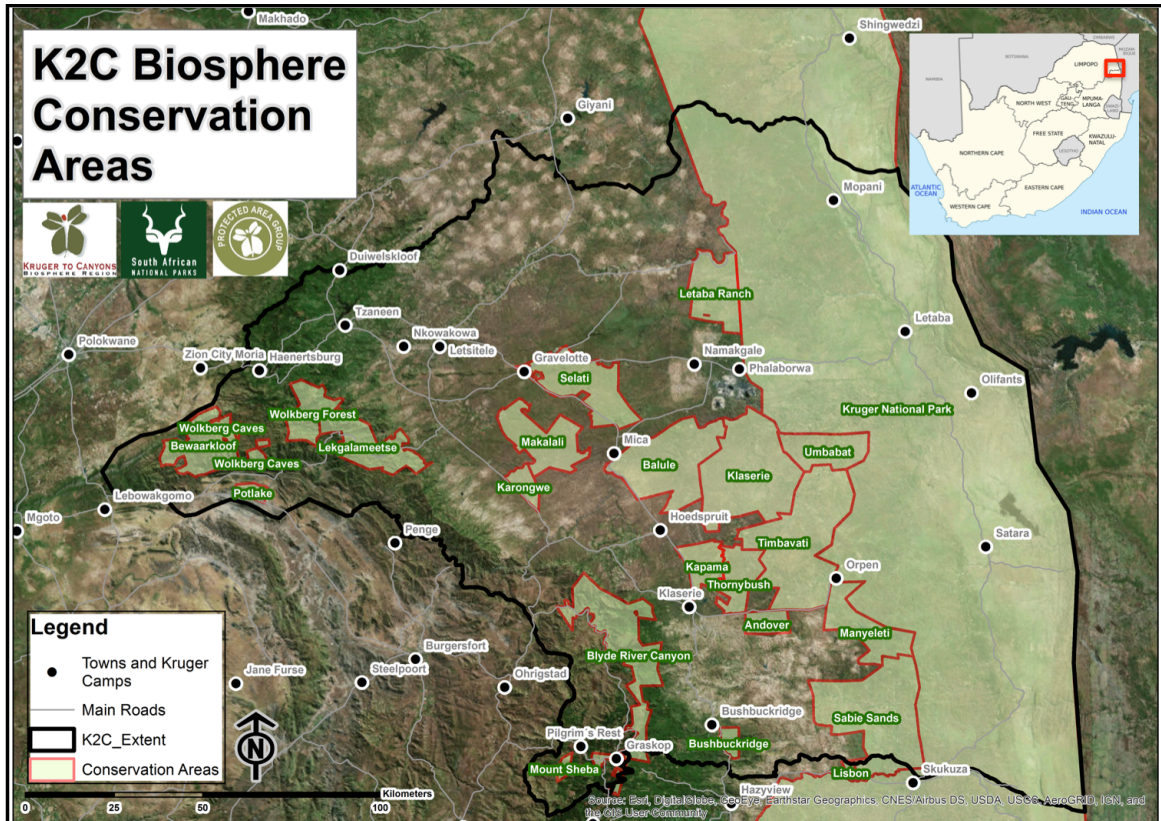


Figure 2.1: Location and extent of the Kruger to Canyons (K2C) Biosphere, within which are the five private reserves included in the study (adapted and used with permission from K2C Biosphere Region, 2017)

PNRs in the K2C and elsewhere in South Africa have less of an explicit obligation than national or provincial protected areas to provide benefits to local community members. However, they may have greater a capacity to support programs that benefit local communities and many have a long history of engagement (Langholz & Kerley, 2006; Spenceley & Goodwin, 2007). Notably, privately owned conservation areas make up 63% of the protected land in South Africa, a substantial portion of protected areas worldwide, and private lands are a major area of opportunity for future conservation areas (Langholz & Krug, 2004; Langholz & Lassoie, 2001; UNEP-WCMC, 2016). This emphasizes the importance of understanding how to best motivate and support private land stakeholders in successful conservation management and long-term natural resource protection.

Complicating this understanding is conflict among stakeholders in the K2C region because of differing priorities and historical race-based inequalities. Specifically, conflicts have occurred between communal areas residents, whose primary interest is infrastructure and economic development for a rapidly growing population, and private nature reserve stakeholders with conservation priorities (Kepe et al., 2005). An additional challenge to successfully engaging communal area residents in conservation is antipathy rooted in a long history of forced relocations and exclusion of black South Africans from regions throughout the country. These regions include national protected areas and private land that was later converted to PNRs (K2C, n.d.). In part because of a lack of access to benefits from protected areas and the associated tourism sector, historical socio-economic inequalities between wealthy landowners and disenfranchised black South Africans have persisted (Ramutsindela, 2015; van Amerom & Büscher, 2005). These inequalities contribute to the costs incurred and lack of environmental justice for communities from the formation and continued existence of protected areas. Environmental justice includes equal access to tangible benefits from natural resources and also intangible elements of participation, cultural recognition, and the capacity of communities and individuals to succeed in their society (Schlosberg, 2013).

Tensions resulting from historical dispossession, racist apartheid policies, and continued environmental injustices have recently been exacerbated by the rise in rhinoceros poaching. Poaching rates in South Africa increased from 14 rhinos in 2007, to 33 in 2010 and then jumped to a peak of 1,215 in 2014 (DEA, 2016). While rhino poaching has

leveled off since 2014 (1,054 were poached in 2016), the mortality rate may still be unsustainably high. Out of a total of roughly 20,000 black (*Diceros bicornis*) and white (*Ceratotherium simum*) rhinos in south Africa, about one quarter reside on private protected land (Duffy, 2014; Emslie et al., 2016), making PNR stakeholders critical actors in the conservation of this charismatic species.

In response to increased rhino poaching, protected area managers in South Africa have amplified protection in equal measure. Anti-poaching tools and methods include: armed guards, tracking dogs, drones, helicopters, electric fences, security cameras, lie-detection technologies, and well-developed intelligence operations (Duffy, 2014; Lunstrum, 2014). This increasingly militarized approach to protecting conservation areas exemplifies a broader trend of ‘fortress conservation’ in response to pressure from surrounding human settlements for access to resources within protected areas (Hutton et al., 2005; Hübschle, 2016; Kareiva & Marvier, 2012).

Recent analyses of militarized conservation indicate a perverse outcome of increased vulnerability of protected areas due to a lack of community support for conservation activities (Annecke & Masubelele, 2016; Duffy et al., 2015; Hübschle, 2016). As protected areas shift resources to militarized protection of biodiversity, local communities experience intensified disenfranchisement. This disenfranchisement comes in the form of decreased consumptive or non-consumptive access to the protected areas, reduced economic and social development benefits from tourism activities, blame for poaching activities, and more prominent visual reminders of disenfranchisement or ‘othering’ (e.g. through more

heavily fortified fence lines and properties) (Annecke & Masubelele, 2016; Duffy et al., 2015; Hübschle, 2016; Neumann, 2004). Disenfranchisement of and environmental injustices for local black South Africans is inherently worrisome, and is additionally problematic for protected areas because of lessened support for the continued existence of the areas.

A protectionist response has been an understandable stopgap solution to the sharp rise in rhino poaching, but its perverse outcomes cannot be ignored and alternative strategies need to be emphasized. Attention should now turn to responses that consider the long-term integrity of protected areas, rather than unsustainable responses to an acute problem. Protected areas need the support of neighbors to survive, and support can be developed through programs that distribute conservation benefits in the protected areas to nearby communities (Anthony, 2007; Balint, 2006; King, 2007; Swemmer et al., 2014). Using the definition from Swemmer et al. (2014, p. 4), benefit sharing is “the process of making informed and fair trade-offs between social, economic, and ecological costs and benefits within and between stakeholder groups, and between stakeholders and the natural environment, in a way that is satisfactory to most parties.” Costs and benefits may be tangible or intangible, and may be ecological, economic, social, cultural, or political in nature (Swemmer et al., 2014). Benefits include livelihoods, good relationships, or natural resource access, and all improve community well-being, while costs include program implementation costs, lost opportunity costs, loss of biodiversity or access to it, or animosity as a result of historical imbalances, loss of constituency, and disempowerment (Swemmer et al., 2014).

Changing relationships between private protected areas and adjacent communities from one of exclusionary protection to one of a conservation constituency through benefit sharing is crucial to fostering their support for conservation activities (Hutton et al., 2005). More information is needed to understand how benefit sharing programs are perceived by both stakeholder groups. Specifically, more needs to be known about PNR stakeholders' motivations and deterrents to engage in benefit sharing programs and the perceived effects of these programs. Addressing this need can provide information that could enhance PNR stakeholder adoption of effective benefit sharing strategies. Effective benefit sharing can partially offset the costs experienced by communities from the formation and continued existence of protected areas and lead to better relationships with neighboring communities. PNRs in the K2C are uniquely positioned to lead a shift in conservation strategy from exclusionary protection to conservation constituency because many of them have a history of community engagement and development projects. For the sake of their long-term integrity, PNRs need to shift to a more inclusive conservation model that improves benefits for surrounding communities to foster greater support for the conservation goals of the PNRs.

This paper reports findings from a survey of PNR stakeholders in the K2C. More specifically, the goal of the paper is to provide insight on trade-offs for PNR stakeholders from engagement in benefit sharing programs. To address this goal, a survey was conducted to determine PNR stakeholder perspectives about implementation and effects of benefit sharing initiatives. Findings from this survey covering reserve communication and

collaboration, reserve and community conflict, reserve security and wildlife asset protection, and reserve benefit sharing programs are reviewed for five PNRs in the K2C. Of particular interest are different approaches to benefit sharing among reserves, and how the rise in rhino poaching has affected the dynamics of benefit sharing strategies.

Theoretical Framework

Informing the design of this study is the theory of social capital. The theory of social capital posits there are collective economic and social benefits that come from cooperation among individuals (Coleman, 1988; Pretty, 2003; Pretty & Smith, 2004). Four aspects of social structure function as resources for individuals within the social system and allow them to achieve their personal aims through cooperation (Coleman, 1988; Pretty, 2003; Pretty & Smith, 2004). These are: trust, reciprocity, rules, and connectedness (Pretty, 2003; Pretty & Smith, 2004). Connectedness in social systems includes bonding, bridging, and linking social capital (Pretty, 2003; Pretty & Smith, 2004). Bonding social capital indicates links between similar people within groups at a local level, such as between stakeholders within the same reserve. Bridging social capital represents horizontal linkages between such groups, sometimes with more disparate views or aims, such as between stakeholders in different reserves. Linking social capital describes the capacity of local groups to link vertically with external groups or agencies with the aim of acquiring resources or affecting policy, such as between community and PNR stakeholders. This research seeks to determine if benefit sharing programs are an appropriate form of social organization that suits conservation and development in the K2C, and the impact of connectedness through engagement in benefit sharing programs on social capital within and between PNRs.

METHODS

Study Area

The K2C incorporates three Southern African biomes: afro-montane forests, grasslands, and savannas (K2C, n.d.; MAB, 2007). The subtropical climate is characterized by hot, humid summers and mild, dry winters with a west to east rainfall gradient averaging 368 mm per year in the eastern plains and up to 3,000 mm on the western plateau (K2C, n.d.). There are high levels of biodiversity, in particular of endemic plant species in the escarpment mountains in the west (K2C, n.d.; MAB, 2007). The K2C includes 898,300 hectares of core protected ecosystems, 476,400 hectares of buffer zones in which land uses compatible with the core areas are allowed, and 1,100,000 hectares of transition areas (MAB, 2007). A network of national, provincial, and private protected areas are included in the core and buffer areas. The transition zone consists primarily of densely populated communities and emphasis is placed on activities that promote economic and human development consistent with the social-ecological sustainability aims of Biosphere Reserves (UNESCO, n.d.). In the K2C, this includes mineral extraction, extensive cultivation, and game farming (K2C, n.d.; MAB, 2007).

Many of the communities in the K2C reside within the former boundaries of apartheid-era 'homelands'. Population densities exceed 300 people/km² in some areas and continue to increase due to limited expansion options because of zonation and land tenure within the Biosphere (Coetzer-Hanack et al., 2016). Due to the socio-economic conditions in these communities, dependence on natural resources, such as construction materials, fuelwood,

wild fruit, and medicinal plants, is high (Twine, 2005). Therefore, increased population pressure is intensifying the development ‘footprint’ through landscape conversion and resource harvesting. Although still the majority of land use in the K2C, intact, protected areas have decreased from 59.49% in 1993 to 52.17% in 2015 due to increasing resource utilization and development (Coetzer-Hanack et al., 2016). The need to concurrently address the challenges of resource conservation and socio-economic development that define the K2C is becoming more urgent.

Five PNRs were selected for inclusion in the study based on their prominence in the nature tourism industry in the region and their proximity to the KNP (Figure 2.2). Four of the PNRs—Balule Nature Reserve, Klaserie Private Nature Reserve, Timbavati Private Nature and Game Reserve, and Umbabat Private Nature Reserve—comprise the Association of Private Nature Reserves (APNR). These PNRs are contiguous without boundary fences, and collectively they are also open to KNP to form an open system extending westward from the KNP. The fifth PNR is Sabi Sand Wildtuin, which is also open to the KNP but is separated from the APNR by communal land and a provincial protected area. Balule, Timbavati and Sabi Sand share a border with one or more communities, and all five of the surveyed PNRs source permanent and contract labor primarily from the surrounding communal areas. Three of these PNRs (Balule, Sabi Sand, and Timbavati) are used as case study reserves to more fully discuss differences in benefit sharing strategies. These reserves were selected based on their more immediate proximity to communities and the different benefit sharing strategies they exemplify.

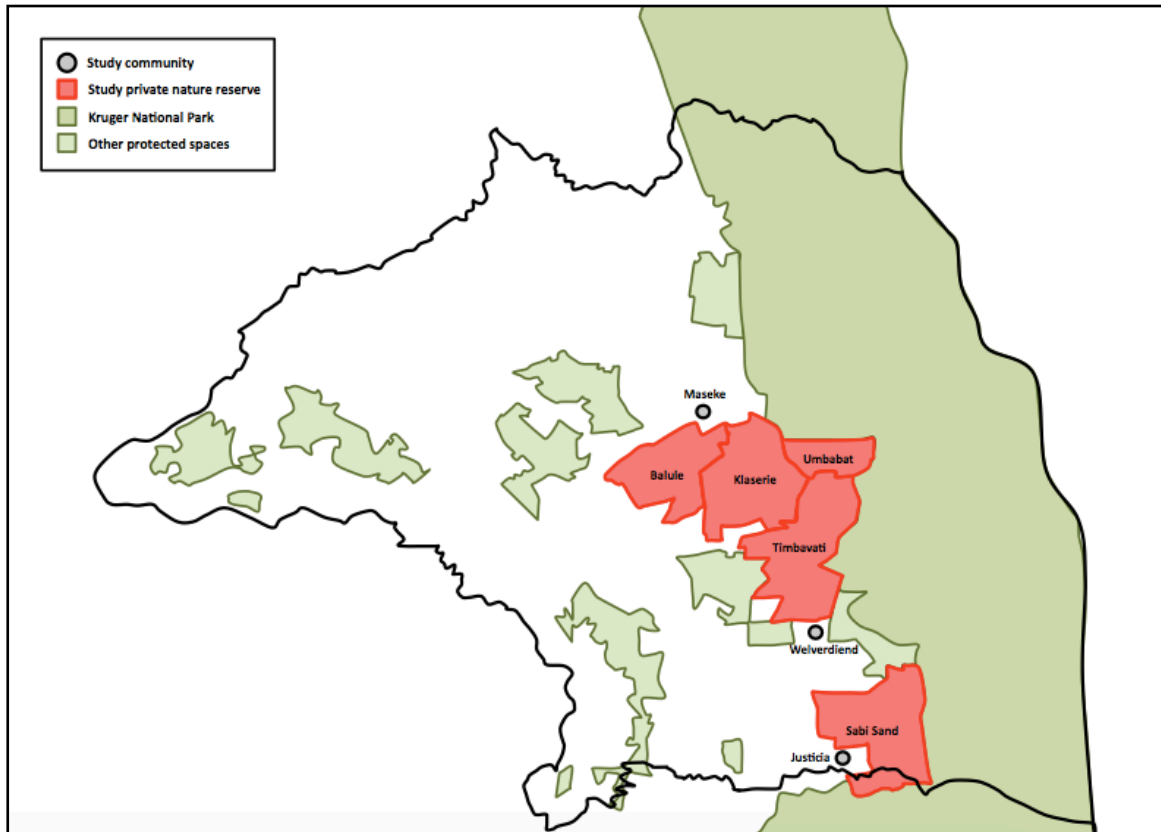


Figure 2.2: Locations of the five private reserves included in the study survey population are labeled and shaded in red. The three communities included in the corresponding community member survey are also labeled.

The PNRs included in this study are privately owned and operated reserves; however, ownership arrangement differs among them. Each land parcel (or ‘farm’) within the PNRs, may be owned by an individual, family, or cooperative and, similarly, commercial lodges within the reserves may be owned and managed by a single landowner, cooperative of landowners, or commercial entity. Management structure also differs between the PNRs. For example, Balule is a federation of seven reserves, referred to as ‘regions’, each with its own warden who manages their region according to the Balule constitution, other region wardens, Balule PNR executive committee, and head warden who has oversight for the Balule PNR (C. Spencer, personal communication, 13 August 2015). The other four PNRs

are not subdivided into multiple management regions; rather land and wildlife management decisions are more or less the responsibility of an overarching reserve management entity (Kreuter et al. 2010). All reserves are governed by an executive committee made up of landowners voted in by the other landowner members of the PNR. However, the size of the executive committees and tenure of committee membership varies across the five PNRs, from seven to thirteen executive committee members with one to five year tenures. The wardens within the reserves generally make recommendations to the executive committee regarding management decisions, and wardens then carry out those decisions.

Program Categorization

As benefits and costs may be tangible or intangible, benefit sharing programs are categorized accordingly. For example, programs that provide income to communities through employment or controlled harvest of natural resources within PNRs are categorized as tangible benefit programs, whereas programs that offer conservation education or job-skills development are categorized as intangible benefit programs. Benefit sharing programs are also categorized with respect to location of the program. Programs that provide benefits in the communal areas are classified as ‘out-reach’ programs, whereas those occurring within PNRs as ‘in-reach’ programs. Both tangible and intangible benefit sharing programs may be either out-reach or in-reach programs. For example, a conservation education program may be run within a protected area (e.g. the Timbavati Foundation Bush School) or in schools within the learners’ community. A benefit sharing strategy is the overall approach to benefit sharing of the reserve, including the focus of programs, method of benefit delivery, and program management structure.

Survey Design and Administration

The study was conducted using a two-phase survey. The first phase consisted of a preliminary survey of key PNR stakeholders, including wardens and community engagement organizers or liaisons. The preliminary survey was administered through semi-structured in-person interviews regarding reserve ownership arrangement, management structure, conflict with neighboring communities, existing benefit sharing programs, and perceived costs and benefits of engagement in these programs.

Next, the second phase of this study consisted of a comprehensive web-based survey of reserve stakeholders within the five PNRs. Findings from the preliminary survey were used to develop survey questions and response options in the subsequent comprehensive survey. Areas of inquiry included the nature of benefit sharing programs and how these programs are perceived, as well as factors that may contribute to program feasibility and efficacy. These factors included: reserve communication and collaboration, conflict between the reserve and community, reserve security, as well as basic demographic information. Survey respondents were asked to respond to questions or statements mostly by using yes/no or seven-point scale response options. Other questions used relevant response categories such as reserve affiliation or year of greatest change in frequency. Additional response options for 'I don't know', 'Not applicable', or 'Other' were included where appropriate, with opportunities to provide another response choice. Respondents were also prompted to provide any additional comments regarding each area of inquiry at the end of that associated section of the questionnaire.

Web-based Survey Administration

The comprehensive survey conducted during the second phase of the study was administered online via emails sent to PNR stakeholders between June and November 2016. Stakeholders included wardens, managers, executive committee members, and landowners, as well as education, outreach, or community liaison employees of the reserve. The questionnaire was sent to a total of 264 PNR stakeholders whose contact information was available (Balule = 22; Klaserie =105; Timbavati = 107; Umbabat = 6; Sabi Sand = 24). While online surveys generally result in lower response rates than multi-phase mail surveys (Dillman, 2007), electronic distribution was necessary because a large percentage of the PNR stakeholders are absentee landowners and their mailing addresses were not obtainable whereas their email addresses could be obtained through the PNR wardens. Additionally, the mail service in South Africa can be very unreliable.

SurveyGizmo (<https://www.surveygizmo.com>) was used to send emails with a link to the online questionnaire to all stakeholders for whom email addresses were obtained. To increase response rate, two reminder emails were sent to all survey respondents who had not yet completed the questionnaire (Dillman, 2007). Additionally, a thank you message was sent to each survey respondent after they submitted the completed questionnaire.

Respondents could opt out of the survey and email correspondence at any time and could skip any questions within the questionnaire.

The survey was conducted after the aims, methods, and desired outcomes of the study had been presented to the reserve wardens (and executive committees when necessary) and after permission was received. In four of the PNRs, the warden or an executive committee

member of the reserve initially distributed the questionnaire to stakeholders within the reserve. This was done in an effort to increase the response rate with the assumption that stakeholders who received the request from a known individual within the stakeholder group were more likely to complete the survey questionnaire. Reminders were sent by an executive committee member for Klaserie, and by the lead researcher for all other reserves. Despite variations in ownership and management structure and size of stakeholder group within each reserve, consistency in message content and distribution schedule was maintained for all five PNRs.

A total of 116 stakeholders returned at least partially completed questionnaires (response rate = 44%) of which, 71 (27%) completed the questionnaire in its entirety. Responses from each PNR were: Balule = 20 (91%), Klaserie = 56 (53%), Sabi Sand = 12 (50%), Timbavati = 24 (22%), and Umbabat = 4 (67%). Responses to individual questions on otherwise partially completed questionnaires were included in statistical summaries and analyses. Although response samples per PNR were small, response differences among PNRs were nevertheless explored. In most instances, there were no statistically significant inter-PNR differences in variable values ($p > 0.05$). In these instances, the survey response values were aggregated across all five PNRs.

Data Entry and Analysis

Online data were exported from SurveyGizmo as a comma separated values (.csv) file to be used in Stata for data analyses (version 14.2, StataCorp, College Station, Texas).

Quantitative response options were on either dichotomous (no = 0, yes = 1) or on a seven

point Likert scale (strongly disagree = 1, disagree = 2, somewhat disagree = 3, neutral = 4, somewhat agree = 5, agree = 6, strongly agree = 7). The same seven point scale was used to code response options ranging from highly unacceptable to highly acceptable and from strong decrease to strong increase.

Index variables were calculated as the sum or median of respondent's answers to relevant questions, when appropriate. For example, the index variable created for total number of benefit sharing programs reported by each respondent for their PNR was obtained by totaling the number of positive response choices selected for alternative programs included in the questionnaire. Additionally, the index variable created for overall perceived efficacy of benefit sharing programs was calculated as the median of the Likert-scale response score values reported by each respondent's answer to questions about their level of agreement with statements of possible program effects. Descriptive summary statistics were calculated to report general findings across all and within each reserve. Comparisons between reserves of ordered categorical variables were made using the Kruskal-Wallis test. When significant differences were found, subsequent pair-wise comparisons were made using the Mann-Whitney U test. Between-reserve comparisons of continuous variables (such as total number of programs) were made using an ANOVA test. When significant differences were found, subsequent pair-wise comparisons were made using a Bonferroni adjustment.

RESULTS

Survey Respondent Characteristics

Of the respondents who provided personal information ($N = 70$), the largest proportions were male (83%) with a postgraduate degree (48%) and an average age of 56 ($SD = 13.51$). Of those who responded ($N = 114$), 85% were landowners, 21% were executive committee members, 16% were PNR wardens/managers, and 6% were education, out-reach, or community liaison employees; 21% also held multiple affiliations, such as being both a landowner and executive committee member. These characteristics did not differ significantly across the five PNRs. The greatest proportion of respondents has been in their current role (39%; $N = 113$) or otherwise affiliated (38%, $N = 65$) with the reserve for 11 to 20 years.

PNR Communication and Collaboration

One area of inquiry for understanding perspectives about programs aimed at benefiting adjacent communities was the dynamics of communication and collaboration between reserve stakeholders. Questions in this area of inquiry addressed aspects of social structure relevant to social capital such as trust, reciprocity, and connectedness. Respondents were asked to report: 1) sources of information that are used in making management decisions for the reserve, 2) degree of change in interaction or communication within the reserves and between reserves, and 3) communication, and collaboration within and between reserves.

First, information sources provided as response options included intra-reserve sources (executive committee and landowners), inter-reserve sources (managers/wardens of other reserves, the APNR, and other reserve associations), and other sources not directly affiliated with the reserves (Agricultural Research Council, SANParks, South African Police Service, and private security companies). Most respondents reported receiving information from multiple sources ($Mdn = 5$, $\bar{x} = 4.69$, $SD = 2.36$), with some stating they obtained information from as many as eight or nine sources. The most commonly selected information source was executive committees (86% of respondents), followed by wardens from other reserves (69%), other landowners within the respondent's reserve (67%), and the APNR (66 %). On average, fewer respondents received information from inter-reserve sources (57%) than intra-reserve sources (62%), and fewer still from organizations not directly affiliated with the reserves (26%).

Second, respondents overall reported a slight increase in frequency of communication within their reserves since January 2010 ($Mdn = 5$, $\bar{x} = 5.06$, $SD = 1.10$), including meetings with wardens and other landowners within the reserve, and electronic or paper mailings regarding ecological management and reserve engagement with nearby communities. Respondents reported a greater increase in inter-reserve communication during the same time period ($Mdn = 6$, $\bar{x} = 5.50$, $SD = 1.36$). The beginning date of this time period was chosen to roughly coincide with the increase in rhino poaching nationally, and to include at least one year before the increase in rhino poaching in private reserves in the study area as was determined in the preliminary survey. The largest proportion (29%) of respondents reported that 2013 was the year of greatest change in inter-reserve

communication. Respondent comments indicate the increase in inter-reserve communication was in response to security concerns driven by the rise in rhino poaching.

Third, respondents in general somewhat agreed with statements regarding intra-reserve social capital (Table 1, Statements A-C, $Mdn = 5$, $\bar{x} = 4.75$, $SD = 1.49$), and with statements regarding inter-reserve social capital (Table 2.1, Statements D-H, $Mdn = 5$, $\bar{x} = 4.19$, $SD = 1.37$). There were, however, significant differences between reserves in regard to knowing most of the stakeholders within the reserve (Statement A) and in nearby reserves (Statement D), and regularly communicating with stakeholders in the reserve (Statement B) and in nearby reserves (Statement E) (Table 2.2). Overall, respondents strongly agreed with statements regarding the occurrence, necessity, and efficacy of coordination and collaboration between reserves (Table 2.1, Statements I-L, $Mdn = 7$, $\bar{x} = 5.96$, $SD = 1.20$) and there were no significant differences between reserves in response patterns. In general, respondents somewhat agreed with statements regarding elements of social capital—both within and between reserves, i.e. both bonding and bridging elements of social capital.

Table 2.1: Survey population agreement with statements of intra-reserve and inter-reserve communication, trust, and collaboration. Strongly disagree = 1 and strongly agree = 7. *Indicates statements with a significant difference (at $p < 0.05$) in agreement between reserves (using the Kruskal-Wallis test).

	Median	Mean	SD
A I know most of the stakeholders within my reserve*	5	4.65	1.82
B I regularly communicate with the stakeholders within my reserve*	5	4.44	1.82
C I trust the primary decision makers in my reserve	6	5.11	1.73
D I know most of the stakeholders in nearby reserves*	4	3.35	1.71
E I regularly communicate with stakeholders in nearby reserves*	4	3.56	1.88
F I trust the primary decision makers in nearby reserves	4	4.44	1.50
G This reserve would spend time helping other reserves in the region	5	5.24	1.30
H Other reserves in the region would spend time helping this reserve	5	4.78	1.53
I Management decisions of this reserve are coordinated with nearby reserves	5	5.35	1.32
J Coordinating with nearby reserves helps this reserve to achieve conservation goals	6	5.88	1.44
K Information sharing and collaborating between reserves in the region is necessary for wildlife asset protection	7	6.55	1.08
L Information sharing and collaborating between reserves in the region is effective at improving wildlife asset protection efforts	7	6.08	1.49

Table 2.2: Median agreement with statements of intra-reserve and inter-reserve communication, trust, and collaboration. Strongly disagree = 1 and strongly agree = 7. Superscript letters indicate significant differences (at $p < 0.05$) in agreement between *case study* reserves (using the Mann-Whitney U test).

	Balule	Klaserie	Sabi Sand	Timbavati	Umbabat
I know most of the stakeholders within my reserve	6	4	5	5	7
I regularly communicate with the stakeholders within my reserve	6 ^a	4	5	4 ^b	7
I know most of the stakeholders in nearby reserves	5 ^a	3	4 ^b	3 ^b	5
I regularly communicate with stakeholders in nearby reserves	5	3	4	4	5

Reserve and Community Conflict

Within this area of inquiry, the type and change in frequency of conflict events between their reserve and the specified adjacent or nearby community were explored, as well as respondents' perception of community member involvement in poaching activities.

Respondents were first asked to select types of conflict that had occurred since January 2010 from a list of possible conflict response options. The most frequently identified area

of conflict since January 2010 was rhino poaching (88% of respondents), followed by other wildlife poaching (53%). Other less frequently reported areas of conflict included theft of belongings, supplies, or money from the reserve, employees, or guests (39%); theft of natural resources from the reserve (13%); grievances reported by the community (8%); demonstrations against the reserve by community members (8%); and arson or willful damage of reserve property (4%).

Across all reserves, the average reported number of conflict types that have occurred since January 2010 was two ($Mdn = 2$, $\bar{x} = 2.14$, $SD = 1.15$). There was, however, a significant difference between reserves in number of conflict types ($F = 6.32$, $p < 0.001$). Sabi Sand ($Mdn = 4$, $\bar{x} = 3.71$, $SD = 3.71$) had a significantly larger number of reported conflict types than Klaserie ($Mdn = 2$, $\bar{x} = 1.83$, $SD = 0.83$, $t = 4.45$, $p < 0.001$) and Timbavati ($Mdn = 1$, $\bar{x} = 1.62$, $SD = 0.77$; $t = 4.45$, $p < 0.001$).

In regard to the frequency of conflict events, the majority (59%) of survey respondents reported that there was no change in the occurrence of all types of conflict events since January 2010 ($Mdn = 4$, $\bar{x} = 4.10$, $SD = 1.12$). The greatest proportion of respondents (42%) also reported no change in wildlife poaching ($Mdn = 4$, $\bar{x} = 4.03$, $SD = 1.36$) (Table 2.3). In noticeable contrast, 61% of respondents reported a strong increase in the occurrence of rhino poaching since January 2010 ($Mdn = 7$, $\bar{x} = 5.89$, $SD = 1.74$). Of those who reported a year of greatest change, the largest proportion reported 2013 (33% as the year of greatest change in all types of conflict, 2015 (39%) for wildlife poaching, and 2014 (27%) for rhino poaching.

Table 2.3: Proportion of responses to the degree of change in conflict in general ($N = 51$), wildlife poaching ($N = 65$), and rhino poaching ($N = 76$) since January 2010. Each proportion is relative to the total number of respondents to each question.

	All types of conflict in general	Wildlife poaching (excluding rhinos)	Rhino poaching
Strong increase	2%	3%	61%
Increase	10%	10%	11%
Slight increase	12%	19%	9%
No change	59%	43%	7%
Slight decrease	12%	13%	4%
Decrease	2%	6%	4%
Strong decrease	4%	6%	4%

Across all reserves, respondents agreed with the statements that nearby community members are active in wildlife poaching (excluding rhino) ($Mdn = 6$, $\bar{x} = 5.30$, $SD = 1.57$) and that community members are active in rhino poaching ($Mdn = 6$, $\bar{x} = 5.99$, $SD = 1.41$). However, the proportion of respondents that strongly agreed that communities are active in rhino poaching in particular (46%) is greater than the proportion of respondents that strongly agreed the communities are active in wildlife poaching (33%) (Table 2.4).

Table 2.4: Proportion of responses to the agreement that community members are active in wildlife poaching ($N = 64$) and in rhino poaching ($N = 69$). Each proportion is relative to the total number of respondents to each question.

	Communities active in wildlife poaching (excluding rhino)	Communities active in rhino poaching
Strongly agree	33%	46%
Agree	17%	31%
Somewhat agree	13%	12%
Neutral	30%	3%
Somewhat disagree	2%	3%
Disagree	5%	1%
Strongly disagree	2%	3%

Reserve Security and Wildlife Asset Protection

Of the protection strategies provided as response options, the most reported was polygraph testing for employees (94%). The majority of respondents also responded that electric

fences (92%), armed patrols (91%), and aerial monitoring or response (88%) were used by their PNR. Less frequently reported but still common strategies included intelligence operations in nearby communities (64%), tracking dogs (60%), and unarmed guards (40%). While respondents across all reserves indicated the use of six security measures ($Mdn = 6$, $\bar{x} = 5.51$, $SD = 1.63$), there was a significant difference between reserves ($F = 4.44$, $p = 0.003$). Timbavati responses ($Mdn = 6$, $\bar{x} = 6.33$, $SD = 1.29$) were significantly greater than those of Klaserie ($Mdn = 5$, $\bar{x} = 4.88$, $SD = 1.43$; $t = 3.14$, $p = 0.025$). In general, PNR survey respondents found other queried protection strategies to be highly acceptable, with no significant difference between reserves (Table 2.5).

Table 2.5: Acceptability of security measures. Highly unacceptable = 1 and highly acceptable = 7.

	Median	Mean	SD
Armed patrols	7	6.42	1.11
Aerial monitoring or response	7	6.39	1.14
Security cameras	7	6.53	0.90
Tracking devices for rhinos	7	6.01	1.53
Polygraph testing for employees or applicants	7	6.49	1.20

Moreover, respondents from all five PNRs on average reported a strong increase ($Mdn = 7$, $\bar{x} = 6.80$, $SD = 0.49$) in protection efforts since January 2010. The greatest proportions of respondents indicated that the most marked increase in protection efforts occurred in 2014 (33%) or 2015 (37%), which aligns with the reported most rapid rise in rhino poaching in 2014. In general, survey respondents agreed or strongly agreed with statements regarding the necessity and efficacy of protection methods (Table 2.6). There were no significant differences between reserves on these sentiments.

Table 2.6: Agreement with statements regarding the necessity and efficacy of protection methods. Strongly disagree = 1 and strongly agree = 7.

	Median	Mean	SD
Increased security was an appropriate and necessary response to wildlife poaching	7	6.31	1.14
Increased security was an appropriate and necessary response to rhino poaching	7	6.61	1.08
Security efforts have been effective at reducing wildlife poaching	6	6.04	1.26
Security efforts have been effective at reducing rhino poaching	6	5.89	1.55
Security efforts should be maintained	4	4.29	2.31
Security efforts should be increased and additional resources added for them to be effective	7	5.82	1.68

Strategies for managing and protecting both white and black rhino populations are of particular interest for the PNRs because of their highly threatened status throughout Africa, their international value as a tourist attraction, and the contribution of white rhinos as bulk grazers in the management of reserves. At the time of the survey, rhino populations were threatened not only by poaching but also by severe drought within the Greater Kruger area (DEA, 2016). One alternative strategy for protecting rhinos is to translocate them to other areas where poaching pressure and the effects of drought may be less severe and/or protection from poaching might be more effective. However, the PNR respondents considered translocation to community conservation areas to be highly unacceptable ($Mdn = 1$, $\bar{x} = 2.14$, $SD = 1.60$) and translocation to national or provincial protected areas to be somewhat unacceptable ($Mdn = 3$, $\bar{x} = 3.17$, $SD = 2.07$). They were neutral to the translocation of rhinos to another private protected area ($Mdn = 4$, $\bar{x} = 3.99$, $SD = 2.11$).

In addition, with particular regard to protection from poaching, respondents indicated that dehorning rhinos to deter poaching and then destroying the horns was highly unacceptable ($Mdn = 1$, $\bar{x} = 2.11$, $SD = 1.77$). By contrast, respondents found the strategy of dehorning rhinos to deter poaching, and then selling the horns through a hypothetical legal market

was somewhat acceptable ($Mdn = 5$, $\bar{x} = 4.19$, $SD = 2.55$). While the harvest and sale of rhino horn was generally somewhat acceptable, the response distribution indicates a polarized view with the greatest proportion (33%) of respondents reporting this strategy to be highly unacceptable (Table 2.7). Additionally, there was a significant difference between reserves for this variable ($H = 10.90$, $p = 0.028$). Balule respondents ($Mdn = 1$, $\bar{x} = 2.88$, $SD = 2.57$) find it significantly less acceptable than Klaserie ($Mdn = 6$, $\bar{x} = 4.74$, $SD = 2.32$; $z = 2.18$, $p = 0.030$) and Timbavati ($Mdn = 7$, $\bar{x} = 5.27$, $SD = 2.43$; $z = 2.42$, $p = 0.016$), and Timbavati respondents find harvesting horns to sell as a protection method significantly more acceptable than Sabi Sand ($Mdn = 3$, $\bar{x} = 2.83$, $SD = 2.14$; $z = 2.156$, $p = 0.031$). Overall, responses to questions on protection strategies indicate positive perceptions of intra-PNR protection strategies, that increased efforts are necessary, and that PNRs provide the best protection for rhinos.

Table 2.7: Proportion of responses to the acceptability of harvesting of rhino horn and its subsequent destruction or sale (through a hypothetical legal market).

	Harvest to destroy	Harvest to sell
Highly acceptable	6%	26%
Acceptable	3%	21%
Somewhat acceptable	1%	8%
Neutral	10%	8%
Somewhat unacceptable	10%	0%
Unacceptable	8%	3%
Highly unacceptable	62%	34%

Reserve and Benefit Sharing Programs

Benefit sharing programs were categorized as programs with tangible benefits versus those with intangible benefits, and in-reach versus out-reach. Sixty-nine survey respondents reported at least one type of benefit sharing program had occurred in their reserve since January 2010 and there was a wide range in the reported occurrence of each program (from

10% to 86%) (Table 2.8). The survey results indicate intangible benefit programs were overall more common than tangible benefit programs (97% and 90%, respectively), and were also more common within both in-reach and out-reach categories (91-87% and 80-70%, respectively). More specifically, conservation education programs for children, both within the PNR and in the community, were reported to be the most common types of programs (at 86% and 81%, respectively).

Table 2.8: Types of benefit sharing programs reported by survey respondents. The proportion represents the ratio of respondents who reported engagement in each program relative to the total number of respondents who reported at least one partnership ($N = 69$).

	Proportion	Median	Mean	<i>SD</i>
Tangible benefit programs	90%	3	3	1.62
Occurring in the reserve	80%	2	2	0.71
Employment with the reserve	75%			
Employment through contract work in the reserve	41%			
Controlled harvest of plant material	10%			
Controlled harvest of wildlife resources	10%			
Occurring in the community	70%	2	2	1.05
Building infrastructure	61%			
Facilitating water projects	33%			
Facilitating garden projects	49%			
Selling community member made arts and/or crafts to reserve guests	15%			
Intangible benefit programs	97%	5	5	2.57
Occurring in the reserve	91%	3	3	1.28
Conservation education for children	86%			
Conservation education for adults	67%			
Other education programs for adults	49%			
Visits and activities for family members of employees	46%			
Visits and activities for community members not directed related to employees	25%			
Occurring in the community	87%	3	3	1.28
Conservation education for children	81%			
Other education programs for children	48%			
Conservation education for adults	54%			
Other education programs for adults	36%			
Tours for reserve guests	14%			

On average, Sabi Sand respondents reported the highest number of programs overall and within each of the four program categories, and Umbabat had the smallest total number of programs (Table 2.9). There were significant differences between reserves in number of programs in each category, and overall Sabi Sand had significantly more programs in total than Balule and Umbabat (indicated by superscript letters in Table 2.9). Respondents reported an increase in all types of benefit sharing programs between 2010 and 2016 ($Mdn = 6$, $\bar{x} = 5.40$, $SD = 1.05$). Of those who indicated a year of greatest increase in benefit sharing programs ($N = 24$), the greatest proportion (29%) indicated this happened in 2014.

Table 2.9: Number of programs in each benefit sharing program category reported per respondent within each PNR. Means rounded to the nearest whole number are on the first line and standard deviations are on the second line of each cell. Superscript letters indicate significant differences (at $p < 0.05$) in the number of programs between *case study* reserves (using the multiple comparison Bonferroni test).

	Balule	Klaserie	Sabi Sand	Timbavati	Umbabat
Tangible benefit	2 ^a 2.15	3 3.25	5 ^b 1.98	4 1.26	1 0.00
In-reach	2 0.62	2 0.71	2 0.53	2 0.73	1 0.00
Out-reach	1 ^a 0.41	2 0.82	3 ^b 1.03	3 ^b 0.89	-
Intangible benefit	4 ^a 2.47	5 2.23	8 ^b 2.25	5 ^a 2.53	2 1.53
In-reach	3 ^a 1.64	3 1.12	4 ^b 0.89	3 1.23	2 1.41
Out-reach	2 ^a 0.87	3 1.00	5 ^b 0.52	2 ^a 1.35	2 0.71
In-reach total	4 2.25	4 1.71	6 2.51	4 1.85	3 1.41
Out-reach total	2 ^a 1.30	5 1.79	8 ^b 1.55	4 ^a 2.28	2 0.71
All programs	6 ^a 3.42	8 3.53	12 ^b 5.50	8 4.03	3 1.73

Perceptions of Programs

Despite differences in organization of benefit sharing program administration and in number of programs offered, there were few differences between reserves in motivations, deterrents, and perceptions of the effects of engaging in benefit sharing. Across all reserves, the motivation statements with the highest degree of agreement related to duty or explicit goal of the reserve to either foster good relationships with or contribute to development of nearby communities (Table 2.10). In general, respondents expressed the highest degree of agreement with statements about deterrents relating to practical aspects of engaging in benefit sharing programs (Table 2.10). Importantly, respondents generally did not agree that engagement in benefit sharing increases risk of conflict with community members, past or current instances of conflict deterred them from engagement, or more access to PNRs would increase the risk of abuse of natural resources.

Table 2.10: Ranking of motivations and deterrents for engagement with communities. Strongly disagree = 1 and strongly agree = 7. Statements were ranked first by their median score and then by their mean score, because agreement scores were categorical rather than continuous. *Indicate a significant difference (at $p < 0.05$) in agreement between reserves (using the Kruskal-Wallis test).

Rank		Median	Mean	SD
Motivation				
1	The reserve has a duty to foster good relationships with nearby communities, regardless of stated commitments.	7	6.97	1.51
2	The reserve has a duty to contribute to economic or social development of nearby communities, regardless of stated commitments.	7	5.60	1.86
3	It is stated in the vision or goals of the reserve to foster good relationships with nearby communities.*	6	6.02	1.17
4	It is stated in the vision or goals of the reserve to contribute to economic or social development of nearby communities.*	6	5.88	1.27
5	Adjacent communities are the most appropriate source of labor.	6	5.83	1.28
6	Adjacent community members are most convenient to employ.	6	5.77	1.20
7	Reserve guests desire engagement with adjacent communities.	5	4.82	1.73
8	Locals provide the most knowledge for guiding and tracking.	5	4.78	1.67
Deterrent				
1	There is a lack of financial resources to support programs.	5	4.65	1.58
2	Programs are difficult to implement.	5	4.56	1.94
3	There is a risk of further abuse of natural resources by community members if more access is allowed through programs.	4	4.24	1.77
4	Lack of trust in community members deters me from engaging in programs.	4	3.75	1.67
5	I am unaware of program possibilities or options.*	4	3.37	1.84
6	Past or current instances of conflict with communities deter me from engaging in partnerships.	4	3.25	1.46
7	Engagement in partnerships increases the risk of conflict with community members.	3	3.28	1.82
8	Constituency building is not in the vision or goals of the reserve, and so should not be emphasized. *	3	2.86	1.76

There were significant differences between reserves in two motivation statements and two deterrent statements (Table 2.11). Balule respondents agreed significantly less strongly than Klaserie, Sabi Sand, and Timbavati that it is stated in the vision or goals of the reserve to either foster good relationships or contribute to economic or social development of nearby communities. Sabi Sand respondents disagreed significantly more than all other reserves, and Klaserie disagreed significantly more than Umbabat, that they are unaware of program options. Respondents from Sabi Sand also disagreed significantly more than

Balule, Klaserie, and Umbabat that constituency building isn't in the vision or goals of the reserve and so should not be emphasized.

Table 2.11: Reserve median agreement values for motivations and deterrents to engage in benefit sharing programs. Strongly disagree = 1 and strongly agree = 7. Superscript letters indicate significant differences (at $p < 0.05$) in agreement between *case study* reserves (using the Mann-Whitney U test)..

	Balule	Klaserie	Sabi Sand	Timbavati	Umbabat
Motivation					
It is stated in the vision or goals of the reserve to foster good relationships with nearby communities.	5 ^a	6	7 ^b	7 ^b	6
It is stated in the vision or goals of the reserve to contribute to economic or social development of nearby communities.	5 ^a	6	7 ^b	7 ^b	6
Deterrent					
I am unaware of program possibilities or options.	4 ^a	4	1 ^b	4 ^a	5
Constituency building is not in the vision or goals of the reserve, and so should not be emphasized.	3 ^a	3	1 ^b	2	5

While there were differences between reserves for some motivations and deterrents to engage in benefit sharing programs, there were no significant differences between reserves of the impact of programs. Overall, respondents only somewhat agreed with statements of both tangible and intangible effects of benefit sharing programs (Table 2.12). They were neutral to or agreed only somewhat that benefit sharing programs reduced conflict between the community and their PNR, and rhino poaching, specifically. By contrast they generally agreed that benefit sharing programs do contribute to education, job skills, or economic development, and improve community member perceptions of protected areas and a conservation ethic in general.

Table 2.12: Agreement with statements of tangible and intangible benefits from programs. Strongly disagree = 1 and strongly agree = 7.

	Median	Mean	SD
Tangible benefits	5	5.19	1.48
Contribute to community economic development	6	5.66	1.31
Reduce conflict between the reserve and community	5	5.37	1.57
Reduce rhino poaching pressure	5	4.51	1.68
Reduce opportunities for conflict events with nearby communities	4	4.52	1.70
Intangible benefits	5	5.30	1.15
Contribute to community education or job skills training	6	5.69	1.26
Increase positive attitudes toward conservation activities in protected areas in general	6	5.65	1.48
Increase positive attitudes toward the reserve	6	5.59	1.44
Encourage a conservation ethic	5	5.51	1.44
Increase negative perceptions toward poaching activities	4	4.03	1.83

PNR respondents were neutral to the statement that program engagement pulls financial resources from other management areas that would be more beneficial to the success of the reserve ($Mdn = 0$, $\bar{x} = -0.38$, $SD = 1.77$). This is somewhat in contrast to respondents generally agreeing that benefit sharing programs lead to desirable outcomes for communities. When asked if continuing to engage in benefit sharing programs is advisable, PNR respondents agreed that it is ($Mdn = 2$, $\bar{x} = 1.85$, $SD = 1.37$).

DISCUSSION

In efforts to develop a conservation constituency to support the long-term integrity of PNRs, stakeholders and their respective organizations engage in benefit sharing programs with adjacent or nearby communities. Findings from this study illuminate the dynamics and perceptions surrounding benefit sharing programs. Factors of relationships both inter-reserve and between reserves and communities are important to understanding the PNR benefits and costs underlying the motivations and deterrents to engage in benefit sharing.

Reported deterrents of engagement in benefit sharing programs across all reserves are financial limitations and implementation difficulties, which are practical restrictions. Due to increased security costs, conflict likely limits reserves' ability to engage in benefit sharing. However, findings indicate respondents are not deterred by negative perceptions from past or current instances of conflict, or are not deterred to the degree that was hypothesized, in initiating or engaging in benefit sharing programs. At least most immediately, rather than stemming from a low regard for the benefits of engagement, hindrances to more or more effective benefit sharing are practical. Financial or informational restrictions to benefit sharing are of course not unique to these protected areas. As such, understanding the motivations and reserve benefits to community engagement is important to overcome deterrents here and elsewhere.

Respondents agreed most strongly that they are motivated to engage in benefit sharing comes from a moral obligation to foster good relationships and contribute to development of communities, rather than for practical reasons. A sense of an ethical responsibility has elsewhere been found to be a reason to provide benefits, as well as a protective measure, public relations exercise, or decreasing poaching (Ramutsindela, 2015; Spenceley, 2001; 2003). Additionally, respondents did not perceive that benefit sharing reduces rhino poaching pressure and only somewhat agreed it reduces conflict in general. It should be said that benefit sharing is also self-serving for reserves, even if motivated by moral obligations for philanthropy. Benefit sharing serves to reduce the likelihood of pursuance of land claims made by communities against reserve properties and philanthropic projects can be leveraged as marketing for socially conscious eco-tourists (Ramutsindela, 2015;

Spenceley, 2003). Importantly, Balule respondents agreed less strongly than Sabi Sand and Timbavati that contribution to either development of nearby communities or to foster good relationships with them is stated in the goals of their reserve. This is likely because they are not as exposed to communities as Timbavati and Sabi Sand. However, including community development and good relationships as explicit goals (for example, included in its constitution) is important for reserves to do. It is a first step in formalizing relationships with communities and benefit sharing processes, and it signals to PNR stakeholders that community wellbeing is consequential for reserve management beyond just perceived moral obligations of its stakeholders (Spenceley, 2003). Findings indicate moral obligations motivate community engagement rather than more practical motivations such as convenience or guest preference.

While moral obligations most motivate benefit sharing efforts within the survey population, the perceived outcomes of programs also influence overall desire to engage with communities. There was not strong agreement that benefit sharing affected any of the tangible or intangible effects, neither benefits accruing within communities nor those that were mutually beneficial. There was a perception benefit sharing contributes to economic development, education, and skills training, and also that programs positively influenced community member attitudes toward conservation and the reserve. However, respondents did not perceive that benefit sharing reduces conflict with the communities and rhino poaching, specifically. This finding underscores that PNR respondents do not perceive a significant practical reserve-side benefit to community benefit sharing programs, even if there are diffuse self-serving practical outcomes for the reserve. Perceived moral or social

obligation to benefit sharing is a valid motivation, but there is also the under-realized additional outcome of conflict and poaching reduction that successful benefits sharing strategies can affect. While ecological factors influence rhino population and subsequent poaching pressure, effective benefit sharing strategies can improve community member perceptions of the reserve and conservation, which can in turn reduce the occurrence of poaching and other conflict.

The benefit sharing strategy of the reserve is a combination of the degree of program provision, focus of benefits, and particularly, how rhino poaching influences that strategy. It is perhaps not surprising that the most commonly reported programs across all reserves were conservation education for children. These are programs that can be run with relatively low risk and cost, are a long established approach to encourage a conservation ethic, and have a good image from within both the community and tourism stakeholder groups (Spenceley, 2003). Of the case study reserves, Sabi Sand respondents consistently reported a greater number of programs in each program category and total number. Timbavati respondents generally reported fewer programs than Sabi Sand, and Balule respondents reported fewer still.

The number of programs offered by reserves seems to be influenced by the degree of exposure of the reserve to neighboring communities, and less directly by PNR stakeholder perceptions born from poaching pressure or other conflict. Respondents from all reserves reported a strong increase in rhino poaching and also strongly agreed neighboring communities are active in this poaching activity. Similarly, respondents reported a strong

increase in security efforts for wildlife protection. While this threat is perceived of respondents across all reserves, those from Sabi Sand reported a significantly greater number of types of conflict than those from Klaserie and Timbavati. Notably, the longer border Sabi Sand shares with adjacent communities increases its exposure to communities, which can amplify conflict incidences, poaching threat, and motivate stakeholders to engage more with communities through benefit sharing. In this way, increased program engagement is a secondary effect of conflict, even while a direct influence of poaching and other conflict is not supported by responses.

As with number of programs, the case study reserves also differed in degree of focus of their benefits. Timbavati programs focus exclusively on education and school based benefit sharing. By contrast, Sabi Sand programs have a broader range of impact areas, including education, environment, and entrepreneurship. At the time of interviews, Balule had a burgeoning Bush Babies conservation education program, which includes visits from their Black Mamba rangers. It can be concluded that the Sabi Sand as a whole does not favor any one approach to benefit sharing, be they tangible or intangible benefits, in-reach or out-reach, nor any one focus such as the education-based focus of Timbavati and Balule. Differences in the degree of focus of benefit delivery appear to be determined by the administration organization of benefit sharing programs, which were determined in the preliminary survey. For example, the education and schools focus of the Timbavati benefit sharing is a focused strategy supported by the centralized organization of the Timbavati Foundation. This Foundation is a legally and financially separate entity from the reserve itself, and receives funding from landowner levies and outside donations. All benefit

sharing from entities within the reserve are channeled through this centralized body, and the result is a highly coordinated strategy with a relatively narrow focus.

Conversely, the mixed approach strategy of Sabi Sand is likely the result of the segmented administration of programs by individual lodges or their associated NGOs. Entities within the Sabi Sand may pursue benefit sharing agendas and programs independently, through their own NGO, or through the Sabi Sand Pfunanani Trust (SSPT). The SSPT is a joint venture of lodges and NGOs that aims to align development initiatives in neighboring communities to maximize impacts. While some coordination and integration is facilitated through the SSPT, a great degree of cohesion is absent relative to the Timbavti Foundation. Other review of PNR benefit sharing points to the importance of individuals in spearheading the development and organization of benefit sharing strategy (Spenceley, 2003). For example, the head warden of Balule is the driving force behind the formation and operation of the Black Mambas program and its associated community activities. To summarize, the benefit sharing strategy of a reserve appears to be influenced externally by exposure to communities and internally by the degree of program provision, organization of program administration, and focus of benefits.

Reserves with a less focused and centralized benefit sharing strategy may be missing an opportunity to minimize costs and maximize the impact of programs through taking advantage of increased economies of scale through coordination (Lindsey et al., 2009; Spenceley & Seif, 2003). The specific strategy favored by a reserve may not be influenced by poaching or other conflict in terms of reducing PNR stakeholders' willingness to

engage with communities. However, the ability to fund and administer programs is restricted by the increased resource use for security efforts and limited awareness of how to design and implement successful programs. These reported deterrents to benefit sharing can be reduced through increased collaboration and coordination within and between reserves, and these connections have recently expanded through the security response to rhino poaching. The sense of a common threat of poaching motivated new and strengthened bonding and bridging connectedness within and between reserves, and thus enhanced social capital. Accessing the enhanced social capital can facilitate sharing information and human resources to design and administer programs, and also reduce financial cost by coordinating planning and implementation of programs. Additionally, highlighting the efficacy of benefit sharing at reducing conflict could further motivate PNR stakeholders to overcome practical deterrents to engage with communities. The rise in rhino poaching and its militarized response has further strained cross-stakeholder relationships in the region, but it also may provide areas of opportunity for increased social capital within and between PNRs to improve benefit sharing efforts.

The sample size in this study, particularly within reserves, is small. Regardless, these findings can serve to outline the primary motivations and deterrents to benefit program initiation and engagement, as well as how PNR stakeholders frame the rhino poaching problem and benefit sharing. While the most effective strategy to benefit sharing cannot be tested experimentally, comparisons of approaches can be made between reserves, and further work on the perceptions of community members can illuminate what benefit sharing strategies are most effective. This will provide information on how to target benefit

sharing and community engagement more thoughtfully. Further research should work to more thoroughly measure the costs of various benefit sharing programs and type and frequency of conflict with communities to quantitatively assess the trade-offs for reserves in community interactions. A transformative devolution of natural resource and protected area access and ownership may be needed to fully address historical and current injustices for black South Africans from the formation and continued existence of these areas. Regardless, efforts can and should be made to improve development initiatives, environmental justice, and conservation constituency building within the current land ownership structure and socioeconomic setting. Acting on these opportunities is suggested to encourage the long-term integrity of the PNRs through effective benefit sharing and building a conservation constituency with surrounding communities.

Conclusion

Overall reserve differences in engagement strategy seem to ultimately be a product of exposure to communities and administration organization, rather than of willingness directly influenced by rhino poaching. Increased social capital built in the response to poaching can be leveraged to improve economies of scale for benefit sharing, both within and across reserves, to reduce deterrents to engagement. There is a lack of understanding on how to best motivate support for effective benefit sharing programs amongst conservation stakeholders, particularly within private conservation areas (Kreuter et al., 2010; Pullin et al., 2013; Ramutsindela, 2015; Spenceley, 2001; Spenceley, 2003). The stakeholders private reserves may have very different goals, expectations, and capital for their properties than stakeholders within state owned conservation areas or environmental

NGOs. Findings reviewed here address this lack of understanding regarding PNR stakeholders, but can also be more broadly applied to other conservation areas and stakeholders. Understanding what impedes and what drives benefit sharing is important to effectively support and encourage meaningful constituency building here and elsewhere as protected areas are under increasing pressure from surrounding human populations. Additionally, a clear and explicit accounting for trade-offs for both stakeholder groups improves the design and impact of benefit sharing strategies to deliver effective benefits more efficiently and avoid empty “win-win” rhetoric (McShane et al., 2011). The findings and insights provided in this research on protected area stakeholder motivations and perspectives surrounding benefit sharing programs can be applied to other areas with goals for “win-win” solutions to address both conservation and development needs.

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CHAPTER III

THE IMPACT OF BENEFIT SHARING PROGRAMS ON

COMMUNITY MEMBER PERCEPTIONS OF

DEVELOPMENT, CONFLICT, AND CONSERVATION SENTIMENT

INTRODUCTION

Many regions around the world are struggling to balance concurrent priorities of nature conservation and socio-economic development. Human settlements adjacent to protected areas in developing countries often have inadequate living space and are restricted from accessing protected areas due to legitimate conservation concerns, such as poaching. Due to barriers to economic opportunities, communities that are adjacent to protected areas often seek access to the conservation economy, natural resources, or other benefit sharing strategies to achieve their development goals. The lack of such economically beneficial opportunities may diminish support from communities for protected areas; yet such support is critical for their long term integrity (Anthony, 2007; Bennett, 2003; Metcalfe, 2003). Attempts to address development goals by leveraging conservation initiatives for “win-win” solutions are challenging and often fall short of expectations (Benjaminsen & Svarstad, 2010; Gillingham & Lee, 1999; McShane et al., 2011). Despite these challenges, it is necessary to improve strategies that simultaneously address nature conservation and socio-economic development goals. It is also crucial to appropriately consider community members’ perceptions as a means of recognition and participation in the design of benefit sharing programs. To contribute to those efforts, this research investigates how community

member perceptions of development outcomes, conflict, and conservation sentiment are affected by different benefit sharing strategies.

For example, the Kruger to Canyons Biosphere (K2C) has parallel conservation and development objectives. It is a 2.5 million hectare region in northeast South Africa, and incorporates the central portion of the Kruger National Park (KNP) to the east, the Blyde River Canyon Nature Reserve to the west, and private and provincial protected areas. Protected spaces comprise just over half of the K2C, including many of South Africa's longest established and largest private nature reserves (PNRs), and are some of the most biodiverse and heavily visited areas in the country (Coetzer-Hanack, Witkowski, & Erasmus, 2016). The K2C also includes over 1.5 million inhabitants mostly residing in semi-rural settlements on communal land, and the opportunities for development are limited to the mining, agriculture, and tourism in the region (K2C, n.d.) (Figure 3.1).

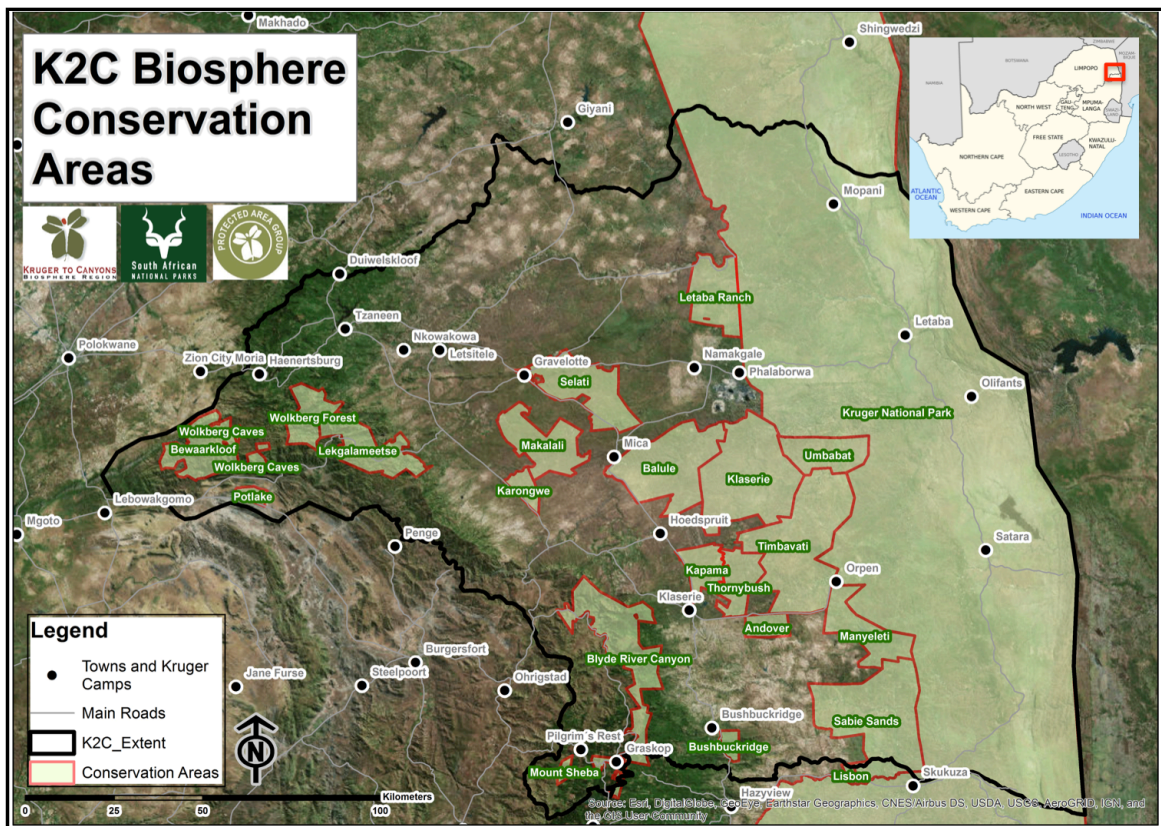


Figure 3.1: Location and extent of the Kruger to Canyons (K2C) Biosphere, within which are the three communities included in the study (adapted and used with permission from K2C Biosphere Region, 2017)

Multiple land uses within this landscape have led to conflict among stakeholders, particularly between communal area residents and PNR stakeholders (Kepe, Wynberg, & Ellis, 2005). This conflict is rooted in legacies of dispossession and disenfranchisement of black South Africans throughout the colonial and apartheid periods. This includes exclusion and forced relocations of communities from the KNP and other protected areas. PNRs are a particular nexus for this conflict because of removals of black South Africans for the establishment of white owned agricultural and ranching operations during the 1960s and 1970s (Baldwin, 1975; Lipton, 1972; Savage, 1986). More recently, these operations have transitioned to nature tourism areas managed for wildlife conservation and game

ranching. Economic disparities linger in the region, and differences between PNR properties and nearby community land are stark. For many community residents, continued lack of access to the nature tourism economy perpetuates poverty, negative perceptions regarding protected areas, and challenges to environmental justice. Environmental justice includes equal access to tangible benefits from natural resources and also intangible elements of participation, cultural recognition, and the capacity of communities and individuals to succeed in their society (Schlosberg, 2013). Inequalities and injustices for black South Africans are inherently lamentable, and are additionally problematic for protected areas. These real and perceived conflicts diminish community support for protected areas, and specifically threaten the integrity of PNRs and other reserves in the K2C.

The sharp rise in rhinoceros poaching, from 83 in 2008 to a peak of 1215 in 2014, has exacerbated the conflict between the region's stakeholder groups (DEA, 2016). South Africa contains 79% of the world's remaining black (*Diceros bicornis*) and white (*Ceratotherium simum*) rhinos, and the Greater Kruger region contains the majority of the populations (Emslie et al., 2016). As such, the region has sustained some of the most intense poaching—reportedly 90% of poaching incidents between 2013 and 2015 were in the region (Annecke & Masubelele, 2016; Emslie et al., 2016). To combat the rise in poaching, KNP, PNRs, and other protected areas have used increasingly militarized methods to deter and apprehend poachers and to disrupt organized illicit wildlife trafficking networks.

While militarized techniques have resulted in some reductions in poaching since 2014, analyses of these “green militarization” strategies indicate second-order effects and unintended consequences, such as human rights violations, erosion of trust between stakeholder groups, and intimidation (Annecke & Masubelele, 2016; Duffy et al., 2015). Community members in the region experience real and perceived further disenfranchisement due to intensified restrictions on access to protected areas and may feel unfairly targeted in anti-poaching efforts. These unintended consequences undermine the community support necessary for continued integrity of conservation in the region.

To counter these consequences, one strategy to aid communities and thereby improve their support for conservation initiatives is the establishment and strengthening of benefit sharing programs. Effective benefit sharing can partially offset the costs and negative consequences experienced by communities from the formation and continued security of protected areas. Strategies vary greatly, and programs can provide tangible or intangible benefits to community members. Tangible benefits include income from employment in a reserve or harvesting natural resources from it, while intangible benefits include conservation education or other skills training. KNP and all of South African National Parks (SANParks) have an obligation to ensure accessible biodiversity conservation benefits, often through social investment and development interventions (Swemmer & Taljaard, 2011). Similarly, PNRs in the region are aware of their obligation to meet both conservation and development goals. Many reserves and lodges within them have a history of benefit sharing programs and, as privately owned organizations, they may be in a unique position to garner funding for such programs.

However, resources that can be allocated to these programs are limited, and aiding a substantial portion of the large population in the adjacent communities is challenging. As such, it is crucial to focus resources that are available for beneficiation strategies in a way that most effectively improves the well-being and conservation perspectives of communities. To implement effectively designed beneficiation strategies, it is necessary to understand community members' impressions of benefit sharing program effects.

The research presented here addresses this need by illuminating how different benefit sharing strategies influence the perceptions of community members living adjacent to PNRs in the K2C. Perceptions explored include: development expectations and outcomes, conflict occurrence, acceptability of poaching and anti-poaching strategies, and conservation efforts in the protected areas.

Theoretical Framework

Informing the design and analyses of this study is the theory of social capital. This theory contends there are economic or social benefits that come from cooperation between individuals. Trust, reciprocity, rules, and connectedness are the aspects of social structure that function as resources for individuals within the social system to cooperate to achieve their personal aims (Coleman, 1988; Pretty, 2003; Pretty & Smith, 2004). Social bonds are important for equitable and sustainable use of natural resources in a system (Wagner et al., 2007). Social capital also strongly influences quality of life and socio-economic achievements, and disadvantaged groups are limited by less access to social capital (Lin,

2000). Effective beneficiation strategies between the PNRs and communities may be able to increase reciprocity and linking connections. These would strengthen bonds between the two stakeholder groups and improve the access of communities to social capital in outside groups. Conversely, absent or ineffective benefit sharing programs may decrease trust and reciprocity between stakeholder groups in the K2C, causing increased conflict and limiting development initiatives.

METHODS

Study Area

The K2C biosphere has three categories of land protection: 898,300 Ha of core conservation land that strictly protects ecosystems, 476,400 Ha of buffer zones that surround the core areas, and 1,100,000 Ha of transition areas (MAB, 2007). Allowable land uses in the buffer zones are compatible with the conservation goals of the core conservation area. Activities in the transition zone aim to promote economic and human development, and in the K2C, these activities include agricultural operations, localized mining operations, and game ranching (UNESCO, 1996).

Included in the core and buffer zones is a network of national, provincial, and privately owned protected areas. Four PNRs are contiguous with each other and the western boundary of the KNP, and together they form the Association of Private Nature Reserves (APNR): the Balule Nature Reserve (hereafter referred to as Balule), Klaserie Private Nature Reserve, Timbavati Private Nature and Game Reserve (hereafter referred to as Timbavati), and Umbabat Private Nature Reserve. Boundary fences have been removed

between these four reserves and between the PNRs and the KNP to allow free movement of wildlife. The Sabi Sand Wildtuin (hereafter referred to as Sabi Sand) is a PNR that is also open to the KNP, but separated from the APNR reserves by a provincial nature reserve and communal land.

Outside the protected areas, the majority of the human population resides in densely populated communal areas within the transition zone. Three communities were chosen for this study based on their proximity to three PNRs and differences in the beneficiation strategies the reserves exemplify. They are Maseke, which is located adjacent to Balule, Welverdiend, which is adjacent to Timbavati and Justicia, which is adjacent to Sabi Sand (Figure 3.2). These three communities are located in the Ba-Phalaborwa, Maruleng and Bushbuckridge municipalities, which incorporate the former homeland regions of Lebowa, Gazankulu, and KaNgwane (Coetzer et al., 2014). Across these municipalities, the population is 96% black, with an average unemployment rate of 43%, and 15% of households report no income (Stats SA, 2011a; 2011b; 2011d). Employment options for members of these communities are generally restricted to the existing industries in the region of mining, agriculture, and tourism sectors and their supporting services (Coetzer et al., 2014; K2C, n.d.).

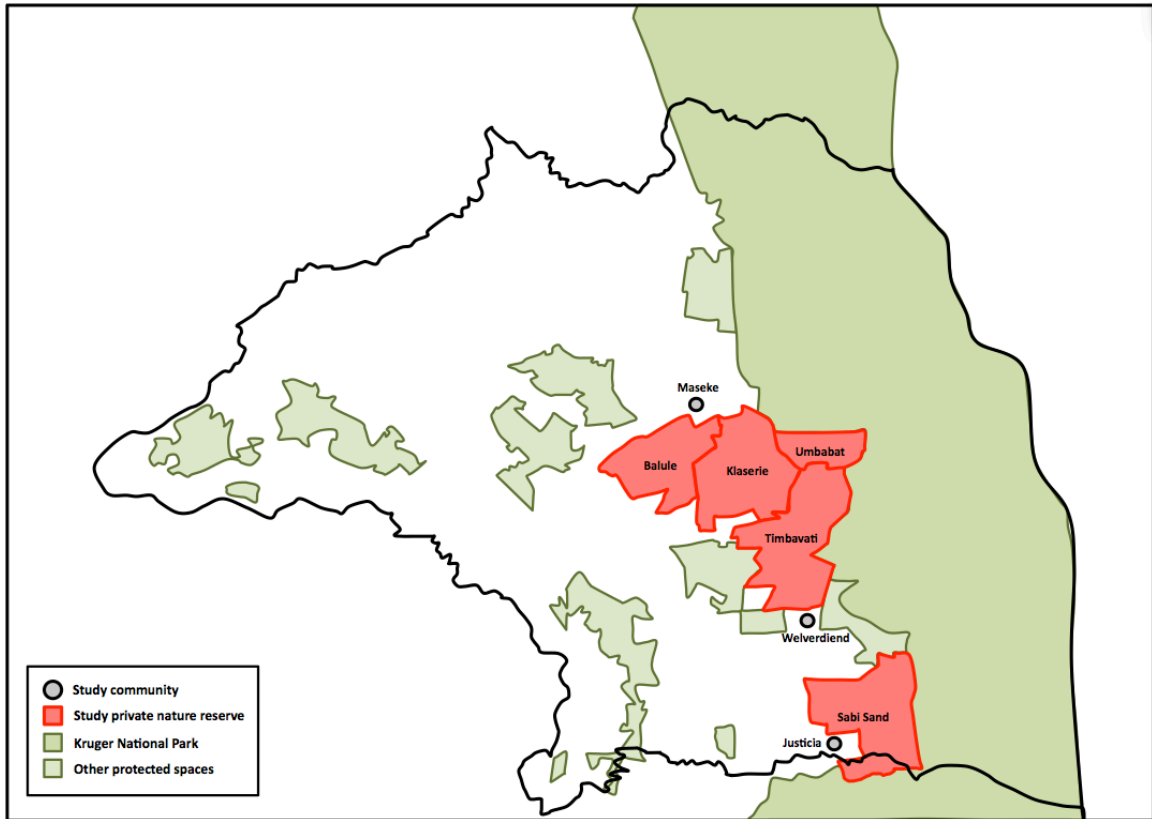


Figure 3.2: Locations of the three communities included in the study survey population are labeled. The five private reserves included in the corresponding PNR stakeholder survey are also labeled and shaded in red.

Residents within former homelands such as Maseke, Welverdiend, and Justicia frequently experience livelihood hardships due to limited options for local employment and to high population densities increasing pressure on natural resources (Blalock, 2014; Maylam, 1990; Ramutsindela, 2015). Census data were not available from Statistics South Africa for Justicia, but the findings for Lillydale (adjacent to Justicia and Sabi Sand) are representative of Justicia and are similar to demographic data from Welverdiend and Maseke. Across all three communities, 19% of the population reports no household income (neither from employment nor social grants), 25% have received no formal schooling, and only 22% have completed high school (Stats SA, 2011c; 2011e; 2011f). The population of the three communities is over 99% black, and the population density is 1,094 people per

km² in the settlements compared to 37 people per km² across all of Bushbuckridge and Ba-Phalaborwa municipalities (Stats SA, 2011a; 2011b; 2011c; 2011e; 2011f). This population density disparity highlights the vastly different land uses in the K2C and ecological pressures in the region. Low educational attainment, high population density, and limited employment options in local industries perpetuate conditions for extreme economic hardships in the K2C.

Program Categorization

Benefit sharing programs implemented by the private reserves are categorized in this research by the type and location of the benefit program. In regard to type, benefits may be either tangible or intangible. Programs that provide income or infrastructure are categorized as tangible benefit programs. By contrast, intangible benefit programs may be some form of education or a tour of the reserve. With respect to the location of the benefit sharing, programs are either 'out-reach' or 'in-reach'. Programs that occur outside of the protected area are 'out-reach', whereas those occurring within PNRs are 'in-reach'. Both tangible and intangible benefit sharing programs may be either out-reach or in-reach. A benefit sharing strategy is a generalization of the primary categories of benefit sharing programs that are most frequently facilitated by the PNRs.

Survey Design and Administration

A preliminary PNR stakeholder survey was used to inform the community survey design and administration. This preliminary survey determined the types of benefit programs offered and with which communities each reserve most frequently interacted. A semi-

structured survey questionnaire was then administered orally in-person to the community members of Maseke, Welverdiend, and Justicia. Areas of inquiry in the community member survey included: awareness and involvement in benefit sharing programs, conflict with the respective PNR, expectations and perceptions of development outcomes, conservation sentiment, and basic demographic information. Survey participants were asked to respond to questions or statements mostly by yes/no or three-point or five-point ordinal response options. Additional response options for 'I don't know' or 'Not applicable' were included where applicable. Participants were also prompted to provide additional comments regarding each area of inquiry at the end of each section. Any participant could opt out of the survey at any time and skip any questions within the questionnaire.

The survey was conducted after introducing the researcher and the aims, methods, and desired outcomes of the study to community leaders at the Tribal Authority Office and receiving permission. Community entry was facilitated by Plough Back to the Communities (<http://www.plough-back.org.za/>), a local non-profit organization that provides interpreting, liaison, field assistance, and other services for researchers within the K2C. When necessary, interviews were conducted with the aid of an interpreter, Lydia Mashabane of Plough Back to the Communities. A purposive snowball sampling technique was used in an effort to capture participants who had been involved in some kind of benefit sharing program. Interviews were typically conducted in the participant's home or place of work, or otherwise in another location within their community. All questions were phrased regarding the PNR adjacent to the community (Balule for Maseke, Timbavati for

Wolverdiend, and Sabi Sand for Justicia). The survey incorporated 105 community members in Maseke (n = 34), Wolverdiend (n = 35), and Justicia (n = 36) between July and September 2015. All of the people who agreed to participate completed the questionnaire, although some questions were not applicable.

Data Entry and Analysis

The interviewer recorded responses on an electronic tablet using Survey Gizmo software (<http://www.surveygizmo.com>). Questionnaires were then downloaded as a comma separated values (.csv) file to be used in Stata for data analyses (version 14.2, StataCorp, College Station, Texas). Quantitative response options were either dichotomous (no = 0, yes = 1), on a three-point Likert-type scale (more = 3, same = 2, fewer = 1), or a five-point Likert-type scale (e.g., strongly agree = 5, agree = 4, neutral = 3, disagree = 2, strongly disagree = 1; strong increase = 5, increase = 4, same = 3, decrease = 2, strong decrease = 1; or 1 = never, 2 = infrequently, 3 = occasionally, 4 = often, and 5 = very often).

Aggregated latent or index variables of program category awareness and involvement were calculated for each participant by summing the number of programs within that category about which the participant reported was aware or in which his/her was household involved. Descriptive summary statistics were calculated to report findings across all communities. Response differences between communities were explored and significant differences between communities were reported. Key variables were compared between communities using a two-sample z-test for proportions for dichotomous variables, the Kruskal-Wallis test for ordinal variables with subsequent pair-wise testing using the Mann-

Whitney U test if Kruskal-Wallis test results were significant, or ANOVA for continuous variables with subsequent pair-wise t-tests using a Bonferroni multiple-comparison adjustment. In some instances, there were no statistically significant inter-community differences in variable values and survey response values were aggregated across the three communities.

RESULTS

Survey Participant Characteristics

Sixty-four percent of participants were female and the average age of participants was 42 years ($SD = 13.75$). Half of the participants were the head of their household, and of those that were not, 56% were the wife, 23% were the daughter, 17% were the son, and 2% were the granddaughter or grandmother of the head of household. The average number of household members was six ($SD = 2.78$), with an average of three adults ($SD = 2.18$) and two minors ($SD = 1.55$). Participants had lived in their respective community for an average of 34 years ($SD = 14.95$). The median educational attainment of the surveyed community members was high school matriculation (41%), but 10% received no formal schooling. Almost a quarter (22%) of participants reported being unemployed at that time.

Benefit Sharing Program Awareness and Engagement

To determine the level of program engagement within each community, participants were first asked if they were aware of benefit sharing programs within their community that had been initiated by the PNR. Proportions of participants who responded “yes” to the occurrence of individual programs and any program within a category in their community

were calculated, and tests of equal proportions were conducted for each program and category (Table 3.1). The occurrence of many programs was reported significantly less frequently in Maseke than in Justicia and Welperdiend. This difference also applies to the out-reach, tangible out-reach, and all intangible benefit categories. Responses regarding community occurrence by the Justicia and Welperdiend community participants were generally similar except for intangible benefit programs, where Justicia reported less in-reach programs but more out-reach programs than Welperdiend. Similarly, the Maseke community members reported a significantly lower level of community occurrence of such programs than the other two communities.

Second, participants were asked if they or any other household members had participated in any of these programs (Table 3.1). Some examples of participation are a household member employed in the reserve, a child attending a school with a bore-hole project, or if the participant performed in a traditional dance group for reserve guests. Not surprisingly, participants reported lower household engagement in programs than they reported as occurring within the community. For example, a participant may have reported household engagement in one particular program, but was likely aware of other programs occurring within their community that their household did not directly benefit from. There was no significant difference between communities for household engagement at the program level. However, there were significant differences at the category level for tangible benefit, tangible benefit out-reach, out-reach, and all programs. Again, Maseke had a significantly lower proportion of participants reporting household engagement in these three categories of programs and all programs. Welperdiend participants reported a significantly larger

proportion of household engagement in tangible out-reach and out-reach categories than the other two communities.

Table 3.1: The proportion of participants who reported knowing a program occurred within their community, and the proportion of participants who reported household engagement in a program. Superscripts a, b, and c indicate significant differences (at $p < 0.05$) in proportions between communities (using the two-sample z-test of equal proportions). In-reach and out-reach program categories include both tangible and intangible benefit programs.

Program category or type	Program occurrence				Household engagement			
	Justicia	Maseke	Wolverdiend	All	Justicia	Maseke	Wolverdiend	All
Tangible benefit	100%	97%	100%	99%	54% ^a	24% ^b	58% ^a	46%
In-reach	100%	97%	100%	99%	34%	24%	17%	25%
Employment with reserve or its lodges	100%	97%	100%	99%	29%	18%	8%	18%
Contract employment	56%	41%	34%	44%	3%	6%	0%	3%
Traditional dance	87% ^a	24% ^b	43% ^b	47%	9%	0%	8%	6%
Out-reach	92% ^a	21% ^b	89% ^a	68%	31% ^a	0% ^b	53% ^c	29%
Traditional dance	95% ^a	3% ^b	51% ^c	43%	9%	0%	3%	4%
Sales of arts and crafts	76% ^a	15% ^b	14% ^b	35%	9%	0%	0%	3%
Sports programs	38% ^a	3% ^b	31% ^a	23%	6%	0%	14%	7%
Water projects	39% ^a	0% ^b	66% ^c	34%	3%	-	31%	11%
Garden projects	45% ^a	0% ^b	37% ^a	25%	3%	-	19%	8%
Infrastructure projects	81% ^a	0% ^b	86% ^a	55%	23%	-	50%	25%
Intangible benefit	100% ^a	47% ^b	94% ^a	81%	34%	24%	42%	33%
In-reach	69% ^a	35% ^b	89% ^c	65%	20%	18%	28%	22%
Conservation education	60% ^a	24% ^b	89% ^a	58%	11%	15%	25%	17%
Visits, game drives	50% ^a	24% ^b	49%	41%	11%	9%	14%	11%
Out-reach	97% ^a	29% ^b	86% ^c	71%	20%	9%	22%	17%
Conservation education	39% ^a	24% ^a	63% ^b	42%	9%	9%	19%	12%
Other education, skills development	63% ^a	0% ^b	31% ^c	32%	17%	-	6%	8%
Guest tours	94% ^a	12% ^b	63% ^c	57%	-	-	-	-
In-reach	100%	97%	100%	99%	46%	35%	39%	40%
Out-reach	100% ^a	38% ^b	100% ^a	80%	37% ^a	9% ^b	58% ^c	35%
All	100%	97%	100%	99%	60% ^a	35% ^b	72% ^a	56%

Third, means of how many benefit sharing programs within each category were calculated, for both occurring within the community and for household engagement (Table 3.2; see Table 3.1 for designation of individual programs within each category). Consistent with reported program occurrence and engagement, results show Maseke participants frequently reported significantly fewer programs both with respect to occurrence within their community and household engagement. More specifically, Maseke participants reported significantly fewer programs as occurring within their community than Justicia and Welverdiend for all categories. Welverdiend participants reported significantly more programs within household engagement categories of tangible, out-reach, and all programs than Maseke, and tangible out-reach than both Maseke and Justicia.

Table 3.2: Mean number (rounded to the nearest whole number) of programs in each program category reported known to occur within the community and with which the household engaged. Standard deviation is reported on the second line for each item. Superscripts a, b, and c indicate significant differences (at $p < 0.05$) in number of programs between communities (using the multiple-comparison Bonferroni test). In-reach and out-reach program categories include both tangible and intangible benefit programs.

Program Category	Community occurrence				Household engagement			
	Justicia	Maseke	Wolverdiend	All	Justicia	Maseke	Wolverdiend	All
Tangible benefit	5 ^a 2.27	2 ^b 0.80	5 ^a 1.96	4 2.25	1 1.45	0 ^a 0.43	1 ^b 1.52	1 1.32
In-reach	2 ^a 0.81	2 ^b 0.70	2 0.84	2 0.80	0 0.64	0 0.43	0 0.38	0 0.51
Out-reach	3 ^a 1.70	0 ^b 0.41	3 ^a 1.59	2 1.83	1 ^a 1.00	0 ^a 0.00	1 ^b 1.37	1 1.09
Intangible benefit	3 ^a 1.43	1 ^b 1.14	3 ^a 1.39	2 1.66	0 0.77	0 0.64	1 0.91	0 0.79
In-reach	1 ^a 0.84	0 ^b 0.71	1 ^a 0.69	1 0.83	0 0.48	0 0.55	0 0.69	0 0.58
Out-reach	2 ^a 0.87	0 ^b 0.60	2 ^a 0.95	1 1.06	0 0.55	0 0.29	0 0.51	0 0.47
In-reach	3 ^a 1.36	2 ^b 1.11	3 ^a 1.12	3 1.29	1 0.96	0 0.71	1 0.81	1 0.83
Out-reach	5 ^a 2.31	1 ^b 0.82	4 ^a 2.24	3 2.68	1 1.27	0 ^a 0.29	1 ^b 1.58	1 1.30
All programs	8 ^a 3.26	3 ^b 1.61	8 ^a 2.98	6 3.60	1 1.91	1 ^a 0.86	2 ^b 1.98	1 1.76

Development Expectations and Perceptions

Across all communities, 13% of participants had households that received income in some form (e.g. employment or sale of crafts) from the adjacent reserve. Justicia had a significantly higher proportion of participants reporting household income from Sabi Sand (31%) than Maseke from Balule (3%) and Welperdiend from Timbavati (3%) ($z = 3.12, p < 0.001$; $z = 3.17, p < 0.001$, respectively). Of those that reported household income from the reserve ($N = 13$), the mean number of household members earning income from the reserve was just one person ($SD = 0.83$), with income derived from PNRs ranging from ZAR 200-12,000 per month ($Mdn = 2,750, \bar{x} = 3,215, SD = 3,160$). Only two participants, both from Maseke, reported collecting natural resources from the neighboring reserve.

Across all communities, participants strongly disagreed that the adjacent PNR provides more options to make money for their household than would be available if the reserve was not there (Table 3.3). However, Maseke and Welperdiend participants disagreed significantly more than Justicia participants who responded neutrally that the PNR provides more options for household income ($U = 2.17, p = 0.030$ and $U = 3.16, p = 0.002$, respectively). In contrast, participants in general strongly agreed that the adjacent reserve provides more options to make money for their community than would be available if the reserve weren't there. However, Maseke participants strongly disagreed with this statement ($U = 4.49, p < 0.001$ and $U = 4.11, p < 0.001$, respectively). Overall, participants were neutral to the statement that the adjacent reserve had fulfilled their commitment of providing development and income opportunities. However, there were significant differences across the three communities; Maseke participants strongly disagreed with the

statement, Justicia participants were neutral and Welverdiend participants agreed ($U = 4.93, p < .001$; $U = 3.07, p = 0.002$; $U = 2.26, p = 0.024$, respectively).

Table 3.3: Agreement with statements regarding PNR provision of financial and development opportunities. Median values are on the first line, mean values are on the second line, and standard deviations are on the third line for each item. Superscripts a, b, and c indicate significant differences (at $p < 0.05$) in agreement between communities (using the Mann-Whitney U test).

	Justicia	Maseke	Wolverdiend	All
The PNR provides more options to make money for their household	3 ^a	1 ^b	1 ^b	1
	2.94	2.00	1.69	2.21
	1.76	1.56	1.21	1.61
The PNR provides more options to make money for their community	5 ^a	1 ^b	5 ^a	5
	4.20	2.38	4.42	3.68
	1.28	1.76	1.04	1.65
PNR fulfilled commitment of providing development and income opportunities	3 ^a	1 ^b	4 ^c	3
	3.00	1.91	3.77	2.89
	1.20	1.60	1.33	1.48

Overall, the survey participants reported no change in provision of development or income opportunities between the 2005 and 2010 or between 2010 and 2015 (Table 3.4). However, Welverdiend participants reported an increase between 2005 and 2010, which was a significantly different median than Justicia and Maseke ($U = 2.59, p = .010$ and $U = 3.29, p = 0.001$, respectively). Moreover, a third of all participants (33%) reported a marked change in either direction in the provision of development or income opportunities between 2005 and 2015, with significantly more Justicia participants (50%) than Maseke (21%) reporting that a marked change occurred ($z = 2.54, p = 0.006$). Some participants commented there was a marked increase in development or income opportunities due to increased community involvement or because of increased tourism around the 2010 Soccer World Cup. However, others indicated a marked decrease in development or income opportunities due to greater surveillance resulting in more dismissals and because

relatively more people from outside the community are hired by the PNR, and consequently there are fewer community members receiving income from the reserve.

Table 3.4: Reported degree of change in the provision of development or income opportunities. Median values are on the first line, mean values are on the second line, and standard deviations are on the third line for each item. Superscripts a, b, and c indicate significant differences (at $p < 0.05$) in perceived change between communities (using the Mann-Whitney U test).

	Justicia	Maseke	Wolverdiend	All
Change between 2005-2010	3 ^a	3 ^a	4 ^b	3
	3.21	3.21	3.91	3.44
	1.09	0.81	1.04	1.04
Change between 2010-2015	4	3	4	3
	3.44	3.29	3.89	3.54
	1.46	0.80	1.28	1.23

Conflict Occurrence and Protection Methods

To understand the prevalence of different conflict types between communities and adjacent reserves, general questions were first asked regarding the occurrence of various types of conflict (besides poaching or protection related conflict) over the past ten years (Table 3.5). 28% of participants across all communities responded that at least one grievance from the community about the reserve had been reported to the reserve. Between communities, Justicia had significantly fewer ($z = 2.65, p = 0.0041$) “yes” responses than Wolverdiend, indicating Wolverdiend participants reported the greatest frequency of conflict of the case studies. Across all communities, 22% of participants indicated at least one demonstration (*toyi-toyi*) had occurred, but there were significant differences between communities.

Wolverdiend participants reported at least one demonstration had occurred more frequently than Justicia ($z = 2.72, p = 0.003$) and Maseke ($z = 4.68; p < .001$), and Justicia reported significantly more than Maseke ($z = 2.57, p = 0.005$). A total of 27 participants (26%) reported animals from the reserve had entered the community and caused damage to

property or people. However, comments indicated seven of these responses were regarding damage causing animal events that occurred before 2005 or were instances of wildlife in the community that did not cause damage (adjusted overall is 19% of participants). And finally, 8% of participants across all three communities reported willful damage of reserve property had occurred.

Table 3.5: Percentage of participants that reported each type of conflict occurring between their community and the adjacent reserve. Superscripts a, b, and c indicate significant differences (at $p < 0.05$) in proportion between communities (using the two-sample z-test of equal proportions).

	Justicia	Maseke	Wolverdiend	All
Community grievance reported to the reserve	14% ^a	26%	43% ^b	28%
Reserve grievance reported to the community	23%	9%	14%	15%
Demonstration	18% ^a	0% ^b	49% ^c	22%
Damage causing animal	29% ^a	3% ^b	46% ^a	26%
Willful damage of reserve property	3%	9%	11%	8%

Eighty percent of participants reported being aware of rhinos in the adjacent reserve, with a smaller proportion of Maseke (58%) participants reporting yes than Wolverdiend (91%; $z = 3.16$, $p = 0.001$) and Justicia (91%; $z = 3.22$, $p = 0.001$). This difference between communities likely reflects both a south to north decreasing gradient of the population of rhinos, and the subsequent decreasing gradient of rhino poaching pressure and exposure to rhino conservation education and protection methods. Almost half of the participants (47%) across the three communities reported having received some kind of information or education on rhino conservation at least one time.

Overall, participants strongly disagreed that they thought poaching wildlife (bushmeat or rhinos) was acceptable (Table 3.6). While still strongly disagreeing, Justicia participants

disagreed significantly less strongly than Maseke and Welverdiend ($U = 2.02, p = 0.043$ and $U = 2.04, p = 0.041$, respectively). Participants also strongly disagreed that their community members thought poaching wildlife (bushmeat or rhinos) was acceptable. Participants responded that community members poached wildlife (bushmeat or rhinos) in the adjacent reserve only infrequently (Table 3.7). Participants reported outsiders poached wildlife (bushmeat or rhinos) in the reserve more frequently than community members. However, Maseke participants reported outsiders never poach which was significantly less frequently than Welverdiend and Justicia ($U = 3.28, p = 0.001$ and $U = 3.45, p = 0.001$, respectively) participants who reported it happening occasionally. This difference may again reflect the gradient of rhino population and poaching pressure.

Table 3.6: Reported degree of acceptability of poaching activity. Median values are on the first line, mean values are on the second line, and standard deviations are on the third line for each item. Superscripts a, b, and c indicate significant differences (at $p < 0.05$) in acceptability between communities (using the Mann-Whitney U test).

	Justicia	Maseke	Wolverdiend	All
Participant's acceptability of poaching wildlife	1 ^a 1.14 0.43	1 ^b 1.00 0.00	1 ^b 1.00 0.00	1 1.05 0.26
Participant's perception of community members' acceptability of poaching wildlife	1 1.69 1.05	1 1.29 0.72	1 1.43 0.77	1 1.47 0.87

Table 3.7: Reported frequency of poaching activity. Median values are on the first line, mean values are on the second line, and standard deviations are on the third line for each item. Superscripts a, b, and c indicate significant differences (at $p < 0.05$) in perceived frequency between communities (using the Mann-Whitney U test).

	Justicia	Maseke	Wolverdiend	All
Frequency community members poach in the reserve	2 2.23 1.42	1 1.79 1.37	2 2.34 1.41	2 2.13 1.41
Frequency outsiders poach in the reserve	4 ^a 3.68 1.49	1 ^b 2.12 1.41	4 ^a 3.31 1.43	3 2.93 1.57

The large majority (96%) of participants were aware of wildlife protection methods used by the reserve. Participants reported that not providing extra protection for rhinos was highly unacceptable ($Mdn = 1$, $\bar{x} = 1.06$, $SD = 0.29$), and correspondingly found protection methods to be highly acceptable overall (Table 3.8). However, on multiple measures, Justicia participants reported significantly lower acceptability of protection methods than Maseke and Welverdiend, including aerial surveillance ($U = 4.10$, $p < 0.001$ and $U = 3.76$, $p < 0.001$, respectively), security cameras ($U = 2.67$, $p = 0.008$ and $U = 3.26$, $p = 0.001$, respectively), and tracking devices on the rhino ($U = 3.48$, $p = 0.001$ and $U = 2.47$, $p = 0.014$, respectively). Interestingly, polygraph testing of reserve employees garnered a more polarized response than other security methods, with 23% of participants reporting it was highly unacceptable and 58% reporting it was highly acceptable. Justicia participants again reported significantly lower acceptability than Maseke ($U = 2.56$, $p = 0.011$), although not significantly different from Welverdiend participants.

Table 3.8: Reported acceptability of protection methods. Median values are on the first line, mean values are on the second line, and standard deviations are on the third line for each item. Superscripts a, b, and c indicate significant differences (at $p < 0.05$) in acceptability between communities (using the Mann-Whitney U test).

	Justicia	Maseke	Wolverdiend	All
Armed patrols	5	5	5	5
	4.72	4.85	4.94	4.85
	0.68	0.50	0.24	0.49
Aerial surveillance	5 ^a	5 ^b	5 ^b	5
	4.28	4.97	4.94	4.77
	1.02	0.17	0.24	0.64
Security cameras	5 ^a	5 ^b	5 ^b	5
	4.68	4.94	5.00	4.89
	0.56	0.34	0.00	0.37
Tracking devices	5 ^a	5 ^b	5 ^b	5
	4.48	4.94	4.82	4.77
	0.71	0.34	0.58	0.57
Polygraph tests	4 ^a	5 ^b	5	5
	3.32	4.06	3.71	3.73
	1.60	1.65	1.80	1.70

The acceptability of protection methods for rhinos was hypothetically posed and had a more polarized responses across all communities than the previous protection methods (Table 3.9). Giving ownership of rhinos, even though they would remain in the reserve, to the communities was overall highly unacceptable. However, Maseke participants reported this was significantly more acceptable than those of Welverdiend and Justicia ($U = 3.93, p < 0.001$ and $U = 4.17, p < 0.001$, respectively). It was also highly unacceptable to harvest rhino horn to destroy in an effort to prevent poaching. However, the median response was neutral toward harvesting rhino horn to sell on a legal market, where 43% reported it would be highly unacceptable and 31% reported it would be highly acceptable. This was the most polarized of the three alternative protection methods explored, and this division is important to consider in light of recent legalization of domestic trade in rhino horn.

Table 3.9: Reported acceptability of alternative rhino protection methods. Median values are on the first line, mean values are on the second line, and standard deviations are on the third line for each item. Superscripts a, b, and c indicate significant differences (at $p < 0.05$) in acceptability between communities (using the Mann-Whitney U test).

	Justicia	Maseke	Wolverdiend	All
Giving ownership of rhinos to nearby communities	1 ^a	5 ^b	1 ^a	1
	1.60	3.65	1.85	2.44
	1.15	1.72	1.54	1.77
Harvest rhino horn to destroy	3	1	1	1
	3.04	2.21	2.26	2.45
	1.67	1.70	1.68	1.70
Harvest rhino horn to sell	3	3	2	3
	3.00	2.85	2.68	2.83
	1.61	1.86	1.84	1.77

Other areas of rhino poaching-related contention involve how reserve or contracted rangers operating within the reserve handle instances of poaching or suspected poaching (Table 3.10). Overall, participants strongly disagreed that community member employees get unfairly laid off. However, participants from both Justicia and Welverdiend responded

neutrally to the statement, which was significantly greater agreement than maseke respondents ($U = 3.74, p < 0.001$ and $U = 3.14, p = 0.001$, respectively). Participants also strongly disagreed that community members are shot while just outside the reserve fence line because it is assumed they are poaching, although Justicia participants disagreed significantly less than Maseke and Welverdiend participants ($U = 2.36, p = 0.019$ and $U = 2.45, p = 0.014$, respectively). Participants responded neutrally to the statement that poachers get shot and killed extra-judiciously more often than they are arrested. However, Maseke participants disagreed significantly more than Justicia and Welverdiend participants ($U = 3.85, p < 0.001$ and $U = 2.38, p = 0.017$, respectively). Generally, agreement with measures of poaching related conflict increases across case studies from Maseke to Justicia. This pattern follows the increase in poaching pressure in the region.

Table 3.10: Reported agreement with actual or alleged ranger responses to real or perceived poaching activity. Median values are on the first line, mean values are on the second line, and standard deviations are on the third line for each item. Superscripts a, b, and c indicate significant differences (at $p < 0.05$) in agreement between communities (using the Mann-Whitney U test).

	Justicia	Maseke	Wolverdiend	All
Employees are unfairly terminated because of false accusations of poaching	3 ^a 2.96 1.48	1 ^b 1.62 1.39	3 ^a 2.82 1.70	1 2.43 1.64
Community members are shot while outside fence line because presumed poaching	1 ^a 1.58 1.17	1 ^b 1.09 0.51	1 ^b 1.03 0.17	1 1.20 0.73
Poachers get shot extra-judicially	3 ^a 3.35 1.09	2 ^b 2.06 1.13	3 ^a 2.79 1.19	3 2.68 1.24

Participants in all communities reported no change in conflict occurrence between 2005 and 2010 (Table 3.11). Overall, participants similarly reported no change in conflict occurrence between 2010 and 2015. However, Welverdiend participants reported a greater decrease in conflict frequency during this period than Maseke or Justicia ($U = 2.08, p =$

0.037 and $U = 3.03$, $p = 0.002$, respectively). In contrast to this, the majority (55%) of participants did indicate a marked change had occurred in conflict levels since 2005. In general, comments from participants indicated this marked increase occurred around 2010 as a result of increased rhino poaching and/or employment disputes. Participant comments indicated that these disputes are typically about the number or relative number of community members employed within the reserve. Some participants did report a marked decrease in conflict levels, and comments indicated this was the result of improved communication between the community and the reserve.

Table 3.11: Reported degree of change in conflict occurrence. Median values are on the first line, mean values are on the second line, and standard deviations are on the third line for each item. Superscripts a, b, and c indicate significant differences (at $p < 0.05$) in perceived change between communities (using the Mann-Whitney U test).

	Justicia	Maseke	Welverdiend	All
	3	3	3	3
Change between 2005-2010	3.13	3.32	3.26	3.24
	0.75	1.17	1.46	1.16
	4 ^a	3 ^a	3 ^b	3
Change between 2010-2015	3.91	3.44	2.82	3.39
	1.16	1.08	1.49	1.32

Conservation Sentiment

Despite real and perceived conflict, participants generally responded favorably toward statements regarding PNR and conservation sentiment (Table 3.12). Participants overall strongly agreed that they liked living next to the reserve. However, Justicia participants, while still strongly agreeing, agreed significantly less than Maseke and Welverdiend participants ($U = 2.55$, $p = 0.011$ and $U = 3.29$, $p = 0.001$, respectively). Participants across all three communities strongly agreed the adjacent reserve is good at conservation.

Participants from all communities strongly agreed that conservation is good because it protects nature. Similarly, the participants overall strongly agreed that conservation is good because it provides their household and community with financial benefits. However, Justicia respondents agreed significantly less than Welverdiend that conservation is good because it provides their community with financial benefits ($U = 2.72, p = 0.007$).

Participants strongly disagreed that protecting land for conservation does more harm than good for them. Justicia participants disagreed less than those from Maseke and Welverdiend ($U = 2.82, p = 0.005$ and $U = 2.45, p = .014$, respectively), with significantly different response distributions compared to both communities.

Table 3.12: Reported agreement with statements of PNR and conservation sentiment. Median values are on the first line, mean values are on the second line, and standard deviations are on the third line for each item. Superscripts a, b, and c indicate significant differences (at $p < 0.05$) in agreement between communities (using the Mann-Whitney U test).

	Justicia	Maseke	Wolverdiend	All
	5 ^a	5 ^b	5 ^b	5
I like living next to the reserve	4.16	4.79	4.94	4.47
	1.26	0.73	0.24	0.81
	5	5	5	5
The reserve is good at conservation	4.63	4.68	4.82	4.71
	0.55	0.88	0.39	0.64
	5	5	5	5
Conservation is good because it protects nature	4.89	4.94	5.00	4.94
	0.40	0.34	0.00	0.31
	5	5	5	5
Conservation is good because it provides my household with financial benefits	4.31	4.59	4.09	4.33
	1.30	1.08	1.44	1.29
	5 ^a	5	5 ^b	5
Conservation is good because it provides my community with financial benefits	4.63	4.74	4.94	4.77
	0.60	0.71	0.24	0.56
	1 ^a	1 ^b	1 ^b	1
Protecting land for conservation does more harm than good for me	1.37	1.09	1.18	1.21
	0.55	0.38	0.72	0.57
	2 ^a	1 ^b	1 ^c	1
Protecting land for conservation prevents me from accessing natural resources I would otherwise	2.60	1.29	1.91	1.94
	1.65	0.91	1.38	1.44
	5 ^a	5 ^b	5 ^b	5
The reserve should continue to protect land for conservation, but with changes to allow for more benefits to the communities	4.37	4.82	4.71	4.63
	1.21	0.76	0.97	1.01

Overall, participants strongly disagreed that protecting land for conservation prevents them from accessing natural resources they would otherwise utilize. There was a significant difference in the distribution of responses across all three communities, however. Justicia participants disagreed less strongly than Maseke and Welverdiend ($U = 4.38, p < 0.001$ and $U = 2.12, p = 0.034$, respectively), and Welverdiend participants disagreed less strongly than Maseke ($U = 2.45, p = 0.015$). Participants across all communities strongly agreed the adjacent reserve should continue to protect land for conservation, but with changes to allow for more benefits to communities. Justicia participants agreed to this significantly less strongly than Maseke ($U = 2.51, p = 0.010$). In whole, Justicia participants agreed significantly less than the other case study communities on three of six measures of desirable reserve and conservation sentiments, and disagreed significantly less on both undesirable reserve and conservation sentiment measures. This indicates that while they do generally support the reserve and conservation activities, their support is not as strong as participants within Maseke and Welverdiend.

DISCUSSION

In an effort to inform the design of programs for effective benefit sharing, community member perceptions of development outcomes, conflict, and conservation were explored. While there are differences in experiences and perceptions within and across communities, two general conclusions can be drawn on how benefit sharing strategies influence the perceptions of communities. First, favorable perceptions of development outcomes appear to be more linked to provision of diffuse benefits and clearly set expectations than to household financial benefit. Second, favorable perceptions toward the reserves and

conservation are likely influenced by conflict levels between the stakeholder groups, but there are differences in the impacts of different types of conflict.

To summarize program provision and benefit sharing strategy of each case study: the benefit sharing strategy between Balule and Maseke can be described as developing, between Timbavati and Welverdiend as focused and widespread, and between Sabi Sand and Justicia as broad. At the time of interviews, the “Bush Babies” conservation education program for school children had just been initiated by Balule in Maseke, and the Black Mamba anti-poaching program had only been operating for about two years. As a result, awareness of and any resultant impacts from these programs were still limited. Timbavati benefit sharing programs with Welverdiend residents are focused on education or other benefits delivered to schools and, because of this, the scope of benefits is limited and expectations are clearer. Their strategy is widespread in that the delivery of benefits is relatively more diffuse across community members—reaching every school, and thus, nearly every child, in Welverdiend. In contrast, while Justicia participants reported a high occurrence of programs and number within each program category, there was not correspondingly higher household engagement in programs. This indicates a strategy that is broad in type of benefits provided, but with less widespread household engagement. The three community and reserve case studies can serve to generally represent three different benefit sharing strategies that other protected areas design and administer.

Diffuse benefit provision is likely linked to favorable perceptions of development outcomes more than household financial benefit or total number of programs. While

Justicia participants overall reported less household engagement in programs than Welverdiend, they did report household income from the reserve significantly more. Despite this, Welverdiend participants agreed significantly more strongly that the reserve fulfilled their development commitments. Preference for diffuse benefits, even if diffusion leads to fewer benefits per person or household, is supported by other studies on the impacts of pro-poor tourism strategies (Mahony & Van Zyl, 2002; Spenceley & Seif, 2003). For example, social infrastructure (e.g. schools or community buildings) provides diffuse benefits and is highly valued because it offers benefits for many more people than individual permanent or contractual employment positions (Spenceley & Seif, 2003). Therefore, more diffuse benefits can be interpreted as providing greater equity of benefits within the community even as the quantifiable benefit per person is less (Gillingham & Lee, 1999; Spenceley, 2001). Similarly, fair recruitment strategies are preferred by communities over referral recruitment strategies because they help to distribute income benefits more widely than when they are limited by those who already have a (often familial) relationship with current employees (Spenceley & Goodwin, 2007; Spenceley & Seif, 2003).

Additionally, clearly set expectations of benefit sharing programs are also an important factor for engendering positive perceptions of development outcomes. Benefit programs between Timbavati and Welverdiend have the advantage of being focused in scope, so expectations of the nature of benefits provided by the reserve via its Foundation are unambiguous. Clearly set expectations have elsewhere been found to be vital for the success and positive perceptions of development outcomes (Spenceley & Goodwin, 2007;

Spenceley & Seif, 2003). Communicating clear expectations establishes an understanding of rules and will improve trust between communities and the reserves, thereby enhancing social capital between the stakeholder groups. Diffuse provision of benefits increases reciprocity, trust, and connectedness among more community members and the reserve, and also extends the opportunity for more community members to have access to this important linking social capital with reserve stakeholders. These intangible social benefits are vital to community members who rely on the reserve for social support and access to various external individuals or organizations (Mahony & Van Zyl, 2002).

Favorable perceptions of community members toward the reserve and conservation are likely associated with conflict, although there appears to be differences in the impacts of different types of conflict. While the reserves and conservation activities were generally regarded positively across all three communities, on some measures they were relatively less favorable to Justicia participants and relatively more favorable to those from Welverdiend. This finding is somewhat surprising, given that Justicia participants more frequently reported household income from the reserve and community occurrence of programs, and Welverdiend participants reported some non-poaching conflicts occurring more frequently. Importantly, Sabi Sand has the most poaching pressure of the three case study reserves, some of which comes from Justicia and other bordering communities. This suggests a difference in the influence of poaching and non-poaching conflict on perceptions of the reserve and conservation.

This difference is likely because types of non-poaching conflict actually function as methods of recognition for communities and, in effect, can serve to improve relationships and perceptions. This idea is supported by other findings that communication and forms of community participation can improve delivery of benefits in this setting (Spenceley, 2003). For example, while they may be points of contention, reported complaints are still dialogue between stakeholder groups. Protests or demonstrations are methods for communities to communicate with reserves and may influence hiring decisions or provision of benefits. In contrast, conflict related to poaching and PNR responses to it worsens perceptions because it exacerbates divisions between the two stakeholder groups. Where poaching pressure is higher, poaching is (slightly, though significantly) less unacceptable, common protection methods are less acceptable, and negative conceptions of how suspected or actual poachers are treated by reserves and rangers are more common. Despite poaching conflict, support for conservation is high among community participants and should be considered a unifying characteristic between stakeholder groups studied here rather than one that needs to be motivated within communities. It is, however, important to design and administer benefit sharing strategies that can enhance behavior supporting conservation initiatives and private nature reserves in particular.

This study further elucidates community member perceptions of benefit programs despite some shortcomings. These include a relatively small sample size compared to the populations of each community and of the K2C Biosphere as a whole. Furthermore, there is a higher percentage of participants who have completed high school and lower percentage of unemployment than the average of the three municipalities. This is likely the

result of the sampling technique including more school and reserve employees than are representative of the population of the whole community or municipality. There is also the potential for response bias of participants given the sensitive nature of the subject matter of conflict, and poaching specifically. Despite these limitations, the three case studies offer an insightful comparison of the impact of benefit sharing approaches, and the findings can be applied in other settings. Benefit sharing does not fully address historical and current injustices and inequalities. To do so may require a transformative devolution of natural resource and protected area access and ownership. However, efforts should still be made to improve development initiatives and promote environmental justice through effective benefit sharing, even within the current landownership structure and socioeconomic setting.

Conclusion

Consideration of the experiences and perceptions of communities adjacent to protected areas is particularly important in determining the efficacy of reserves' benefit sharing strategies, and frequently overlooked (Bennett, 2016; Spenceley, 2001; Spenceley & Seif, 2003). This research addresses this need by describing and comparing both quantitatively and qualitatively how community members perceive the outcomes of different approaches to benefit sharing. Benefits delivered by PNRs adjacent to the KNP may be relatively small compared to the size of the population and degree of poverty within the K2C. However, the findings of this study corroborate the results of other research that show there are characteristics of benefit sharing strategies that can be leveraged to most effectively enhance positive community member perceptions of the reserves and reduce community-

reserve conflict. These characteristics are diffuse benefit provision and clear expectations. It is recommended that these characteristics are taken into consideration in the design and improvement of benefit sharing strategies, not only so the resources of reserves are applied most effectively, but perhaps more importantly, so the preferences of communities are reflected in the further development of benefit sharing programs.

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CHAPTER IV

BENEFIT SHARING STRATEGY AND STAKEHOLDER PERCEPTIONS OF PROGRAM OUTCOMES

INTRODUCTION

Conservation land management increasingly considers social and financial development factors for the regions surrounding protected areas. The continued integrity of conservation spaces relies on the support of local communities impacted by and impacting these spaces (Anthony, 2007; Kreuter et al., 2010; Metcalfe, 2003). Such local community support can often be cultivated through development schemes linked to the protected area (Anthony, 2007; Balint, 2006; King, 2007; Swemmer et al., 2014). A thorough understanding of the relationship between the provision of benefits and support for protected areas is vital to further the work of initiatives aiming to address both conservation and development needs. This paper reports on findings from two complimentary surveys of private nature reserve stakeholders and nearby community members in the Kruger to Canyons (K2C) Biosphere. It aims to understand the relationships between benefit sharing programs, conflict, and perceptions, and to make recommendations for effective benefit sharing strategies.

Biosphere Reserves are designated areas of both conservation and development importance. They include core protected areas, as well as buffer zones and transition areas where economic activities that compliment the core area conservation goals are supported. However, the designation of these zones within a Biosphere may be based on existing land-use, and land management that adheres to Biosphere Reserve goals may be

complicated as a result (Coetzer-Hanack et al., 2016). The K2C Biosphere in northeast South Africa is one such Biosphere (Figure 4.1). It consists of the central portion of Kruger National Park (KNP) to the east, the Blyde River Canyon Nature Reserve to the west, and between these extremities is a patchwork of private and provincial protected areas, human settlements, agriculture, and a large mining operation. Protected spaces in the K2C make up just over half of the land cover, and of this, privately owned protected areas (PNRs) in the region contribute a significant portion (Coetzer-Hanack et al., 2016). Some of the largest and earliest established are adjacent to the western boundary of the KNP. By dropping boundary fences between the national park and each other, the PNRs have appreciably expanded the area of land available to wildlife in the Biosphere. Dense human populations that total over 1.5 million reside in the K2C (K2C Biosphere Region, n.d.). Having such a large population surrounding protected areas is a challenge for both conservation management and the development of communities.

wealthy white South Africans, and includes areas from which black South Africans were evicted (Baldwin, 1975; Lipton, 1972; Savage, 1986). Most of the private land was formerly crop and livestock production and converted to wildlife-based tourism or ranching operations primarily during the 1990's when the wildlife economy became more lucrative (Kreuter et al., 2010). This transition saw both the formation of PNRs comprised of contiguous farms and ranches, and the loss of jobs for neighboring communities with rise of the less labor-intensive nature tourism industry (Coetzer et al., 2013).

The legacies of relocations and restricted employment options continue today in the K2C, which contribute to environmental justice concerns for black South Africans.

Environmental justice includes equal access to tangible benefits from natural resources and also intangible elements of participation, cultural recognition, and the capability of communities and individuals to succeed in their society (Schlosberg, 2013). Specifically in the K2C, there are highly and densely populated communities with a limited number of options for employment in industries in the region, and a lack of access to land, natural resources, and the wildlife economy for the majority black population (Blalock, 2014; Langholz & Krug, 2004). Additionally, and unsurprisingly more so for privately owned protected spaces, there remains unequal participation and recognition of black South Africans in environmental decision-making, and an inability to adequately enable them to succeed in their society.

These inequalities and injustices in the region have resulted in tension between community and PNR stakeholder groups, and since 2011, this conflict has been amplified by the sharp

rise in rhinoceros poaching and the protectionist response to it. Both black (*Diceros bicornis*) and white (*Ceratotherium simum*) rhinos occur in South Africa, and poaching numbers in the country rose from 83 in 2008 to a high of 1,215 in 2014 (DEA, 2016). Although these numbers have dropped slightly in the past two years, this level of population loss to both species is concerning, and vigilance is necessary to prevent further stimulating illegal and potentially unsustainable trade (Kitade & Toko, 2016). In response to such a dramatic rise in poaching and the threat of species extinction, managers of protected areas in the country have intensified security dramatically using increasingly militaristic strategies. This approach, called ‘green militarization’, includes the use of armed patrols, aerial monitoring and response, tracking dogs, and elaborate intelligence gathering operations (Duffy, 2014; Lunstrum, 2014).

However, militarized strategies for the protection of rhinos and conservation areas have perverse outcomes that undermine the intention of protection efforts (Annecke & Masubelele, 2016; Duffy et al., 2015b; Lunstrum, 2014). These unintended consequences include intimidation, human rights violations, and erosion of trust (Annecke & Masubelele, 2016; Duffy et al., 2015a). The result of this is the deterioration of support from local communities that is critical for the long-term integrity of protected areas. Environmental injustices for black South Africans and the consequences of militarized protection are inherently worrisome and are problematic for protected areas because of lessened local support for the areas. Importantly, community support can be garnered through effective sharing of benefits generated by the protected areas (Anthony, 2007; Balint, 2006; King, 2007; Swemmer et al., 2014). Benefit sharing can partially offset the costs and inequalities

resultant from the formation and continued existence from protected areas, and PNRs are uniquely motivated to provide benefit programs in the K2C. Firstly, there is reason to deliver benefits to local communities because PNRs have a contentious history and represent contemporary racial disparity in many ways. And secondly, many of these reserves or the lodges within them have already demonstrated an interest to engage in benefit sharing through long-established programs. However, PNR stakeholders are often unaware of strategies that can augment security efforts through effective deliver of benefits, supporting the long-term integrity of protected spaces.

There is a need to thoroughly understand the drivers and impacts of benefit sharing strategies that appropriately considers both community member perspectives of outcomes and the motivations and deterrents for participation by PNR stakeholders. To address this need, this paper addresses three objectives: 1) to synthesize findings from a survey of three PNRs to identify motivations and administrative conditions that support effective benefit sharing, 2) to synthesize findings from a survey of three communities to determine preferred benefit sharing strategies, and 3) to provide recommendations of benefit sharing strategies that best decrease conflict, satisfy development expectations, and encourage a conservation constituency, while considering both community and PNR stakeholder perspectives.

Theoretical Framework

This research is informed by and contributes to the theory of social capital, which asserts there are four aspects of social structure that function as resources for individuals to realize

their personal objectives (Coleman, 1988; Pretty, 2003; Pretty & Smith, 2004). These aspects are: trust, reciprocity, rules, and connectedness. Common rules, norms, and sanctions ensure the interests of groups and individuals are complimentary, and allow for mutual cooperation. Cooperation is enhanced by, and in turn enhances, reciprocity, trust, and connectedness in social systems. Enhancing these aspects of social structure allow for economic and collective benefits that are facilitated by the lowered transaction costs of working together (Pretty & Ward, 2001).

Increasing cooperation and trust results in people having confidence to invest in collective activities instead of unrestrained private actions that are often the cause of conflict and resource degradation in natural resource use systems (Wagner et al., 2007). In the K2C region, unbounded individual actions are contributing to the degradation of natural resources utilized by communities and the illegal harvest of natural resources within protected areas. Equally importantly, socio-economic achievements and quality of life are also heavily influenced by access to social capital (Lin, 2000). Improved relationships between PNR and community stakeholder groups through benefit sharing programs can facilitate reciprocity and foster trusting relationships that can ameliorate tensions between the two groups. Engagement in programs can also promote bonds of connectedness both within communities, and crucially, more linkages between communities and PNRs. This would advance information, finances, or even natural resources to the community. Access to education, skills training, and financial resources are of course vital to development, and these cross-group ties facilitate better access to resources needed by disadvantaged community members.

METHODS

Study Area

The K2C region contains grassland, afro-montaine forest, and savannah biomes (K2C, n.d.; MAB, 2007). The subtropical climate here is characterized by mild, dry winters and hot, humid summers with a west to east rainfall gradient averaging 386 mm per year in the eastern lowveld and up to 3,000 mm in the western plateau (K2C, n.d.). There are high levels of biodiversity in the region. Of particular note are endemic plant species in the escarpment mountains in the west, and the culturally and economically important wildlife species in the protected areas in the east. Of a total of nearly 2.5 million hectares, 36% (898,300 ha) of land cover is designated as core protected ecosystems, 19% (476,400 ha) as buffer zones where land uses compatible with the core areas are allowed, and 44% (1,100,000 ha) as transition areas (MAB, 2007). Permissible transition zone activities include those that aim to promote economic and human development that are compatible with the social and ecological sustainability goals of Biosphere Reserves (UNESCO, 1996). In the K2C, the transition zones include private and commercial agricultural operations, a large cluster of open-pit and underground mines (which is antithetical to conservation goals), and over 1.5 million residents.

The core and buffer areas in the K2C consist of a patchwork of national, provincial, and privately owned land managed for ecological conservation. Balule Nature Reserve, Klaserie Private Nature Reserve, Timbavati Private Nature and Game Reserve, and Umbabat Private Nature Reserve are four PNRs that are adjacent to the western boundary of the KNP and together comprise the Association of Private Nature Reserves (APNR).

The four PNRs are contiguous with each other and the KNP and have removed all boundary fences between them. This allows the PNRs and the national park to form a continuous protected area that allows for animal migration and regulated shared access to properties for tourism or management operations. Sabi Sand Wildtuin (Sabi Sand) is a PNR that also shares a fence-less border with the KNP, but it is separated from the APNR reserves by a provincial reserve and community settlements.

The APNR reserves and Sabi Sand were selected for inclusion in the PNR stakeholder survey based on their prominence in the region's tourism industry and their close relationship with the KNP (Figure 4.2). Because of the independent formation of each of the PNRs, their ownership and management arrangements may differ. For example, each land parcel ('farm') within the PNR may be owned by an individual, a family, or cooperative. Commercial lodges may or may not be operated on the land parcels, and these may be owned and managed by a single landowner, cooperative of landowners, or commercial entity. Similarly, the management structure of the PNRs also differs. Balule is a federation of seven 'regions', each with its own warden who manages the region in accordance with the other region wardens, the Balule executive committee, the head warden, and the PNR's constitution. The other PNRs are not subdivided into multiple management regions, and management decisions are the responsibility of an overarching reserve management entity. All the PNRs are governed by an executive committee made up of landowners voted into the positions by other landowners. However, the size of the committee (from seven to thirteen) and tenure of members (from one to five years) varies across the five reserves. Wardens of the reserves generally make recommendations to the

executive committee and carry out decisions, but they do not have the authority to make all decisions without consultation with and permission from the executive committees.

Of these five surveyed reserves, Balule, Timbavati, and Sabi Sand were selected for case studies of community-reserve transects. These were selected based on their proximity to communities and differences in their approaches to benefit sharing. The intensity of poaching pressure experienced by the KNP and adjacent PNRs has a south-north gradient. The southern portion (referred to as the 'Intensive Protection Zone') incurs the heaviest level of poaching, which decreases northward. The case study reserves are also roughly in a south-north orientation, with Sabi Sand in the south and Balule in the north.

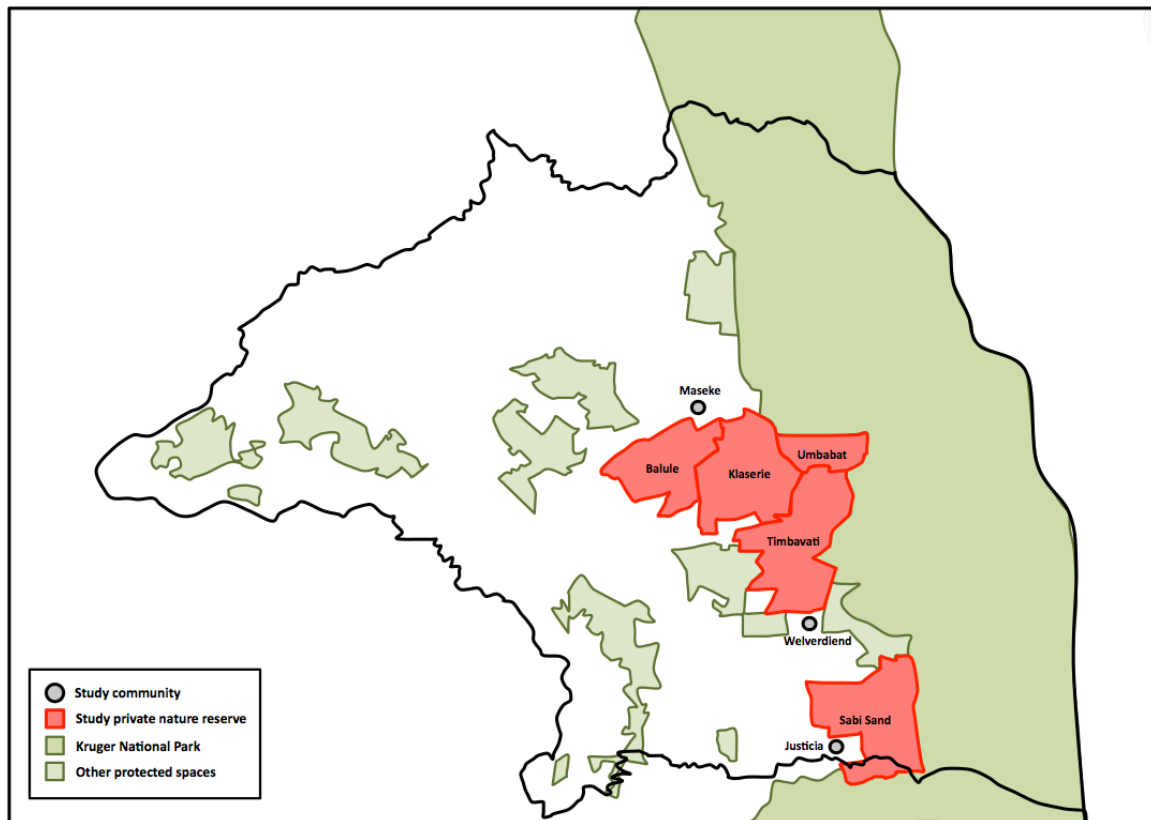


Figure 4.2: Locations of the five private reserves included in the study survey population of private reserve stakeholders in red, and the location of the three communities included in the study survey population of community members.

The three case study communities are adjacent to each of the three reserves (Figure 4.2), although the immediacy and length of shared border differs between them varies. Sabi Sand has the longest shared border with the Justicia community. Timbavati also has an exposed border, however, it is shorter and separated from the Welverdiend community by Orpen Road, a main thoroughfare to one of the KNP's entry gates. Balule is the case study that is least exposed to its corresponding community, Maseke. Justicia and Welverdiend are in Bushbuckridge municipality and Maseke is in Ba-Phalaborwa municipality. Traditional settlements within former homelands, such as the case study communities, typically have higher population densities and more extreme economic hardships than the

other areas. Census data were not available for Justicia, but data for Lillydale (adjacent to Justicia and Sabi Sand) are representative of Justicia. Across all three communities, the population is over 99% black with an average population density of 1,091 people per km² compared to 53 and 20 people per km² in Bushbuckridge and Ba-Phalaborwa municipalities, respectively (Stats SA, 2011a; 2011b; 2011c; 2011d; 2011e). On average, 19% of the three communities have no reported household income from employment or social grants, which is somewhat higher than 17% in Bushbuckridge and 13% in Ba-Phalaborwa (Stats SA, 2011a; 2011b; 2011c; 2011d; 2011e). Options for local employment are few and limited to the mining, agriculture, and tourism sectors and their supporting services (Coetzer et al., 2014; K2C, n.d.). Only 22% of adults across the case study communities completed high school, and 25% received no formal schooling.

Program Categorization

Benefit sharing programs occurring within each of the three case studies are characterized by the benefit type and by the program location. Programs can provide either ‘tangible’ or ‘intangible’ benefit types. For example, programs that yield income, infrastructure, or natural resources by the reserve to adjacent communities are categorized as tangible benefit programs, whereas those that provide education or a tours within the reserve are categorized as intangible benefit programs. Programs are also categorized by benefit location as either ‘in-reach’ or ‘out-reach’. Programs that generate benefits outside the PNR and within the proximate community are out-reach, and those that generate benefits for communities within the boundaries of the PNR are in-reach. Tangible and intangible benefit programs may be either in-reach or out-reach. For example, conservation education

for community youths may occur within the PNR or out in the community at schools. The benefit sharing strategy of a reserve-community pairing is a generalization of the categories of programs most typically facilitated by the PNR.

Survey Design and Administration

The study was conducted using complementary surveys of stakeholders from the five PNRs and community members from the three communities. Design and administration of both surveys were informed by a preliminary survey of key PNR informants throughout the K2C to identify the most appropriate PNRs and communities to include in the study. Information derived from the preliminary PNR survey and initial community interviews was used to determine key survey items and appropriate response options for the subsequent comprehensive surveys. This included benefit sharing program options and types of conflict experienced by the stakeholder groups. Areas of inquiry for both surveys included: basic demographic information, identification of benefit sharing programs facilitated by the reserve, and the occurrence of conflict. PNR stakeholders were also asked questions related to inter-reserve communication and collaboration, wildlife asset protection, motivations and deterrents to engaging in benefit sharing, and perceptions of the effects of their PNR's benefit sharing programs. Community members were also asked questions related to their perceptions of development outcomes and support for conservation and security. Survey participants were asked to respond to questions or statements mostly by using yes/no and five or seven-point ordered response options. Where appropriate, response options for 'I don't know' or 'Not applicable' were also

included. Participants were also prompted to provide any additional comments within each area of inquiry in the questionnaire.

After evaluating findings from the preliminary survey, a questionnaire was developed for the comprehensive PNR survey. This comprehensive survey was administered online via emails sent to each PNR's stakeholders, including wardens, managers, executive committee members, landowners, education and outreach facilitators, and community liaison employees. While online surveys typically have lower response rates than mail surveys, electronic distribution was necessary because many of the survey participants are absentee landowners/managers (some international). Additionally, the South Africa mail service is slow and intermittently unreliable, and in many instances mailing addresses were unobtainable. Survey questionnaires were distributed after the researcher was introduced to the PNR wardens of each reserve who were informed about the aims, methods, and anticipated outcomes of the study; and they granted permission to conduct the study. In all reserves, the initial request to participate in the study was sent by the warden or an executive committee member to the PNR members. This was done in an effort to increase the response rate with the assumption that reserve stakeholders would be more likely to complete the survey questionnaire if the request came from a known individual. Following a modified Dillman (2007) method, two reminder messages were sent by the lead researcher to participants who had not yet completed the questionnaire. A thank you message was also sent to each respondent after they submitted the questionnaire. Despite variation between reserves in ownership and management structure, consistency in message content and distribution schedule was maintained. The PNR questionnaire was

sent to 153 contacts (Balule = 22, Sabi Sand = 24, and Timbavti = 107). Of these, a total of 56 respondents returned at least partially completed questionnaires (response rate = 37%), and 36 completed the questionnaire in its entirety (24%). Responses from partially completed questionnaires were used if responses were available for the variables being explored. Responses received from each PNR were: Balule = 20 (36%), Sabi Sand = 12 (21%), and Timbavati = 24 (43%).

The comprehensive community survey was administered after the researcher was introduced to community leaders at the Tribal Authority Office of each community who were informed about the aims, methods, and anticipated outcomes of the study; and they granted permission to conduct the study. A local non-profit organization, Plough Back to the Communities (<http://www.plough-back.org.za/>), facilitated community entry and provided an interpreter for the interviews. A purposive snowball sampling technique was used to allow inclusion of participants who were involved in benefit sharing programs. All questions were phrased with respect to the adjacent case study reserve for each community (Balule for Maseke, Timbavati for Welverdiend, and Sabi Sand for Justicia). The community questionnaire was administered to 105 community participants as follows: Justicia = 36, Maseke = 34, and Welverdiend = 35.

Data Entry and Analysis

PNR survey questionnaires were self-administered online via an emailed link to the questionnaire developed using SurveyGizmo (www.surveygizmo.com). For community interviews, responses were recorded by the interviewer on a tablet device using an offline

version of the questionnaire also through SurveyGizmo. Survey responses from each survey were downloaded as comma separated values (.csv) files for data analysis using Stata (version 14.2, StataCorp). Quantitative response options were either dichotomous (no = 0, yes = 1), or on a five or seven-point Likert scale for agreement, increase, and frequency scales (from 1 = Strongly disagree to 5 = Strongly agree, or 1= Strongly disagree to 7 = Strongly agree, and similarly from Strong decrease to Strong increase or from Never to Very often). Five-point scales were used for the community survey, while seven-point scales were used for the PNR survey. The seven-point scale was preferred to allow more fine distinctions between responses, but initial interviews in the community survey found a simplified scale was more appropriate for the study population. Responses in both five and seven-point scales were then standardized to a 0 to 1 scale, with 0.05 as the neutral value for each.

Associations between variables and each stakeholder group were explored to identify relationships between key predictor variables and outcomes (Tables 4.1-4.3). Perceived outcomes for both stakeholder groups were within the categories of reserve and conservation sentiment, conflict, and development (Tables 4.2 & 4.3). An absolute r-value of 0.10-0.29 is considered a weak, 0.30-0.49 a moderate, and ≥ 0.50 a strong relationship (Acock, 2012). As the stakeholder groups' role in benefit sharing initiatives differed, questions on the perceived or experienced outcomes from programs were not identical for the two groups. Nevertheless, certain measures within each stakeholder survey can be considered equivalencies, and differences between the two groups regarding perceived outcomes are also explored here. Dummy variables were used for community and reserve

affiliation and latent scale variables were developed for conflict intensity. For both survey groups, conflict intensity is the sum of the total number of conflict types reported as occurring (out of seven) and the response value of change in conflict frequency (on a standardized 0-1 scale). The conflict intensity summative scale was then also standardized on a 0 to 1 scale. For PNR stakeholders, associations were investigated between reserve affiliation, number of programs reported, motivations, deterrents, and perceived outcomes.

Table 4.1: PNR stakeholder motivation and deterrent survey questions and variable labels. Associations were explored between predictor variables listed here with reserve affiliation and the number of benefit sharing programs reported as occurring with the community.

Label	Survey Question	Measure
Motivation		
Appropriate labor	Adjacent communities are the most appropriate source of labor	Agreement
Convenient labor	Adjacent communities are the most convenient to employ	Agreement
Knowledge	Locals provide the most knowledge for guiding	Agreement
Guest desire	Engagement with adjacent communities is desired by reserve guests	Agreement
Relationship goal	It is stated in the vision or goals of the reserve to foster good relationships with nearby communities	Agreement
Development goal	It is stated in the vision or goals of the reserve to contribute to economic or social development of nearby communities	Agreement
Relationship duty	The reserve has a duty to foster good relationships with nearby communities, regardless of stated commitments	Agreement
Development duty	The reserve has a duty to contribute to economic or social development nearby communities, regardless of stated commitments	Agreement
Deterrent		
Lack money	There is a lack of financial resources to support programs	Agreement
Pull resources	Benefit sharing pulls financial resources from more advantageous areas	Agreement
Not goal	Constituency building is not in the vision or goals of the reserve, and so should not be emphasized	Agreement
Lack trust	Lack of trust in community members deters me from engaging in programs	Agreement
Risk abuse	There is a risk of further abuse of natural resources by community members if more access is allowed through programs	Agreement
Conflict occurrence	Past or current instances of conflict with communities deter me from engaging in programs	Agreement
Conflict risk	Engagement in programs increases the risk of conflict with community members	Agreement
Unaware	I am unaware of program possibilities or options	Agreement
Difficult	Programs are difficult to implement	Agreement

Table 4.2: PNR stakeholder perceived outcome survey questions and variable labels. Associations were explored between outcome variables listed here with reserve affiliation and the number of benefit sharing programs reported as occurring with the community.

Label	Survey Question	Measure
Reserve & conservation sentiment		
Reserve positive	Increasing positive attitudes among nearby community members toward reserve	Agreement
Conservation positive	Increasing positive attitudes among community members toward conservation activities in protected areas in general	Agreement
Poaching negative	Increase negative perceptions among community members toward poaching activities	Agreement
Conservation ethic	Encourage a conservation ethic among local residents	Agreement
Conflict		
Conflict intensity index	Total of reported conflict types and the average of response values for degree of change in conflict events, including poaching, since 2010	Scale
Community poach rhino	Adjacent community active in rhino poaching in this reserve	Agreement
Community poach wildlife	Adjacent community active in wildlife poaching in this reserve	Agreement
Increase conflict	Increase opportunities for conflict with nearby communities	Agreement
Reduce rhino poaching	Reduce rhino poaching pressure, specifically	Agreement
Development		
Economic development	Contribute to community economic development	Agreement
Education & skills	Contribute to community education or job skills training	Agreement

For community members, associations were investigated between community affiliation, household income from the adjacent reserve, number of programs reported, and perceived outcomes. Community participants were asked to report programs they were aware of occurring within their community and programs they or a household member had participated in or benefitted from in the past 12 months. Both reported community and household program totals were explored for associations with community affiliation and perceived benefit sharing outcomes.

Table 4.3: Community stakeholder perceived outcome survey questions and variable labels. Associations were explored between outcome variables listed here with household income from reserve, the number of benefit sharing programs reported as occurring with the community, the number of benefit sharing programs with which the household engaged, and community affiliation.

Label	Survey Question	Measure
Reserve & conservation sentiment		
Like reserve	I like living next to the reserve	Agreement
Conservation good	Conservation is more good than good for you	Agreement
Poaching unacceptability	I think poaching is unacceptable	Agreement
Community poaching unacceptability	My community members think poaching is unacceptable	Agreement
Protects nature	Conservation is good because it protects nature	Agreement
Conflict		
Conflict intensity index	Total of reported conflict types and the response value for degree of change in conflict events since 2010	Scale
Community poach	How often you think members of your community poach wildlife in the reserve	Frequency
Outsiders poach	How often you think people from outside your community poach wildlife in the reserve	Frequency
Unfair termination	Members of your community are unfairly fired from the reserve because of false accusations of being involved in rhino poaching	Agreement
Poachers shot	People who are rhino poaching in the reserve are shot and killed by guards more often than they are arrested	Agreement
Assume poaching	People from your community are shot and killed by guards when they are near the reserve fence line because it is assumed they're rhino poaching	Agreement
Development		
Community options	The reserve provides more options to make money for your community than would be available if the reserve wasn't there	Agreement
Household options	The reserve provides more options to make money for your household than would be available if the reserve wasn't there	Agreement
Development fulfillment	Do you think the reserve fulfills their commitment of development opportunities for your community	Agreement

RESULTS

PNR Outcome Associations

Key predictor variables of motivations, deterrents, and perceived outcomes were used to explore the perceptions related to engagement in PNR benefit sharing programs. Six motivations were moderately to strongly associated with the number of benefit sharing programs offered by the reserve (Table 4.4). Of these motivations, the goal to foster good

relationships is the most strongly associated with the total number of benefit sharing programs and in most of the program categories. Other motivations strongly associated with program number are a stated goal to contribute to development and the perception that neighboring communities are the most appropriate labor source. The fact that the goals to foster good relationships with and contribute to economic development of neighboring communities are frequently strongly associated with number of programs, over even the duty to foster good relationships and contribute to development, indicates the value in making explicit goals to support benefit sharing initiatives.

There are fewer statistically significant deterrents to the number of benefit sharing programs, and they are nearly all moderate associations (Table 4.4). Only reported unawareness of program options is associated with the total number of benefit sharing programs, and is also associated with all but one of the program categories. That there are fewer significantly associated deterrents than motivations indicates the general support for benefit sharing programs—respondents are generally more motivated than deterred to engage in them. It is unsurprising that reporting unawareness of benefit sharing program options would be associated with reporting a smaller number of programs. Furthermore, unawareness is a condition that can be remedied through improved information sharing.

Table 4.4: Motivation and deterrent statements that are significantly associated with the number of benefit sharing programs reported. All *r*-values shown in the table are significant at the *p* = 0.05 level. Predictor variables not included from Table 4.1 did not have a significant association with the number of programs in any category. Variable labels are explained in Table 4.1.

	# tangible programs	# intangible programs	# in-reach programs	# out-reach programs	# all programs
Motivation					
Appropriate labor	0.43	0.52	0.57	-	0.55
Guest desire	0.44	-	-	0.39	0.42
Relationship goal	0.64	0.59	0.40	0.60	0.62
Development goal	0.64	0.51	-	0.59	0.54
Relationship duty	0.46	0.48	-	0.48	0.41
Development duty	-	0.36	-	-	-
Deterrent					
Risk abuse	-0.36	-	-	-	-
Unaware	-0.45	-0.50	-0.48	-	-0.45
Difficult	-	-	-0.43	-	-

The number of benefit sharing programs reported was positively associated with desirable outcome measures in each of the categories (Table 4.5). Importantly, there is a significant association between number of programs and reducing rhino poaching, even while there was not an association with other poaching-related outcomes. Findings indicate respondents who report a greater number of programs believe they do have an appreciable effect on reserve and conservation sentiment of, poaching-related conflict with, and both economic and educational development of adjacent communities.

Table 4.5: Perceived outcomes that are significantly associated with the number of benefit sharing programs reported. All r -values shown in the table are significant at the $p = 0.05$ level. Outcome variables not included from Table 4.2 did not have a significant association with the number of programs in any category. Variable labels are explained in Table 4.2.

	# tangible programs	# intangible programs	# in-reach programs	# out-reach programs	# all programs
Reserve & conservation sentiment					
Reserve positive	0.36	0.37	-	-	0.39
Conservation ethic	0.60	0.48	0.43	0.42	0.56
Conflict					
Reduce rhino poaching	0.53	0.50	-	0.58	0.48
Development					
Economic development	0.55	0.55	0.58	0.39	0.63
Education & skills	0.59	0.65	0.68	0.49	0.70

There are fewer significant associations between reserve affiliation and motivations and deterrents to engagement (Table 4.6). This indicates there are few differences between reserves' stakeholders in their willingness to engage with benefit sharing initiatives. However, affiliation with Balule is negatively associated with reported goals of fostering good relationships with and contributing to the development of the neighboring community. Correspondingly, affiliation with Balule is positively associated with reporting that constituency building is not a goal of the reserve. Benefit sharing seems to be less of a mandate for Balule than the other case study reserves, possibly because they have less exposure to communities than the other two case study reserves. The negative association of Sabi Sand affiliation with reporting lacking finances and being unaware of program options is indicative of the established history of the reserve, and lodges and properties within it, in community beneficiation programs.

Table 4.6: Motivation and deterrent statements that are significantly associated with reserve affiliation. All *r*-values shown in the table are significant at the $p = 0.05$ level. Predictor statements not included from Table 4.1 did not have a significant association with reserve affiliation. Variable labels are explained in Table 4.1.

	Sabi Sand	Timbavati	Balule
Motivation			
Guest desire	0.38	-	-
Relationship goal	-	-	-0.58
Development goal	-	0.44	-0.65
Deterrent			
Lack money	-0.36	-	-
Not goal	-	-	0.34
Unaware	-0.43	-	-

Importantly, differences between reserves for perceived outcomes are only within undesirable conflict measures and not within desirable reserve and conservation sentiment, conflict, or development outcomes (Table 4.7). These findings indicate that positive perceptions among PNR stakeholders of program outcomes are only associated with reported program engagement, rather than with reserve affiliation. Respondents with Timbavati affiliation are more likely to feel benefit sharing effectively reduces conflict with the adjacent community, while responses from Sabi Sand and Balule have a positive association with the conflict intensity index and the perception that benefit sharing increases opportunities for conflict, respectively. Sabi Sand affiliation and the positive association with conflict intensity is likely a product of the long community border and poaching pressure gradient. However, the positive association of Balule affiliation and the perception that benefit sharing increase opportunities for conflict is important to consider when working to identify and encourage conditions supportive of effective benefit sharing.

Table 4.7: Perceived outcomes that are significantly associated with reserve affiliation. All *r*-values shown in the table are significant at the $p = 0.05$ level. Outcome variables not included from Table 4.2 did not have a significant association with reserve affiliation. Variable labels are explained in Table 4.2.

	Sabi Sand	Timbavati	Balule
Reserve & conservation sentiment			
<i>No significant associations</i>	-	-	-
Conflict			
Increase conflict	-	-0.41	0.43
Conflict intensity index	0.49	-0.49	-
Development			
<i>No significant associations</i>	-	-	-

Associations between the number of benefit sharing programs and reserve affiliation were also explored (Table 4.8). Overall, responses from Sabi Sand respondents have a strong positive association across all but one category of program, while responses from Balule stakeholders show a strong negative association with the number of tangible and outreach programs and a moderate negative association with the total number of benefit sharing programs.

Based on these findings and from interviews with key reserve stakeholders during the preliminary PNR survey, a characterization of the three case study reserves' benefit sharing strategy was developed to help draw conclusions on effective benefit sharing strategies. Sabi Sand's strategy is characterized here as broad in that relatively more benefit programs within and across categories, were reported as occurring within the community in both stakeholder surveys. However, as detailed below, correspondingly higher household engagement in programs in the community survey were not reported (Table 4.14), indicating less diffusion of benefits in Justicia than in Welverdiend. Timbavati's strategy is characterized as focused and diffuse in that benefit sharing

programs are mainly focused on education and other benefits delivered to schools. And it is widespread in that benefit delivery is relatively more diffuse across community members by reaching every school, and thus, nearly every child in Welverdiend. Balule’s strategy is characterized as developing in that at the time of surveys, the reserve’s conservation education program for school children was recently initiated in Maseke, and the all-female, unarmed Black Mamba anti-poaching unit had only been operating for about two years.

Table 4.8: Reserve affiliation that is significantly correlated to the number of benefit sharing programs reported as occurring with the community. All *r*-values shown in the table are significant at the *p* = 0.05 level.

	# tangible programs	# intangible programs	# in-reach programs	# out-reach programs	# all programs
Sabi Sand	0.60	0.55	-	0.71	0.50
Timbavati	-	-	-	-	-
Balule	-0.60	-	-	-0.59	-0.39

Community Outcome Associations

Key outcome variables of reserve and conservation sentiment, conflict with the reserve, and development were also investigated within the community survey to explore community member perceptions of the effects of benefit sharing programs. To begin with, correlations between these outcome variables and reported household income from the reserve were determined (Table 4.9). Unsurprisingly, having household income from the reserve is moderately positively associated with a perception that the reserve provides more options for household income than would be available if the reserve were not there. It is somewhat surprising, however, that household income from the reserve is not positively associated with any other desirable outcomes, particularly development related outcomes. Furthermore, household income from the reserve is positively associated with undesirable

conflict measures of the perceived frequency of community members poaching in the reserve and the perception that community members are assumed to be poaching and shot by reserve guards when they are near the fence line. A likely cause for this is that reserve employees, and those in the same household, are more aware of information and conversations surrounding poaching activities and poaching related conflict.

Table 4.9: Outcome statements that are significantly associated with reported household income from the reserve. All r -values shown in the table are significant at the $p = 0.05$ level. Outcome statements not included from Table 4.3 did not have a significant association with reported household income. Variable labels are explained in Table 4.3.

	Household income from reserve
Reserve & conservation sentiment	
<i>No significant associations</i>	-
Conflict	
Community poach	0.28
Assume poaching	0.36
Development	
Household options	0.41

There were more significant correlations between outcomes statements and the number of programs reported as occurring within the community than with household income from the reserve (Table 4.10). Overall, there was a strong association between number of programs occurring in the community and perceptions that the reserve provides more options for income throughout the community than would otherwise be available and that the reserve has fulfilled development commitments. There was a weaker, but still significant, positive association between the number of programs and the perception that the reserve provides more income options for the participants' household than would otherwise be available. This weaker association is understandable, as reported household engagement in programs was lower than the number of program reported in the

community. However, as with household income from the reserve, reported number of programs occurring in the community was positively associated with undesirable conflict measures. This may similarly be explained by participants with a greater awareness of reserve interaction with community through benefit sharing programs are also more aware of information or conversations surrounding poaching-related conflict.

Table 4.10: Outcome statements that are significantly associated to the number of benefit sharing programs reported as occurring *with the community*. All *r*-values shown in the table are significant at the $p = 0.05$ level. Outcome statements not included from Table 4.3 did not have a significant association with the number of programs occurring with the community. Variable labels are explained in Table 4.3.

	# tangible programs	# intangible programs	# in-reach programs	# out-reach programs	# all programs
Reserve & conservation sentiment					
<i>No significant associations</i>	-	-	-	-	-
Conflict					
Conflict intensity	0.36	0.28	0.22	0.37	0.35
Unfair termination	0.30	0.26	0.21	0.32	0.31
Poachers shot	0.24	-	0.25	0.21	0.24
Development					
Community options	0.54	0.56	0.41	0.60	0.59
Household options	0.27	0.20	0.20	0.26	0.27
Development fulfillment	0.55	0.63	0.42	0.64	0.62

In addition to associations between benefit sharing outcomes and the number of community programs, associations were determined between outcomes and the number of programs participants reported they or a household member benefited from (Table 4.11).

As with the number of community programs, household engagement was positively associated with the development perception that the reserve provided more income opportunities for the community and their household, and with the perception that the reserve fulfilled its development commitments. The associations are less strong than with the number of community programs, potentially because of the smaller sample size of

respondents with any reported household engagement with benefit sharing programs. Importantly, there were no significant associations between number of programs the household benefitted from and undesirable conflict measures, as there were with the number of community programs. This may again be because the fewer number of respondents who reported any household engagement. It may also indicate that household engagement in more programs, beyond even household income from the reserve (Table 4.9), does reduce undesirable perceptions of conflict. Surprisingly, the increased household engagement in in-reach programs was negatively associated with the desirable conservation sentiment outcome that their community members perceive rhino poaching to be unacceptable. It is possible that participants with greater access to the reserve through the various in-reach programs feel that the conservation-related perceptions of their community members with less access to the reserve are significantly different from their own.

Table 4.11: Outcome statements that are significantly associated to the number of benefit sharing programs reported as occurring *with the household*. All *r*-values shown in the table are significant at the $p = 0.05$ level. Outcome statements not included from Table 4.3 did not have a significant association with the number of programs occurring with the household. Variable labels are explained in Table 4.3.

	# tangible programs	# intangible programs	# in-reach programs	# out-reach programs	# all programs
Reserve & conservation sentiment					
Community poaching unacceptability	-	-	-0.21	-	-
Conflict					
<i>No significant associations</i>					
Development					
Community options	0.35	-	-	0.35	0.33
Household options	0.28	-	0.22	-	0.20
Development fulfillment	0.43	0.28	0.23	0.46	0.45

Associations between benefit sharing program outcomes and community affiliation were also explored (Table 4.12), as they were with PNR affiliation in the reserve survey. Within development outcomes, Justicia and Welverdiend affiliations have a weak and moderate association, respectively, with the perception the reserve provides more income opportunities for the community than would exist otherwise. In contrast, responses from Maseke had a strongly negative association with this measure. It is an important distinction that Justicia participants are relatively more likely to feel the reserve provides more income opportunities for their community than for their household. Conversely, Welverdiend participants are most likely to perceive that the reserve provides more community income opportunities, but are not likely to report that the reserve provides more household community income opportunities. Despite this, respondents from Welverdiend were most likely to report that the reserve had fulfilled their development commitments. Responses from Maseke participants had a negative association with the perception that the reserve fulfilled their development commitments to the community.

Table 4.12: Outcome statements that are significantly associated to the community case study affiliation. All *r*-values shown in the table are significant at the $p = 0.05$ level. Outcome statements not included from Table 4.3 did not have a significant association with community case study affiliation. Variable labels are explained in Table 4.3.

	Justicia	Welverdiend	Maseke
Reserve & conservation sentiment			
Like neighbor	-0.37	0.23	-
Conservation good	-0.20	-	-
Community poaching unacceptability	0.26	-	-
Conflict			
Conflict intensity	-	0.27	-0.29
Outsiders poach	0.25	-	-0.41
Unfair termination	0.21	-	-0.37
Poachers shot	0.34	-	-0.38
Members shot	0.32	-	-
Development			
Community options	0.22	0.32	-0.55
Household options	0.33	-0.23	-
Development fulfillment	-	0.49	-0.53

While responses from Maseke participants had a negative association with desirable development outcomes, they were also negatively associated with four undesirable conflict measures (Table 4.12). In contrast, responses from Justicia participants had a positive association with four conflict measures. This is possibly because the north to south gradient of poaching intensity and length of shared border makes it least likely for the Maseke-Balule case study, and most likely for the Justicia-Sabi Sand case study, to have opportunities for conflict, particularly poaching-related conflicts. Responses from Welverdiend participants have a positive association with conflict intensity and no other conflict measures. The important distinction here is that the conflict intensity measure includes non-poaching-related instances and frequency of conflict.

Despite positive association with conflict intensity, Welverdiend participants were more likely than other case study communities to report that they liked living next to the reserve

(Table 4.12). Justicia affiliation had a negative association with the measure of liking the reserve as a neighbor and also that conservation is more good than bad for them. Maseke affiliation, on the other hand, had no significant associations with desirable reserve and conservation sentiment outcome measures. Affecting desirable reserve and conservation sentiment outcomes is important in benefit sharing strategy design and administration, and it is notable that these outcomes are almost exclusively only associated with community affiliation. Reserve and conservation sentiment outcomes were not associated with household income from the reserve or the number of programs reported occurring within the reserve and only associated with one category of number of programs the household engaged with (and not the total number of programs the household had benefited from). Beyond simply establishing benefit sharing programs, it appears other elements also impact reserve and conservation sentiment.

The supposition that simply establishing benefit sharing programs is sufficient to affect desirable reserve and conservation perceptions is further supported when considering Justicia participants were more likely to report a higher number of benefit sharing programs occurring in their community (Table 4.13). While the reported number of benefit sharing programs occurring within the communities corroborates the findings from the reserve survey (Table 4.8), community participants did not report the same pattern for household engagement in the programs (Table 4.14). Participants from Welverdiend, not Justicia, are the most likely to report the greatest number of programs with which their household engaged. As the number of programs the household engaged with and Welverdiend affiliation are positively associated with desirable development outcomes,

household engagement appears to be an important factor in influencing desirable development perceptions. Specifically, despite being less likely than other case study communities to report the reserve provided more household income opportunities than would be available without it, Welverdiend participants are more likely to feel the reserve has fulfilled their development commitments (Table 4.12).

Table 4.13: Community affiliation that is significantly associated to the number of benefit sharing programs reported as occurring *with the community*. All *r*-values shown in the table are significant at the $p = 0.05$ level.

	# tangible programs	# intangible programs	# in-reach programs	# out-reach programs	# all programs
Justicia	0.34	0.32	0.20	0.38	0.36
Wolverdiend	0.26	0.29	-	0.31	0.30
Maseke	-0.61	-0.61	-0.39	-0.70	-0.66

Table 4.14: Community affiliation that is significantly associated to the number of benefit sharing programs reported as occurring *with the household*. All *r*-values shown in the table are significant at the $p = 0.05$ level.

	# tangible programs	# intangible programs	# in-reach programs	# out-reach programs	# all programs
Justicia	-	-	-	-	-
Wolverdiend	0.29	-	-	0.37	0.28
Maseke	-0.32	-	-	-0.36	-0.30

Alignment of PNR and Community Stakeholder Perceptions

Finally, differences between stakeholder groups' perceptions of outcome measures were determined to identify areas of misalignment in the aim and impact of benefit sharing strategies (Table 4.15). Comparisons were made between whole stakeholder groups and stakeholder groups within each case study transect (Sabi Sand-Justicia, Timbavati-Wolverdiend, and Balule-Maseke). Across all reserve and conservation sentiment measures, significant differences between stakeholder groups in their perceptions of the reserve and/or conservation indicated that reserve stakeholders perceive community

members to have less favorable perceptions of these measures than the community members reported having. This may partly be influenced by response bias in community participants responding more favorably to these measures than their actual perceptions because support for conservation may be thought to be more socially desirable. Even so, the strong support does indicate overall community support for the reserve and conservation initiatives. This conservation sentiment across both stakeholder groups should be appreciated as common ground between the groups.

Significant differences between stakeholder groups in conflict measures all show reserve stakeholders reported greater conflict intensity and a greater threat of poaching from communities than community participants reported (Table 4.15). Again, there may be response bias on community participants' reported frequency of rhino poaching activity within their community because respondents believe rhino poaching to be a socially undesirable activity. Reserve stakeholders may also be more aware of poaching activity within the community because of intelligence operations. However, a strong component in this difference is likely because the impact of the threat and reality of rhino poaching is more concentrated on reserve stakeholders than on community members.

Table 4.15: Comparison of equivalent measures of outcomes from benefit sharing for both stakeholder groups. Shown in the table are the median, mean, and standard deviation values (on the first, second, and third lines, respectively) of outcome measures for each stakeholder group and the p -value from a Mann-Whitney U test comparing the two stakeholder groups. PNR and community summary and p -values are for whole stakeholder groups, across all three case studies. Bold p -values indicate significant differences between stakeholder groups at the $p = 0.05$ level. Outcome statements included here from Tables 4.2 and 4.3 were chosen as equivalent and/or relevant to compare between stakeholder groups. Variable labels are explained in Tables 4.2 and 4.3.

Reserve measure Community measure	Summary values		p - value	Summary values		p - value	Summary values		p - value	Summary values		p - value
	Sabi Sand	Justicia		Timbavati	Welverdiend		Balule	Maseke		PNR	Community	
Reserve & conservation sentiment												
Reserve positive Like reserve	1.00 0.88 0.25	1.00 0.79 0.31	0.427	1.00 0.85 0.18	1.00 0.99 0.06	0.001	0.67 0.73 0.21	1.00 0.95 0.18	<0.001	0.84 0.81 0.21	1.00 0.93 0.20	<0.001
Conservation positive Conservation good	1.00 0.88 0.25	1.00 0.91 0.14	0.776	1.00 0.87 0.18	1.00 0.96 0.18	0.017	0.76 0.72 0.26	1.00 0.98 0.09	<0.001	0.92 0.82 0.24	1.00 0.95 0.14	<0.001
Poaching negative Community poaching unacceptability	0.67 0.69 0.15	1.00 0.83 0.26	0.032	0.42 0.40 0.34	1.00 0.89 0.19	<0.001	0.50 0.53 0.27	1.00 0.93 0.18	<0.001	0.59 0.55 0.31	1.00 0.88 0.22	<0.001
Conflict												
Conflict intensity Conflict intensity	0.50 0.58 0.26	0.25 0.22 0.15	0.002	0.25 0.26 0.12	0.25 0.27 0.20	0.959	0.50 0.39 0.16	0.13 0.17 0.10	<0.001	0.38 0.37 0.19	0.13 0.22 0.16	<0.001
Community poach rhino Community poaching frequency	0.84 0.84 0.15	0.25 0.31 0.35	0.004	1.00 0.90 0.23	0.25 0.34 0.35	<0.001	0.84 0.76 0.23	0.00 0.20 0.34	<0.001	0.84 0.84 0.22	0.13 0.28 0.35	<0.001
Development												
Economic development Community income opportunities	1.00 0.88 0.21	1.00 0.80 0.32	0.650	0.84 0.80 0.18	1.00 0.86 0.26	0.083	0.84 0.80 0.17	0.00 0.35 0.44	0.004	0.84 0.82 0.18	1.00 0.67 0.41	0.534
Economic development Development fulfillment	1.00 0.88 0.21	0.50 0.50 0.30	0.007	0.84 0.80 0.18	0.75 0.69 0.33	0.540	0.84 0.80 0.17	0.00 0.23 0.29	<0.001	0.84 0.82 0.18	0.50 0.47 0.37	<0.001

Reserve stakeholders also reported stronger agreement than community participants regarding the desirable development outcomes benefit sharing programs (Table 4.15). When comparing the perceived impact of benefit sharing on community economic development and perceived agreement that the reserve provides more income opportunities for their community than would otherwise be available, there is no overall significant difference between stakeholder groups. However, comparing development impact to what community members believe the reserve committed to providing, there is a significant difference. This suggests a misalignment in the communication and understanding of benefit sharing commitments.

When community participants were asked to report how they knew of the reserve's commitments to benefit sharing, half (50%) of those who were able to provide a response ($N = 52$) reported this information had come from community meetings and/or the Community Development Forum. A large proportion of participants (35%) reported this information had come directly from a reserve representative (liaison, education officer, or other employee) at a community meeting, school, or crèche. A sizable proportion of participants (10%) reported their understanding of reserve development commitments had come from hearsay. Other responses were that the information had come from community members that are employees in the reserve (2%), the newspaper (2%), and that it was an assumption (2%). Identifying these sources of information is important to know how information, or misinformation, on benefit sharing commitments is spread throughout the community.

In addition to investigating community participants' knowledge of reserve benefit sharing commitments, participants were then asked an open-ended question about what development opportunities they thought were most important for their community (Table 4.16). Up to three opportunities were recorded per participant, and when totaled across all three communities, the most common responses were water projects (48% of participants), employment (46%), and public or social infrastructure (e.g. schools, community hall, library) (30%). However, there were some differences in most common responses between communities; for example, there was a much greater desire for public infrastructure among Maseke responses than Justicia or Welverdiend respondents (Table 4.16). Collecting information on desired development opportunities in a rigorous way is an important practice to help tailor benefit sharing efforts to target the community. While some of the proffered opportunities may not be surprising (e.g. employment), the activity is valuable as a way to enhance community participation in the design of benefit sharing efforts.

Table 4.16: Percentage of participants that responded what development opportunities they thought were most important for their community. Each participant ($N = 103$) provided up to three opportunities. The top three requested opportunities for each community are in bold text.

Development opportunity	Justicia	Welverdiend	Maseke	All
Water project	59%	49%	35%	48%
Employment	41%	34%	62%	46%
Public infrastructure	12%	31%	47%	30%
Tar road	35%	40%	6%	27%
Garden project	24%	14%	35%	24%
Job skills training	26%	17%	24%	22%
Shopping complex	15%	17%	15%	16%
Sports (facility and/or program)	9%	14%	18%	14%
Bursary for business development	-	3%	15%	6%
Health clinic	-	-	15%	5%
Reserve tours	-	9%	3%	4%
Housing infrastructure	9%	-	-	3%
Environmental education	-	9%	3%	4%
Facilitate arts & crafts sales	-	6%	-	2%
Bursary for education	-	6%	-	2%
Orphanages	6%	-	-	2%
Cultural development	-	3%	-	1%
Community security	-	3%	-	1%
Community relationship improvement	3%	-	-	1%
Collect fuelwood from reserve	3%	-	-	1%

DISCUSSION

Findings from the community survey indicate that, excluding employment, participants prefer benefit sharing programs that have limited focus and provide diffuse benefits. This benefit sharing strategy establishes clearly set benefit expectations and more equitable benefit provision, which in turn supports development satisfaction and positive perceptions of the reserve and conservation within communities. While household income, the number of programs reported as occurring in the community, and the number of programs the household was reported to engage in were all positively associated with desirable development perception outcomes, they were not associated with positive reserve and conservation perceptions. From this, it can be inferred that there is a difference in benefit sharing strategies, beyond just program provision, that affect desirable reserve and

conservation sentiment perceptions. While external factors greatly influence poaching pressure, improved community member perceptions of benefit sharing efforts and reserves can improve perceptions of poaching-related and other conflict. It is, therefore, important to identify and encourage PNR administrative conditions that support a benefit sharing strategy with limited focus and diffuse benefits.

A benefit sharing strategy that has a limited focus can best establish clear benefit expectations among communities. Specifically, of the case studies, Welverdiend and Timbavati respondents did not report the greatest number of benefit sharing programs, but Welverdiend participants were most likely to report perceiving the reserve fulfilled their development commitments and liking living next to the reserve. A possible reason for this finding is that the Timbavati Foundation programs have a narrower focus than those from lodges within Sabi Sand. Limiting the focus of the area of benefit impact, as in Timbavati's primary focus of education and schools-based projects, establishes clearer benefit expectations within the community. Whereas the broad area of benefits from Sabi Sand lodges makes expectations from reserve benefit programs less clear. This is a possible explanation for Justicia participants reporting less positive perceptions of development outcomes despite reporting the largest overall number of benefit sharing programs among the three case studies. As found elsewhere, mismatched expectations regarding benefit provision and the nature of these benefits can undermine the success of programs, and more focused initiatives can avoid this undesirable outcome (McShane et al., 2011; Spenceley & Goodwin, 2007; Spenceley & Seif, 2003).

As clear expectations are important for affecting desirable outcomes, programs that provide diffuse benefits among community members, even those that are intangible, such as education, are likely to positively influence community member perceptions of the reserve's benefit sharing efforts. Undoubtedly, income from reserves and the broader tourism economy in the region is extremely important to community development and to address environmental justice issues surrounding protected areas, particularly PNRs. However, there are limits to the number of employment opportunities that PNRs can provide to surrounding community members and, therefore, on the ability of PNRs to generate broader economic effects for the communities. And so, second to maximizing employment benefits for community members, strategies should focus on providing more broadly accessible benefits to reach more households throughout nearby communities.

The equitable nature of diffuse benefits encourages a positive regard for the reserve, conservation, and conflict. For example, although Welverdiend participants did not most frequently report earning household income from Timbavati (Clifton, 2018), they did report the highest number of programs in which individual households were engaged and the most positive correlations with desirable development and reserve and reserve sentiment outcomes. Moreover, there were other unexpected relationships with outcome variables for survey participants who did report receiving household income from their associated reserve. For example, household income from the reserve was not associated with a perception that the reserve fulfilled their development commitment, that the reserve provided more income opportunities for their community than would otherwise be available, or with any desirable reserve and conservation sentiments. Additionally, earning

household income from the reserve was, counter intuitively, positively correlated with undesirable conflict measures of reported frequency of community members poaching and the perception that community members are shot by reserve guards while near the fence line because it is assumed they are poaching rhinos. This implies that even participants who receive income from the reserve are sensitive to real or perceived inequity of distribution of benefits throughout their community. Other studies similarly found that the ability of projects to positively influence local attitudes towards conservation endeavors is hindered by unequal distribution of benefits (Gillingham & Lee, 1999; Spenceley, 2001). These findings underscore the importance of the equity of benefit provision among target community members for affecting development satisfaction and other desirable community member perceptions of PNRs.

Given that communities appear to prefer benefit sharing strategies that establish clear expectations and equitable benefit distribution, it is important to analyze PNR conditions that foster administration of such strategies. Findings from the PNR survey do not indicate marked differences between reserves in motivations and deterrents to engage in benefit sharing, but there are differences in organization and communication that seem to be more supportive of administering an effective benefit sharing strategy. PNR stakeholders reported to be primarily motivated by a sense of duty or explicit obligation to foster good relationships with and contribute to economic development of the community, rather than as a protective measure or public relations exercise (Spenceley, 2001).

Despite general support for benefit sharing, respondents are deterred by practical limitations, such as funding and knowledge, rather than by a lack of desire to engage in benefit sharing or perceptions of conflict with the community (Clifton, 2018). Some surveyed reserve respondents reported conditions to ameliorate these limitations (Clifton, 2018). First, having greater information exchange with stakeholders, particularly regarding benefit sharing projects, increases awareness of these efforts. Second, having explicit goals within the reserve constitution to foster good relationships with communities and to contribute to community development highlights the importance of benefit sharing for reserve management. And third, having more centralized administration of benefit sharing programs facilitates focused benefit sharing projects that complement each other and improve outcomes. Funding for benefit sharing via landowner levies can facilitate a centralized administration entity and provide regular and reliable income for project administration. These conditions can promote a culture of informed stakeholders who prioritize benefit sharing, and an administrative structure that makes the best use of information and funding for targeted projects that provide equitable benefits for communities.

Findings identified reserve conditions that are more conducive to administering a benefit sharing strategy with limited focus and diffuse benefits that are preferred by surveyed community members. However, analyses comparing perceived outcomes between reserve and community stakeholder groups showed misalignment in all three outcome categories. When considering whole stakeholder groups rather than individual case studies, there were significant differences between groups in all three compared measures of reserve and

conservation sentiment. Community members reported more positive perceptions toward the reserve and conservation than reserve stakeholders reported benefit sharing programs positively impacted these measures. Somewhat similarly, reserve respondents indicated community poaching activity and other conflict was greater than was reported by community participants. Helpfully, instances of past or current conflict were not reported by reserve respondents to be a deterrent to benefit sharing. Mutual support across stakeholder groups for conservation activities can also work against any poaching-related divisiveness. However, findings show a misalignment between stakeholder groups generally (although, not Timbavati and Wilverdiend) in perceptions of development impact and fulfillment. This misalignment of understandings should be ameliorated through improved communication of benefit sharing commitments.

Recommendations to support a benefit sharing strategy that best achieves desired outcomes for reserves and communities and improves communication of benefit sharing commitments include coordination between reserves and appropriate community consultation to optimize and tailor programs with consideration of the constraints of PNR resources. Increased communication and more centralized administration improves benefit provision within reserves, and it can also improve benefit provision in the broader region if applied across reserves. There are economies of scale in ecological and security management areas when PNRs in the region collaborate, and this principle can be applied to benefit sharing (Lindsey et al., 2009; Spenceley & Seif, 2003). Coordination and collaboration between reserves facilitates greater information exchange, more effective use of financial and material resources, and administration of complementary projects.

Increased rhino poaching has led to a cross-reserve security response that promotes information exchange and collaboration. This increased inter-reserve social capital could also be leveraged to the advantage of benefit sharing. Centralization of benefit administration within reserves makes it easier for coordination between them to scale up efforts and maximize project impacts.

In addition to facilitating improved benefit provision, amalgamated organization among PNRs could lead to increased consultation and, therefore, improved relationships with communities. Coordinated, institutionalization, and formalization of these relationships will ensure more active participation of and consultation with community members (Spenceley, 2003; Spenceley & Goodwin, 2007). For example, the specific role of a liaison coordinator, such as Sabi Sand's community liaison or Timbavati Foundation's educators, to function as a point of regular contact for the communities enhance the PNRs' capacity to formalize and improve community interaction. This engagement will in turn strengthen communication and reciprocity and increase linking social capital between reserve and community stakeholder groups. Interestingly, conflict between communities and reserves may even function as a method of engagement in reserve activities, especially if the reserve responds to conflict or community grievances. For example, a community participant reported that the adjacent reserve stopped flying surveillance aircraft over parts of the community following a complaint to the reserve.

Consulting with communities to tailor benefit sharing programs and monitor their success is vitally important (Spenceley, 2001; Spenceley & Seif, 2003). Of course, some

development opportunities preferred by communities cannot feasibly be addressed by a PNR, such as a shopping complex, a tar road, or employment levels that are meaningful for the whole community. However, there is great value in acquiring community input when designing and implementing benefit sharing strategies to both ensure community participation and to maximize the impact of investments in such efforts. Applying practices to incorporate community participation, to distribute benefits as widely and equitably as is feasible, and to coordinate benefit sharing efforts across reserves will likely enhance positive benefit sharing impacts and promote more positive community member perceptions of the reserves and development outcomes.

To facilitate coordination of PNRs' benefit sharing efforts, future research should more thoroughly quantify per household impact of various benefit sharing programs and strategies. Additionally, it would be useful to more thoroughly measure differences between or changes in conflict, particularly poaching-related conflict, for protected areas with different benefit sharing strategies. This would further strengthen arguments for benefit sharing affecting the community members' behavior as well as their perceptions. It may require a transformative devolution of natural resource and protected area access and ownership to fully address historical injustices and achieve environmental justice in the region. However, even within the current land ownership structure and socioeconomic setting, efforts can and should be made to improve development initiatives, environmental justice, and conservation constituency building.

Conclusion

Private reserves have the potential to meaningfully contribute to the economic, structural, and educational development of local communities, and doing so will address environmental justice concerns and ensure the longevity of conservation areas in the region. Of the three case studies reviewed here, findings indicate a benefit sharing strategy that provides clearly focused and diffuse benefits to community members is most effective at encouraging development satisfaction and a conservation constituency. Coordinated collaborative organization among PNRs of benefit sharing programs would improve efficiency in managing programs and help optimize benefit delivery. Furthermore, improved community consultation through a regular point of contact with the reserve will improve the design programs and communication of benefit expectations. This research adds to the needed body of knowledge on community member perspectives in the design and evaluation of benefit sharing programs (Bennett, 2016; Spenceley, 2001; Spenceley & Seif, 2003). Furthermore, findings help to address a lack of understanding on how to best motivate support for effective benefit sharing programs amongst conservation stakeholders (Kreuter et al., 2010; Pullin et al., 2013; Ramutsindela, 2015; Spenceley, 2001; Spenceley, 2003). Insights provided in this research on conservation and development minded stakeholder perceptions regarding benefit sharing programs can be applied to other areas and programs with both conservation and development goals. This will provide guidance on how to design a benefit sharing strategy that can be tailored to a region to improve development outcomes and support the sustainability of conservation work.

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CHAPTER V

SUMMARY AND CONCLUSION

Areas managed for conservation have increasingly become islands of protected land among broader landscapes of development, agriculture, and intensive resource extraction. The Kruger to Canyons (K2C) Biosphere is one such region with a patchwork landscape of resource extraction and conservation. It also has a history of conflict due in part to forced removals of populations of black South Africans from the areas that became protected areas and commercial farms. Significant legacies of substantial racial inequalities in access and ownership of land resources still exist and have led to continued conflict in the K2C. This conflict has been exacerbated by the militarized response to the precipitous rise in rhino poaching in the region and the unintended negative consequences of this response. Injustices experienced by black South Africans from the formation and continued security of protected areas are inherently lamentable. Furthermore, the resultant diminished support from local communities for protected areas is problematic for the future integrity of these areas. To compensate for land access and ownership disparities in the K2C, it is imperative that disfranchised communities surrounding the private nature reserves (PNRs) receive benefits from conservation to promote environmental justice and to ensure continued support for conservation activities.

Despite efforts by PNRs to share some of the benefits of conservation with neighboring communities, there has been growing criticism of purported win-win outcomes from joint conservation and development programs. Critics argue that development projects are not

relevant or sustainable, community enfranchisement into conservation programs is still absent, and programs are not creating positive perceptions of development projects or conservation institutions (Benjaminsen & Svarstad, 2010; Bennett, 2016; Gillingham & Lee, 1999). While benefit sharing cannot wholly resolve historical and current injustices experienced by local black South Africans, it can partially offset the costs and negative consequences experienced by local communities from the formation and continued existence of protected areas. Accordingly, there is a need to better understand how to best share benefits with appropriate consideration of conservation and community stakeholder groups. Within the context of the K2C region, this information can be applied to appropriately address development needs that improve environmental justice and conservation management strategies that ensure the long-term integrity of PNRs without relying solely on militarized protectionist strategies.

The aims of the research presented in the dissertation were to: 1) provide PNRs and benefit sharing organizations with information for designing and implementing benefit sharing strategies that enhance conservation constituency building and support development goals to protect the integrity of conservation spaces and 2) provide people in communities with information that can facilitate active participation in the benefit sharing and constituency building process. Surveys of two stakeholder groups were used to elucidate and measure the occurrence of and perceptions regarding existing benefit sharing programs. This was achieved in three phases of research. First, interviews were conducted with managers of private reserves in the K2C region as a preliminary census survey. Second, in-person interviews were conducted with community members of three case study communities.

Finally, an emailed electronic survey was administered to stakeholders of five PNRs, including three that are adjacent to the case study communities. The social capital theoretical framework was used to help organize the design, methodology, and analysis of the research to address the primary objectives of this study.

The specific research objectives were to: 1) identify and describe PNR stakeholders' motivations and deterrents to initiate and engage in benefit sharing programs; 2) understand how benefit sharing influences nearby community members' perceptions of development outcomes, conservation sentiment, conflict, and acceptability of poaching and anti-poaching initiatives; and 3) recommend the most effective benefit sharing strategy to decrease conflict, support the conservation constituency within affected communities, and simultaneously address conservation and development goals. Following is a summary of the main findings of three manuscripts included in this dissertation, each of which address one of these objectives.

1) Motivations and deterrents for private reserve stakeholders to engage in benefit sharing (Chapter II)

Findings of this chapter provide insight on the trade-offs for PNR stakeholders with respect to engagement in benefit sharing programs. The different benefit sharing strategies among reserves were identified, as well as how the rise in rhino poaching may have affected the dynamics of benefit sharing. Simple descriptive analyses of data derived from a survey of PNR stakeholders were used to determine benefit sharing efforts and perceptions of these programs between and across reserves. Principal motivations and deterrents to engage in

benefit sharing did not significantly differ between reserves, but there were marked differences between reserves in the number and focus of benefit sharing programs. The primary motivations to engage in these programs was found to be a sense of moral responsibility to contribute to economic development of and foster good relationships with nearby communities. By contrast, the primary deterrents to engagement in such programs were reported to be practical restrictions, such as a lack of funding or knowledge resources to plan and administer programs. Overall, respondents did not indicate that their willingness to engage in benefit sharing was affected by general concerns over conflicts with the neighboring communities nor by concerns specific to the rise in rhino poaching. Rather, differences in benefit sharing strategy, such as the number or focus of programs, seem to be the result of the degree of exposure of PNR borders to neighboring communities as well as different administrative organization among the PNRs. Findings indicate PNR survey respondents perceive that benefit sharing programs contribute to economic development, education, and desirable community member attitudes toward conservation and the reserve. However, they do not perceive that benefit sharing programs reduce rhino poaching or other conflict with communities.

2) The impact of benefit sharing programs on community member perceptions of development outcomes, conflict, and conservation sentiment (Chapter III)

This chapter illuminated how different benefit sharing strategies influence the perceptions of community members living adjacent to PNRs in the K2C. Perceptions explored include: development expectations and outcomes, conservation efforts in the PNRs, conflict occurrence, and the acceptability of poaching and anti-poaching methods. Simple

descriptive data analyses were conducted to explore these perceptions using data derived from the interviews with community members. Overall, positive perceptions of development outcomes from benefit sharing activities seem to be attributed more to the provision of diffuse benefits and clearly set expectations, rather than to individual household financial benefits. Providing diffuse benefits increases the equity of benefit provision across the community, and community members are sensitive to this perception of equity, even if they are a household that receives financial income from the reserve. Unclear expectations can undermine the perceived impact of benefit sharing programs, and maintaining these expectations through communication and a consistent benefit focus is critical. Across all three case study communities, conservation activities, rhino protection, and the PNRs were highly regarded. However, favorable perceptions of conservation efforts and the PNRs appear to be impacted by poaching levels. Specifically, the case study reserve that experiences the highest poaching pressure also has relatively lower community members' regard toward the reserve and conservation.

3) Benefit sharing programs and perceptions on development outcomes, conflict, and conservation sentiment (Chapter IV)

Synthesizing findings from both the community and PNR surveys, this chapter described the preferred benefit sharing strategy and reserve administrative conditions that best support effective benefit sharing. Analyses of the data from both surveys explored correlations between various input variables and output variables of benefit strategy perceptions and benefit sharing programs. The importance of, and community member desire for, employment opportunities for their communities should not be overlooked. And

beyond employment, community member perspectives on other benefit sharing programs must be taken into account when designing a benefit sharing strategy. Findings indicate a benefit sharing strategy that has diffuse benefits and limited focus is the most effective to foster development satisfaction within and reduce conflict with communities. These recommendations will not fully remedy historical and current injustices toward local black South Africans. However, implementing these recommendations will improve benefit sharing within the current system of land ownership. Centralized organization of benefit sharing administration both within and across PNRs will best support this suggested benefit sharing strategy. An analogous arrangement is the Association of Private Nature Reserves that coordinates ecological management and security across its member reserves. The formation of contiguous private protected areas and, more recently, the security response to rhino poaching has increased reserve communication and collaboration, and these networks can be leveraged to improve benefit sharing program administration. Such a structure would enhance inter-PNR collaboration with respect to financial, human, and informational resources for benefit sharing program planning and administration, as well as coordination of programs to maximize efficiency and impact.

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