BUILDING ROBUSTNESS TO DISTURBANCE: GOVERNANCE IN SOUTHERN AFRICAN PEACE PARKS

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"Building Robustness to Disturbance: Governance in Southern African Peace Parks"

Abstract

Transboundary conservation has gained currency over the past decade as an effective means for achieving a wide array of goals ranging from improved biodiversity conservation to regional economic development to the promotion of peace between countries. Studies to analyze these competing claims oscillate between views of transboundary protected areas (TPBAs) as panaceas that can solve wide-ranging societal challenges in any type of setting to studies that view them as idiosyncratic entities with no generalizable traits, and few studies assess institutional arrangements for governance. This study, by contrast, uses 150 key informant interviews within two TBPAs in southern Africa – the Kgalagadi Transfrontier Park in Botswana and South Africa and the Great Limpopo Transfrontier Park in Mozambique, South Africa, and Zimbabwe – to address analytically how different governance structures of transboundary protected areas maintain robustness in response to various types of disturbance.

The insights arise from the fundamentally different institutional development paths of the two cases. This study argues that that the bottom-up institutional development and the slow, unforced evolution of governance in the Kgalagadi Transfrontier Park have allowed governing bodies to learn how to adapt and respond to transformations in the social-ecological system from an operational level. By contrast, institutional development in the Great Limpopo has struggled operationally due to the top-down imposition of the park on local-level communities and officials and the short time horizons permitted for goal attainment. However, top-down park formation has resulted in other accomplishments, primarily in bridging international boundaries. The central premise is that the national-level commitment to the Great Limpopo results in greater degrees of cooperation at a policy level than in a park that develops from the bottom-up. Such high levels of policy cooperation without parallel gains in operational cooperation have led to unexpected challenges in the Great Limpopo.

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Abbreviations

AHEAD – Animal Health for Environment and Development
ARASUL – Mozambique's Southern Mozambique Water Authority
CAMPFIRE – Zimbabwe's Communal Areas Management Programme for Indigenous Resources
CMA – catchment management association
CSIR – South Africa's Council of Scientific and Industrial Research
DEAT – South Africa's Department of Environmental Affairs and Tourism
DNA – Mozambique's National Directorate of Water
DNAC – Mozambique's National Directorate of Conservation Areas
DNPWLM – Zimbabwe's Department of National Parks and Wildlife Management
DWAF – South Africa's Department of Water Affairs and Forestry
GEF – Global Environment Facility
GKG – Gaza-Kruger-Gonarezhou
GLTFCA – Great Limpopo Transfrontier Conservation Area
GLTP – Great Limpopo Transfrontier Park
GTZ – Deutsche Gesellschaft für Technische Zusammenarbeit (German government's international development group)
IAD – Institutional Analysis and Development Framework
ICDP – Integrated Conservation-Development Program
IFR – in-stream flow rate
IR – international relations
IUCN – World Conservation Union
JMB – joint management board
KfW – *Kreditanstalt für Wiederaufbau*, (the German Development Bank)
KTP – Kgalagadi Transfrontier Park
LNP – Limpopo National Park, Mozambique (also PNL – Parque Nacional do Limpopo)
NGO – non-governmental organization
PIU – Project Implementation Unit
PPF – the Peace Parks Foundation
RP – research program (used in international relations literature)
SANParks – South Africa National Parks
TBNRMA – transboundary natural resource management areas
TBPA – transboundary protected area
TFCA – transfrontier conservation area
TPC – threshold of potential concern
USAID – United States Agency for International Development

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Glossary

Adaptability – the capacity of actors to influence resilience

Adaptive capacity - the preconditions necessary to enable adaptation, including social and physical elements, and the ability to mobilize these elements

Adaptive cycle – the progression of a system through four phases of organization and function, with changing levels of resilience, potential and connectivity

Adaptive Management – learning by doing, an iterative decision-making process in the face of imperfect, incomplete information with the aim of reducing uncertainty through experimentation

Attractor – a subset of a state space to which orbits originating from initial conditions tend as time increases

Basin of Attraction – the set of initial conditions leading to long-time behavior that approaches an attractor

Disturbance – any relatively discreet event in time that disrupts society, ecology, etc. (at one or more levels of structure) and/or changes natural resource distribution or physical environment. The key being to always think in terms of "disturbance to _____".

Gamma-level biodiversity – geographical biodiversity, number of species over a large area

Governance –resolving collective action problems through creating, adopting, and adapting institutions for settling conflicts and engendering cooperation

Hysteresis – a phenomenon wherein two (or more) physical quantities bear a relationship which depends on prior history

Institutions – the rules, norms, and operating procedures designed by humans to shape human interaction

Metapopulation – a system of populations connected by movements of individuals

Panarchy – nested adaptive cycles across time and spatial scales

Panmictic – random mating of individuals within a population

Parastatal – a company owned by the government, examples – the US Postal Service, SANParks

Polycentricity – the concept in which political systems with multiple centers of decision-making that function autonomously on some issues and act as part of an interdependent system for others

Regime (scientific) – a class of physical conditions, usually parameterized by some specific measures, where a particular physical phenomenon or boundary condition is significant

Regime (political) – an international organization outside of national governments established to provide information, coordination, and regulation on a specific set of issues

Resilience – the ability of a system to absorb disturbance and still retain its basic function and structure

Robustness – the maintenance of system performance either when subjected to external, unpredictable perturbations or when there is uncertainty about the values of internal design parameters

Social capital – the way people relate to and draw upon one another's capabilities

Social-Ecological System – the integrated concept of humans in nature stressing the delineation between social and ecological systems is artificial and arbitrary
Stability domain – a mathematical term that refers to a system residing in a stable condition but not necessarily ever at equilibrium
State – the current parameters in a dynamical system
Sustainability – the capacity to maintain a certain process or state indefinitely
Transformability – refers to the capacity to create a fundamentally new system when the existing system is untenable
Transformation – a fundamental alteration of the nature of a system once the current ecological, social, or economic conditions become untenable or are undesirable
Vagility – ability of a species to move

(Note: definitions and, where appropriate, citations available in text)

1. Chapter One: Transfrontier Conservation Areas in Southern Africa

> *"The most sagacious and laborious naturalists have never yet succeeded in tracing with certainty the line which separates the district of vegetable life from the neighboring region of unorganized matter, or which marks the termination of the former and the commencement of the animal kingdom."*
>
> - *James Madison, The Federalist Papers Number 37(p. 228)*

The challenges that Madison wrote about in *The Federalist Papers* consisted of taxonomic boundaries. However, scientists and practitioners, government officials and business people alike, all face similar challenges in negotiating systems of governance across boundaries. Some of the boundaries lie between states, provinces, and nations. Others exist as barriers between public and private enterprises or the disciplinary silos of knowledge within the academy. Through our awareness of today's increasingly complex world, we face a task of crucial importance in navigating across and beyond these borders and boundaries. Transboundary protected areas or TBPAs provide a potentially effective means of exploring cross-border coordination and cooperation, in these cases across international frontiers. This dissertation will look at this particular form of transfrontier conservation from a decidedly institutional perspective, delving into the political and operational struggles of jointly managing a complex social-ecological system across a political border for sustainability. It will examine a number of questions of interest to academics and practitioners alike, as both groups grapple with how to improve governance across a border, whether the border is between nations, municipalities, public and private partners, state and communal authorities, or other areas necessitating cross-border management. Among these questions include:

- How do we effectively manage within a multi-level, polycentric governance system?
- How can actors design or modify institutions to improve cooperation in areas that would benefit from more collaborative efforts?
- In turn, how can we design institutions to be more robust to future challenges or disturbances?
- When and how do park managers, non-governmental employees and government officials work together in transboundary parks?
- Why do these actors foster or facilitate cooperation across borders in some areas and not others?
- Finally, with long-enduring institutions, how do we sustainably manage a social-ecological system?

In addressing these questions, the dissertation focuses on two TBPAs in southern Africa, the Kgalagadi Transfrontier Park and the Great Limpopo Transfrontier Park. By looking at how officials in these parks address and react to disturbances, create cross-border institutions and engender cooperation, the study attempts to provide answers to these questions from the two cases and provide policy-makers with pragmatic suggestions for the future. Likewise, the analysis endeavors to advance theoretical discussions on institutional robustness, multi-level and multi-scale studies of governance and cross-border cooperation, and managing for the sustainability and resilience of complex social-ecological systems. In what follows, this dissertation first will look at transboundary protected areas and the rationale behind their creation. It will identify the key policy puzzles and theoretical challenges to be addressed in the following text. The second chapter will focus on current theories of resilience and robustness, the literature on cooperation and coordination, and governance at multiple scales and levels. This overview will provide the theoretical framework for the rest of the research. Next, chapter three uses the notion of "disturbances" and responses to these disturbances faced by park managers as a means to explore several hypotheses on institutional development and cooperation levels in the two case studies. The fourth chapter utilizes these theories to study two cases – contrasting the Kgalagadi Transfrontier Park, a case of relative simplicity, with the Great Limpopo Transfrontier Park, a confusing complex of interrelated issues – and test the proposed hypotheses. From here, chapter five will summarize these findings on robustness, resilience, and collaborative governance before turning its attention to offering a few insights for practitioners. The goal of the study is to move beyond a purely academic study to elucidate the subject, providing potential ideas and solutions to the people in the field that formed the backbone of this study.

1.1. Insight into Transboundary Conservation

1.1.1 What are TBPAs, TFCAs, and Peace Parks?

One of the major confusions surrounding transfrontier conservation arises from the laxity in terminology. Different groups use a diverse set of terms to discuss similar types of land use and land tenure. Academics and practitioners alike use such disparate terminology as transboundary protected areas or TBPAs (Sandwith et al., 2001), transfrontier conservation areas or TFCAs (Thorsell, 1990), transfrontier parks (DEAT, 2005), internationally adjoining protected areas (Zbicz, 2001), peace parks (Westing, 1993; de Villiers, 1999), parks for peace (McNeil, 1990; Hamilton, 1998), transboundary natural resource management areas or TBNRMA (Griffin et al., 1999; van der Linde et al., 2001), and even "Super Parks" (Duffy, 1997) or "Mega Parks" (van Aarde and Jackson, 2007). With a few minor differences in semantics, these are all referring to "relatively large areas that straddle frontiers or boundaries between two or more countries and

cover large-scale natural systems" (Booth, 1992). In Southern Africa, most academics and practitioners alike use the term transfrontier as opposed to transboundary to designate management across an international frontier. References to parks typically correspond to IUCN Category II protected area management categories where the protected area is managed mainly for ecosystem protection and recreation (IUCN, 1994). Protected areas, as the name suggests, tend to connotate a level of protection as well, but refer to the broader suite of IUCN categories of protected land use. Conservation areas, by contrast, tend to focus on multiple land uses and encompass parks and protected areas, communal areas, and natural resource management areas. Peace Parks, or Parks for Peace, self-evidently refer to transboundary parks and protected areas formally dedicated "to the promotion of peace and cooperation" (Sandwith et al., 2001). In the international community, led by IUCN, "transboundary protected area" finds favor. In the southern African conservation community, however, the terms "transfrontier conservation area" or "transfrontier park" are most commonly used. The leading African NGO promoting these projects, the Peace Parks Foundation, prefers the term Peace Park. In the course of this research, the phrases "transfrontier conservation area" or "transfrontier park" will be used when referring to initiatives in the region and the more commonly used "transboundary protected area" when referring to others outside the region. Peace Parks, as used in the title, will only be used to draw attention to issues of cooperation and collaborative governance in cross-boundary conservation efforts in the promotion of peace.

1.1.2 A Brief History of Transboundary Conservation

In 1925 Poland and Czechoslovakia signed the Krakow Protocol, which "pioneered the concept of international cooperation in establishing border parks" with the result of the formation of three joint park areas (Thorsell and Harrison, 1990, p. 6). At the time these protected areas were created, the idea of fostering peace through nature was not indicated as a goal. Rather, the protected areas were seen as an opportunity to preserve a natural landscape that happened to cross an international border. This initiative also served as one of the first attempts to mitigate conflict over a border dispute through the joint management of a "collective" good, an endeavor that scholars still debate (van Amerom, 2007). With the dedication of the Glacier-Waterton International Peace Park on the Canadian-US border in 1932, the first officially declared international peace park was established. The park was seen as a formal means "to commemorate the bonds of peace and friendship between the two nations" (www.glacierwaterton.com). In the years thereafter many TBPAs became known colloquially as peace parks and were designed to promote goodwill and peace between sovereign nations through the preservation of nature. Growth in transboundary protected areas around the world has occurred through the initiative of

the World Bank, IUCN, and many of the prominent international conservation NGOs. This growth has accelerated rapidly, and the movement has gained in popularity in recent years, with TBPAs increasing in number from 59 in 1988 to 169 in 2001 and an estimated 227 in 2007, as shown in Figure 1.1 (Zbicz and Green, 1998; Zbicz, 2001; UNEP, 2007).

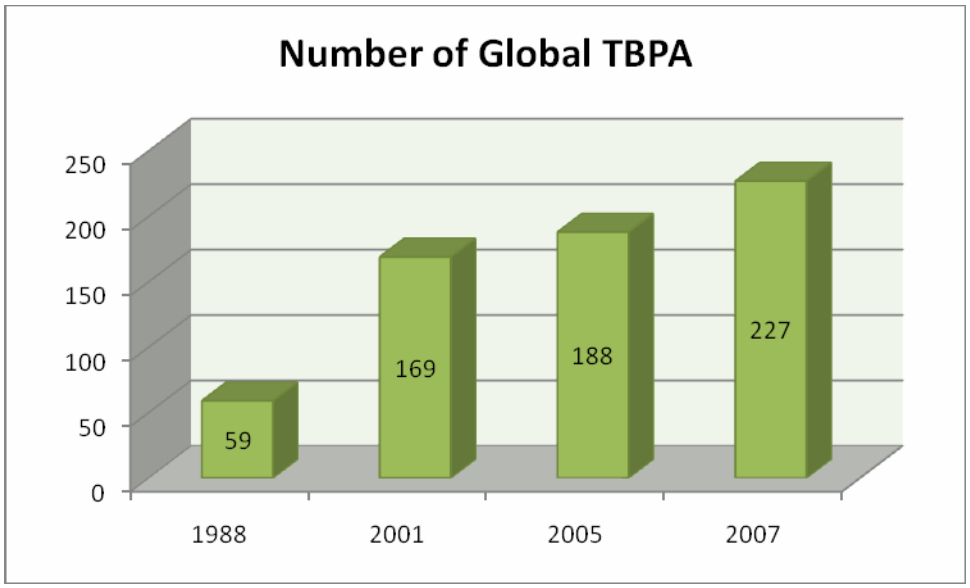

Figure 1.1: Worldwide TBPA Growth over Time

In southern Africa, the earliest versions of a transfrontier park arose in the 1920s when Jan Smuts noted the potential for massive conservation areas in the "wilds" of Africa, building on the Kruger National Park, which had been created in 1926 (Carruthers, 1995). Then, in the 1930s, with the creation of the Kalahari Gemsbok National Park in South Africa and the adjoining Gemsbok National Park in the Bechuanaland Protectorate, which became Botswana upon independence in 1966, the first *de facto* transfrontier park in southern Africa came into being. The two parks share a common border and have, since 1948, worked under an informal agreement to cooperate. In effect, South African park officials helped to manage the Botswana park, augmenting Botswana's limited park staff (de Villiers, 1998). Their role gradually grew until Botswana's government declared South African staff to be honorary rangers in Botswana, allowing them to legally perform park functions across the border. In 1992, a transfrontier management committee was formed for the two national parks, and in 1998 the governments decided to formalize their *de facto* arrangements. On April 7, 1999 Presidents Mbeki and Mogae signed a treaty creating the, more culturally appropriate named, Kgalagadi Transfrontier Park, and on May 12, 2000 the first *de jure* transfrontier park opened in southern Africa (SANParks, 2006).

Throughout this time period, the Portuguese government in Mozambique had also broached the subject of transboundary conservation with South Africa, looking for cooperation on conservation management between Kruger National Park and neighboring Mozambican hunting concessions in the 1960s and early 1970s. These ideas then faded away in the face of civil unrest and war in Mozambique through the 1970s and 1980s (Mello, 2007). Real progress toward a transfrontier park did not appear again in earnest until after the end of the civil war in Mozambique in 1992 and the fall of the apartheid regime in South Africa in 1994. The World Bank, through the Global Environment Facility (GEF), commissioned a pre-feasibility study on transfrontier conservation in Mozambique in 1992 just before the cessation of violence and collapse of apartheid (Booth, 1992). Combined with earlier work from the World Wildlife Fund, the reports recommended refocusing conservation initiatives away from strictly protected and isolated national parks and toward multiple use transfrontier conservation areas. Then, in 1997, the Peace Parks Foundation began operation, emerging from World Wildlife Foundation-South Africa and other conservation efforts under the guidance of Anton Rupert and John Hanks. The Peace Parks Foundation began encouraging and sponsoring governments to start working toward the creation of TFCAs throughout the southern African region. Around the same time, the World Bank, again through the Global Environment Facility, funded a feasibility study for a TFCA in the Mozambican Gaza Province, the site of the Coutada 16 hunting reserve. These feasibility studies and capacity building exercises continued through funding from *Kreditanstalt für Wiederaufbau*, KfW, (the German Development Bank), the Peace Parks Foundation, and other donor agencies, ultimately resulting in the creation of the Limpopo National Park in 1999 and the signing of a Memorandum of Understanding with South Africa and Zimbabwe, resulting in the formation of the Gaza-Kruger-Gonarezhou or GKG Transfrontier Park, the precursor to the Great Limpopo Transfrontier Park, in November 2000.

Since 1997, a great deal of energy and resources by a great number of actors have gone into the building of the Great Limpopo Transfrontier Park. As shown above, it was due in great part to the involvement of and pressures by the World Bank, the Peace Parks Foundation and other influential actors, that the Memorandum of Understanding was signed in 2000 by the most senior levels of government, including Ministers of the Environment and the Heads of State from the three nations. A formal tri-lateral treaty inaugurating and renaming the GKG as the Great Limpopo Transfrontier Park followed in December 2002. Other high-level support was provided by such influential people as former South African President Nelson Mandela, former Mozambican President Joachim Chissano and the late Prince Bernhard of the Netherlands. At one occasion, Mandela even made his frequently quoted declaration that "I know of no political

movement, no philosophy, no ideology, which does not agree with the peace parks concept as we see it going into fruition today. It is a concept that can be embraced by all" (Mandela, 2001 in DeMotts, 2006). With backing from the highest authorities, the Mozambican Ministry of Tourism, the Department of Environmental Affairs and Tourism in South Africa, and Zimbabwe's Ministry of the Environment began working together for the harmonization of policies and the creation and management of the Transfrontier Park. Day to day operations of the GLTP fall to the National Directorate of Conservation Areas in Mozambique (DNAC), South Africa's Park Board (SANParks), and Zimbabwe's Department of National Parks and Wildlife Management (DNPWLM).

The Peace Parks Foundation's first major achievement was in formalizing the aforementioned relationship between Botswana and South Africa in the Kgalagadi TFCA. Building off of the Kalahari Gemsbok National Park of South Africa and the Gemsbok National Park in Botswana, the Kgalagadi TFCA, as mentioned above, officially became an internationally managed peace park in May 2000. Although both national parks had shared an open border in the parks since 1948 and South African rangers played a major role in managing the entire protected area for over 35 years, but until the TFCA was official recognized there was no joint management through both governments (www.peaceparks.org). In November 2000 the PPF took its first substantive steps towards the creation of a completely new protected area, as the Ministers for the Environment of Mozambique and South Africa, accompanied by a Zimbabwean representative, signed a memorandum of understanding for the second of six planned peace parks involving South Africa – the Great Limpopo Transfrontier Park (GLTP) (www.gkgpark.com, now www.greatlimpopo.com). The newly created protected area currently covers 35,000 km^2 and will encompass over 100,000 km^2 when expanded to include a multiple-use conservation area beyond the park. In May 2003, the first fences between the international borders were torn down in a symbolic gesture of goodwill towards the protected area creation. In June 2003 translocation of animals from South Africa to Mozambique began with the release of several hundred wildebeest, zebras, and elephants from Kruger Park into Coutada 16.

Recent protected area creation efforts of the PPF have focused on the GLTP, the Kgalagadi TFCA, and four other transfrontier conservation areas involving South Africa. The other four TFCAs under development are: 1) the Ai-Ais/Richtersveld TFCA on the border of Namibia and South Africa, 2) the Limpopo-Shashe TFCA in Botswana, South Africa, and Zimbabwe, 3) the Lubombo-Goba TFCA between Mozambique, South Africa, and Swaziland, and 4) the Maloti-Drakensberg TFCA in Lesotho and South Africa. Another 16 transfrontier protected areas have been identified as suitable sites in locations spanning all 15 countries in

southern Africa (see Figure 1.2). Of these, the Four Corners or KAZA TFCA appears to be the most ambitious, spanning over 300,000 km^2 and five countries (Angola, Botswana, Namibia, Zambia, and Zimbabwe).

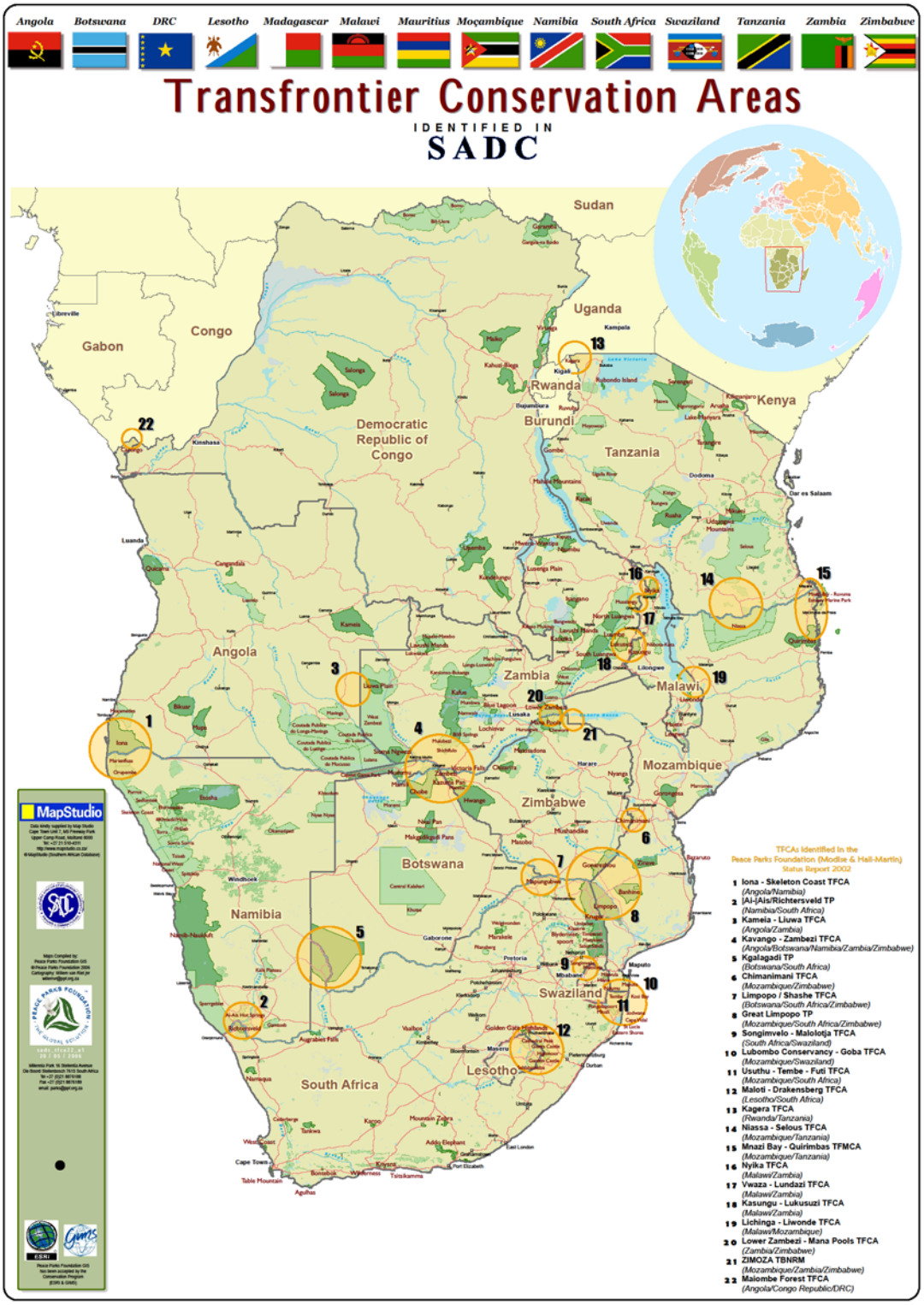

Figure 1.2: Map of SADC Transboundary Protected Areas

1.2 What is the Rationale for TBPAs?

1.2.1 Ecological, Economic, and Political Arguments for TBPA

Interest in TBPAs has risen as countries realize the additional benefits possible through transboundary parks, beyond biodiversity conservation and ecosystem service protection (Stern et al, 2003). Foremost among the expanded list of claimed benefits is the promotion of local and regional economic development through ecotourism. As will be discussed below, many proponents view the large scale of transboundary protected areas as marketable drawing cards for the international tourism market and are seen as both ecotourism destinations and cultural sites (Spenceley, 2006). In addition to the ecological and economic benefits of transboundary conservation, politicians and practitioners alike continue to make claims that partnering in TBPAs generates international goodwill and ultimately leads to peace (Thorsell, 1990; Brock, 1991; Hanks, 2003). Cooperation on conservation initiatives between sovereign nations is seen as a friendly sign in the international community, helping to improve foreign relations at the governmental, corporate, and citizen levels. Within national governments, support for transboundary protected areas not only comes from park commissions and environmental ministries but also from border control officials, economic advisors, and ethnic leaders. The environmental ministries view TBPAs as an opportunity to gain bureaucratic power through increased budget and staffing (Niskanen, 1980; Niskanen, 1994), and Wolmer notes the support for TBPAs also coming from immigration and security officials as a large natural barrier to stem illegal migration and the smuggling and trafficking of illegal or stolen substances (2003). A final source of potential support is from ethnic leaders in previously divided communities, split by arbitrary national boundaries. Odegaard indicates that TBPAs can serve as a means of reuniting divided communities as the protected areas can be viewed as a means for the "preservation and enhancement of cultural values" (1990, p. 92). For all of these reasons, prospects for the future are positive, as many other transboundary protected areas are being considered and proposed (Westing, 1993). Yet missing from many of these analyses are the needs of local communities surrounding proposed parks (Brosius and Russell, 2003), and for each of these perceived benefits others claim TBPAs lack the ability to achieve such lofty objectives (Griffin, 2003).

1.2.2 Are TBPAs the most effective means for achieving these goals?

As listed above, advocates have laid great expectations on the visions of transboundary protected areas. Many see transboundary conservation efforts as the last in a long line of conservation panaceas – the latest fad that sweeps the global conservation community similar to previous movements advocating community-based natural resource management, integrated conservation and development programs, and ecological hot spots. In much the same way that

protected areas, as a whole, must provide more and more benefits beyond biodiversity conservation, transboundary park officials see the need to justify the creation, expansion, and ongoing development of TBPAs. In doing so, they often claim to facilitate the achievement of goals listed above, aside from simply conserving the ecosystem. However, considerable debate exists on whether parks can justifiably make claims to these benefits. From the literature on parks and protected areas, more generally, many discussions focus on the effectiveness of parks versus other land use regimes for the conservation of biodiversity. Some argue that protected areas provide effective means of preserving biodiversity, primarily through the demarcation of boundaries, compensation of local communities, and strict rule enforcement (Brunner et al., 2001; Struhsaker et al., 2005). Other studies contend that other land use regimes may also provide effective means for communities and other property owners to enforce boundary rules and that protected areas do no better than alternative governance structures (Hayes, 2006; Ostrom and Nagendra, 2006). Regardless, experts estimate that protected areas cover a very small percentage of the estimated biodiversity of the earth, requiring other moves toward conservation and sustainability than sole reliance on protected areas (Rodrigues et al., 2004).

Expanding these arguments over the benefits and drawbacks of protected areas, the debate on the role of local communities and over equity issues in land tenure arrangements, and the institutional diversity available for biodiversity conservation and ecosystem management, several articles and books argue about the appropriate governance approach to these topics. In one of the most widely contested subjects in conservation biology, several authors stake out the strict protectionist stance in which biodiversity concerns necessitate the removal of people from the landscape (Oates, 1999; Terborgh, 1999). Oates, a leading advocate of what is often called "fortress conservation" or a "fines and fences" approach, insists that parks will fail as long as conservationists link biodiversity concerns and economic development. Terborgh goes further and discusses the failures of ecotourism and the sustainable development movement, as well as the "fallacy" of relying on the ecological sensibility of local communities or traditional knowledge. Likewise, in the book *Last Stand*, the authors argue that protected areas must, first and foremost, form the cornerstone for all conservation plans (Kramer et al., 1997). Other land tenure arrangements may be possible, but effective conservation ultimately requires parks.

At the opposite end of the spectrum, others argue that Western-oriented conservation ideals of parks and wilderness are often inappropriate for much of the more directly resource-dependent developing world (Adams and McShane, 1992). Brockington, for instance, focuses on perceptions of wilderness in East Africa and how wilderness areas are often protected at the expense of local livelihoods (2002). Igoe agrees, contending that western-style protected areas

are ecologically incompatible with African savanna ecosystems and local communities and that people and the landscape have co-evolved (2004). Related to these discussions fighting for the rights of communities, similar arguments in support of community-based conservation plans include the work of Neumann (1997, 1998), Ghimire and Pimbert (1997), Hulme and Murphree (2001), and Western and Wright (1994). These discussions generally focus on development and the necessity to involve local communities for both moral and utilitarian reasons. In other nuanced arguments between the poles of people or the environment, the complex interrelationship between global biodiversity conservation and local-level social justice issues emerge (Brechin et al., 2002; Wilshusen et al., 2002; Brechin et al., 2003). In these interrelated articles, the authors critique the protectionist arguments as painting an incomplete picture while still acknowledging many of their points such as the problems with integrated conservation and development programs, the myth of ecologically friendly local communities, and the moral issues of biodiversity protection. Taking these arguments one step further, Brandon et al. discuss the need for protected area managers to engage with local populations and argue that the fringe benefits of protected areas – economic development, political empowerment, and improved governance – are requirements for protected areas to succeed rather than add-on benefits (1998). At the same time, the authors argue that clear demarcation of protected areas and effective enforcement both require community engagement.

Throughout all of the debates on the wide-ranging costs and benefits of protected areas, few have expanded the discourse to transboundary conservation (Wolmer, 2006). If intelligent people disagree on the merits of protected areas in general, the debates on transboundary protected areas are even less developed and more disputed. Most of the discourse on transboundary conservation has come from advocates within the park service or NGO promoters (de Villiers, 1999; Sandwith et al., 2001; van der Linde et al., 2001; Hanks, 2003). Recently, critics of the current state of the Peace Park movement, particularly environmental anthropologists and geographers, have started to respond (Ramutsindela, 2004; Draper et al., 2004; Duffy, 2006; Büscher, 2006; Spierenburg and Wels, 2006). In spite of the vast claims by its supporters (and its critics), few have undertaken baseline scientific studies for transboundary parks, whether ecological, economic, or otherwise. In what follows, the paper will examine the scant evidence available.

1.3 What does the evidence show?

1.3.1 The Ecological Case for Transfrontier Conservation

In building an ecological case for transboundary conservation, ecological theory generally suggests that "bigger is better". Allowing protected areas to span international borders creates potentially larger, contiguous areas under similar land use regimes and provides

promising remedies for the dilemmas raised by having small "islands of conservation" amidst degraded landscapes. The sheer magnitude of many transboundary protected areas differentiates them from many national and regional parks. Of course, it is quite possible to have a very small TBPA or very large national park, but for the most part present TBPA are quite large, contiguous landscapes under a single land use, particularly in Africa and South America. The size of the TBPA has four principal effects which link to some of the ecological rationale for TBPA promotion – the opportunity for managing at the scale of the ecosystem, the application of theories of island biogeography, the reduction of habitat fragmentation, and the opening of corridors for migration.

For the first of these effects, bioregionalists, those advocating an approach to political and environmental issues based on "natural" delineations, many housed within the international conservation organizations driving TBPA development, argue that the natural environment should be separated from the current political environment and managed at the ecosystem level, regardless of national boundaries (Wolmer, 2003). Some bioregionalists, however, appear to have a naïve viewpoint of the natural world and the tendency to simplify ecological discussions to grand ecoregions without looking at nested levels of ecosystems, transition zones, and the difference between active resource management as compared with a hands-off management approach. They also often take a reductionist view to the social world, the historical background of a region, and the co-evolved role of indigenous society in the ecosystem (ibid). However, often such romanticized views are not far different from more traditional conservationist viewpoints steeped in ecological theory promoting management at the scale of the ecosystem. Conservation at the scale of the ecosystem allows for the management of rivers and watersheds, landscapes and ecoregions in a holistic, conservation-focused manner. Such approaches have sound logic behind them. However, while many of the bioregionalist and systems ecology views make intuitive sense, few transboundary parks appear to be designed around ecoregions. In the two cases of this study, the transfrontier parks do not correspond to ecological hotspots, watersheds, single ecosystems, or other regional perspectives. Instead, their boundaries match the political realities of enforceable borders in sparsely populated landscapes. If one argues for large-scale protected areas that match ecosystems or large, contiguous sections of larger ecosystems, one should try to match conservation borders with these ecosystems rather than grabbing available land for conservation regardless of location. Transboundary parks may improve regional conservation outcomes, but scientific studies should guide the "where" and "how". Political arguments, hidden behind poor, shoddy science, do not provide compelling reasons for transboundary conservation.

In a similar vein to the bioregional discussion above, island biogeography theory suggests that ecological outcomes will improve through the conservation of larger areas (MacArther and Wilson, 1967). As it relates to land-based protected areas, these improvements arise in two manners. Larger areas will host a wider variety of species due to the greater potential heterogeneity of habitats available in a larger area. Likewise, flora and fauna will have greater opportunities for colonization in larger areas. Second, smaller, isolated areas will suffer higher rates of species extinction because smaller, localized populations will have greater propensity to decline to zero than larger initial populations. However, several problems emerge in attempts to apply a theory developed for oceanic islands to "islands" created in a mosaic of terrestrial landscapes (Hilty et al., 2006).

The principal problem is that habitat matrices are much more complex than the original theoretical application. The habitat surrounding a transboundary park may be degraded, but it may not stop in- and out-migration of populations or disrupt ecosystem services. Dispersal of local communities of a larger metapopulation may or may not be impacted. TBPAs need rigorous studies to determine whether or not they improve species and ecosystem performance over other land use systems, rather than generic application of a transboundary panacea. Additionally, application of island biogeographic concepts to protected areas neglects the impacts of different levels of species vagility. Protected area managers often face concerns of invasive species, while decrying the loss or genetic inbreeding of endangered species – challenges of species varied abilities to disperse and colonize.

In southern African transfrontier conservation, one issue that views the protected areas as islands of conservation in a fragmented landscape emerges with the management of elephant populations (Whyte et al., 2003). With elephants confined by fences and protected from traditional predators (humans), the population has exploded, in the process radically re-engineering landscapes as compared to management expectations from the recent past. Instead of predation pressures, many expect population to respond instead to the stresses of food or water shortages or human controls (Koenig, 2007). At the same time, even basic ecological studies on biodiversity often fail to support transboundary conservation projects. While cases in some transboundary parks seem to improve biodiversity measures through the addition of diverse habitat patches, as in the Glacier-Waterton International Peace Park, others gain little from the extra space. In southern Africa, some ecologists have decried the ecological impetus behind the Great Limpopo Transfrontier park, saying that "we don't need to conserve any more Mopani woodlands than we already do" (Zimbabwe consultant, 6/14/2007). In both the GLTP and the Kgalagadi Transfrontier Park, the addition of protected areas across borders improved gamma-

level biodiversity, or large scale geographic biodiversity, minimally, if at all, although it should improve the genetic diversity of the park. Ultimately, while island biogeography supports the "bigger is better" philosophy behind transboundary conservation, blanket application with little to no scientific support for particular applications creates situations of dubious benefit to transboundary conservation efforts.

Similar to managing to the scale of the ecosystem and theories of island biogeography, linking preexisting national or sub-national protected areas or creating new areas of conservation adjacent to existing parks will reduce habitat fragmentation. This reduction, in turn, should improve conservation outcomes in at least three ways. First, due to the larger area and the reduced edge to core ratio of a large transboundary park, minimal edge effects help species sensitive to changing habitat types, all else being equal. By maintaining landscape continuity, larger-scale ecosystems and the accompanying ecosystem services should improve. Second, habitat fragmentation may reduce the opportunities for dispersal and can result in isolated, at risk populations. This isolation, in turn, results in increased genetic drift due to the smaller breeding population. If dispersal among two or more colonies cannot occur due to excessive fragmentation, gene flows are reduced and species fitness inevitably declines. Similarly, isolation and limited dispersal also disconnect metapopulations, reducing the chances for re-colonization, resulting in small local colonies with a greater propensity for inbreeding and eventual local extinction in the face of disturbances. For this reason, some view "mega-parks" as a remedy for the maintenance of metapopulations (van Aarde and Jackson, 2007). Just as discussions on bioregionalism and theories of island biogeography support transboundary conservation, in general, transboundary conservation should also minimize the fragmentation of habitat.

However, several potential flaws exist that should be studied before assuming that TBPAs are a conservation panacea. To begin, while the "single large or several small (SLOSS) reserves debate has waned (Diamond, 1975; Diamond et al., 1976; Simberloff and Abele, 1982), with most conservation biologists agreeing that one large, contiguous patch is superior to several smaller patches in terms of resistance and recovery from disease or other disturbances, it is not clear that this is always true. For instance, some species, particularly generalist predators and scavengers such as spotted hyenas (*Crocuta crocuta*) or leopards (*Panthera pardus*), may benefit from habitat edges between woodlands and grasslands. In the case of savanna ecosystems as in the Kgalagadi and the Great Limpopo, buffer zones and non-conservation zones may not be substantially different, at least ecologically, from strictly protected areas. The argument in favor of preserving metapopulations likewise depends on whether metapopulations exist, as opposed to a panmictic population where all individuals are potential partners, and that dispersal may occur

between the local communities. In both the GLTP and the KTP, few, if any, studies show whether metapopulations exist for key species.

Finally, in viewing mega-parks as a preserve for metapopulations, van Aarde and Jackson make an important assumption that both sources and sinks exist for the keystone species, the African elephant (*Loxodonta africana*) (ibid). However, today's presence of sinks for this particular species comes from the elimination of local populations through historic poaching, not through a natural process that will help to stabilize the wider population. For all of these reasons, transboundary conservation efforts may make contributions to conservation efforts through the minimization of fragmentation, but grounded scientific research specific to local ecosystems must form the basis for specific TBPA projects. Until the completion of such studies, grand claims should be delivered with caution.

Closely tied to the reduction in habitat fragmentation, the fourth ecological rationale supporting transboundary protected areas is that they do provide a means to manage at the scale of ecosystems. In particular, they may allow for the opening up of historic migration paths and seasonal movement for wildlife and the coordination of hunting and resource use policies, so that animal movement is not unidirectional. In the past, animals moved across borders and poachers took their fill, resulting in a one way path to extirpation. Often the scale of TFCAs is sufficient to insure ecological integrity and protect adequately large gene pools, particularly for large animals with greater habitat requirements and migratory ranges (Fall, 1999). Because transboundary protected areas are often created by linking existing protected areas across borders or creating national protected areas adjacent to another country's existing protected areas, TBPA increase the propensity to take a network approach to nature conservation. This linking of protected areas reduces the challenges inherent with other types of protected areas being seen as "islands of conservation" and increases connectivity of ecosystems (Brandon et al., 1998).

Increasing the size of protected areas by branching across international borders is often especially important because ecologically important areas often straddle land boundaries (Fall, 1999). In advocating for transboundary conservation, proponents often claim the benefits of opening up migratory paths. Perhaps focusing attention here makes the most sense for visualization and understanding. However, it neglects a few critical points. To start with, often little information exists regarding migration, at least in the GLTP. In one of the few studies of large-scale cross-border migration in southern Africa, Cumming expresses doubt about the historical record (2004). In the case of the GLTP, the Lubombo Mountains form a natural barrier, running north and south, separating two of the national parks included in the TFCA and limiting potential dispersion and migration. Officials in the Kruger Park Science Staff see little evidence

of mammalian migration, although they believe that avian migration along riparian channels occurs (Kruger Science Staff, 11/18/2007). Because the location of the Limpopo National Park in Mozambique lies adjacent to the northern two-thirds of Kruger National Park and much of the high density elephant population lies in the southern third of the park, some doubt that the TFCA will contribute to migration or dispersal (SANParks science staff, 2/13/2007).

Others see the Limpopo National Park as a sink for the overabundant Kruger elephant population due to the virtual elimination of elephants due to hunting pressures during the Mozambican civil war in the 1980s and 1990s. While this may provide a solution in the short-term, it does not eliminate the challenge of an unchecked elephant population in the TFCA. In connecting the South African and Mozambican sections of the GLTP to the Zimbabwean section, the Gonarezhou National Park, the only corridor connecting the three is the Sengwe community corridor, a strip of land roughly 10 kilometers wide and 40 kilometers long. Many doubt that this can possibly allow for significant connection for wildlife between the three national portions of the TFCA. The corridor runs perpendicular to water sources, still houses local human populations, was recently covered with land mines, and provides a narrow, poorly vegetated land connection. Only wishful thinkers view this as a legitimate linkage between the three national parks. Nevertheless, this corridor provides geographic authenticity for the TFCA. Beyond these biological and technical challenges, no one knows if historic migration paths can spontaneously re-emerge when they have been halted for years by fences and out human barriers. No evidence suggests that a species collective memory and instinct will self-organize in such a way to restart a large-scale migration.

With the removal of fences along the Mozambique-South Africa border, animal dispersal rates can finally be studied. Early translocations of animals provided evidence contrary to the TFCA with the majority of elephant families returning to South Africa quickly and of their own accord. Recent support for the TFCA, however, does emerge from the latest surveys of the Limpopo National Park which show dispersal of several large mammal species (Whyte and Swanepoel, 2007). By contrast, in the Kgalagadi, large-scale migrations have always occurred, regardless of its zoning as a transfrontier park. The park can claim to help retain this migration, but the lion's share of the hartebeest and springbok migration occurs beyond the jurisdiction of the TFCA between the Botswana section of the TFCA and the Central Kalahari Game Reserve in central Botswana. So while transfrontier conservation efforts and the elimination of artificial barriers, such as fences and land mines, can only help facilitate historic migration paths, park advocates should take care to check the scientific research before making grand claims in support of transfrontier conservation.

To summarize the ecological case for transfrontier conservation in southern Africa, many valid reasons exist supporting the push for transfrontier protected areas (Cumming, 1999). However, not all transfrontier protected areas benefit from these opportunities. Likewise, for many of the same reasons that people critique protected areas in general, it is not always clear whether TFCAs are the best use of limited conservation resources, the optimal land use, or of general benefit to the ecosystem. Only through scientific research can support be found for the many claims of TFCA promoters. At present, these studies are sorely lacking.

1.3.2 The Development Case for Transfrontier Conservation

Aside from the potential ecological benefits from the scale of transboundary parks, advocates for TBPAs also actively promote the massive scale of some of these parks as a means of stimulating regional economic development. The roles of transboundary protected areas in the economic sphere are twofold – the promotion of ecotourism and the economic stimulation and development of marginalized rural communities. Parks and conservation areas of all types make similar claims, but three factors help to distinguish the extent of the claims of transboundary parks as compared to other protected areas. First, even more than normal, international conservation NGOs and development agencies have been major proponents and financial backers of many transboundary parks. These same organizations are quite often involved in sponsoring, creating, and managing protected areas of all types throughout the world, but their role in TBPAs has been enormous (Duffy, 2001). Organizations such as the Peace Parks Foundation have been created solely for the purpose of transboundary protected areas and are backed by significant resources. As well, these organizations possess close connections with senior government officials and powerful business leaders. The Peace Parks Foundation's Club 21, in charge of fundraising for transboundary parks in southern Africa, has included such political and business heavyweights as Nelson Mandela the former President of South Africa, Joaquim Chissano the former President of Mozambique, Prince Bernhard of the Netherlands, Sir Richard Branson, Ted Turner, and the Rothschild Foundation (www.peaceparks.org).

In a related trend, much of the support for transboundary initiatives comes from predominantly Northern concerns of using large-scale protected areas, beyond the scope of most national parks, in the globalization of the commons (Schmidtz and Willott, 2003). In this manner, local environmental issues are often intricately linked to global environmental effects, and large scale conservation is seen as a means to minimize global environmental impacts (Hughes, 2005). Because over two-thirds of southern Africa's population lives in communally held land, global commons advocates often view this land as an inexpensive, painless (for them) means of carbon sequestration, biodiversity conservation, and other issues of the global commons

(Katerere et al., 2001; Katerere and Mohamed-Katerere, 2002). Transboundary conservation's scale makes the ecological claims even louder and the international discourse often drowns out the voices of local communities. With discussions between heads of state, multi-billion dollar conservation groups, and international organizations such as the World Bank, the views of a few thousand peasants often seem to vanish.

A third difference between the creation of TBPA and other types of protected areas comes from the international development organizations – World Bank, USAID, GTZ, and others. As mentioned above, many advocates of protected areas of all types view TBPAs as sources of regional development through eco-tourism (McNeely, 1993; Chapin, 2004). The difference between TBPAs and other protected areas is that the transboundary efforts often take a prominent position within government tourism departments as regional economic zones, often even as Spatial Development Initiatives or the start of development corridors (Katerere et al., 2001). Over the past several years, the Peace Parks Foundation has helped to support and fund several positions within South Africa's park service and Department of Environmental Affairs, as well as similar positions within the environmental departments of Botswana, Mozambique, and Zambia. The Department of Environmental Affairs and Tourism in South Africa went so far as to hire a coordinator to develop the role of TFCAs in furthering economic growth during the 2010 Soccer World Cup, hosted by South Africa. In several departmental reports, most recently in May 2007, South African officials view TFCAs as a tourist magnet to capitalize on soccer supporters and stimulate regional economic growth (van Schalkwyk, 2007). Before buying into the hype of economic development through TFCAs, however, we should explore the two primary economic arguments for them – the boon of ecotourism and the stimulation of rural economies.

Regarding the benefits from ecotourism, advocates claim that large-scale protected areas actively promote eco-tourism in mega-parks (Duffy, 1997). Historically, many national borders are in remote hinterlands far from the capital or major cities and have correspondingly lower levels of development (Duffy, 2001). Often these are the same reasons that the land is ecologically important. Transboundary protected areas and transboundary natural resource management (TBNRM), more broadly, are also viewed by many as simply the latest "hot" natural resource management trend. With the failure to achieve wildly optimistic goals in a variety of challenging settings, conservation organizations and their financial supporters have shifted funding from integrated conservation-development programs (ICDPs) (Wells and Brandon, 1992) to community-based conservation and then community-based natural resource management (CBNRM) (Western and Wright, 1994; Kellert et al., 2000). Transboundary natural resource management is simply the latest extension. Donor imperatives are driving the budget and the

money needs to be used. What happens when the next fad hits or when TBNRM fails to live up to lofty expectations is still open for conjecture.

In addition to the role of transboundary protected areas in promoting ecotourism, advocates also claim that TBPAs serve to foster regional and/or rural economic development. Young (2006) notes a couple of the problems with promoting rural economies through conservation. First, it is often unclear whether wildlife conservation provides the best financial returns on land use. Some studies find that it outperforms other land uses in the southern African lowveld (Child, 2006). Other studies see certain types of agriculture outgaining wildlife conservation (Young, 2006). One land use option that seems to be profitable in parts of South Africa is game farming, raising specific species to help restock game reserves and protected areas in the region. It is unclear if this option would work for local communities or not. A significant challenge lies in profit distribution. As experiences with CAMPFIRE show, even in very profitable regions (in CAMPFIRE's case, profitable hunting concessions) the amount of earnings on a household or per capita basis often drop to such low numbers (<$10/year) that they don't compensate for the loss in resource access and usage or enable a move from a direct resource usage economy to a fully monetized system (Metcalfe, 1994; Metcalfe, 2004). Many ecotourism or game farming options provide wonderful salaries for a few skilled workers and owners, but fail to provide sufficient jobs or economic returns for an entire community. The same type of project that creates a great deal of wealth for private owners may prove to be too small when attempting to spread the rewards throughout a community. Past experience indicates that the "benefits" of a protected area to a community often result in a community dance troupe or a small curio market for tourists (South African consultant, 11/8/2006). Neither of these provides a major income source for most community members.

The second point that Young makes is that rural population dynamics are undergoing radical changes with urbanization resulting in plummeting rural populations in much of sub-Saharan Africa, particularly in South Africa. While the author does not advocate resettlement, he questions whether policies to foster development in a declining population are the best use of limited financial resources. If conservation programs link with development plans, it may prove counterproductive to conservation by providing incentives for people to remain in an area or to move there to take advantage of development initiatives when they would otherwise choose to leave. The argument does not deny the imperative to help people in need. Nor does it intend to denigrate traditional lifestyles or rural cultures. Instead, it advocates policies that take advantage of structural changes in the political economy rather than trying to fight against them.

A further challenge to stimulating rural economies through community-based tourism emerges from the skills required to compete in the hypercompetitive tourism market. Private sector tourism agencies often have the size to compete in a global ecotourism market, the connections to tap into marketing campaigns worldwide, and the business acumen to win customers and make profits. The capitalist incentive system of private sector tourism provides clearly articulated goals of profitability. Public- and community-run tourism groups do not have such clear objectives. Community lodges, for instance, must balance profitability to be shared community-wide with job creation goals. Additionally, the skills necessary to run an ecotourism operation generally do not exist in rural communities. Restaurant wait staffs may have never eaten in a restaurant, and hotel staff may have never stayed in a hotel. It makes it difficult to acquire the service skills, let alone the professional business management skills, marketing expertise, required connection with outside tourism programs, and the financial backing to succeed. This is not to say that it cannot be achieved or that community-based tourism programs will not work, only that it will be difficult. Communities can overcome all of these deficiencies through government training programs, initiatives like the South African College for Tourism, and subsidized projects. Community-based tourism projects can also succeed with communal-private partnerships such as the Makuleke-Wilderness Safaris partnership in the Pafuri Lodge, located in the Pafuri region of the Kruger National Park (www.wilderness-safaris.com). However, for every Pafuri Lodge success, several underfunded, poorly staffed community-based lodges exist. The meager existence created by many of these does not support the "development through conservation" argument so frequently given.

An additional challenge facing community-based tourism enterprises in the Great Limpopo and the Kgalagadi comes from the pre-existing tourism infrastructure. In the Kgalagadi, the primary animal viewing areas lie along the two riverbeds. Both rivers already have several camps along them. This limits further infrastructure development within the park. Even excluding community interests, the Kgalagadi already struggles to provide better opportunities for Botswana, as South Africa has built lodges at the top sites over the past 70 years. Although the Botswana section of the park comprises 2/3 of the total area, the Nossob River forms the national boundary and serves as one of the few areas where wildlife can be routinely found. The transfrontier park continues to struggle to balance the tourism goals of the two parks (DWNP staff interview, 3/29/2007). Recently SANParks worked with the local San and Mier communities to open a community-owned lodge on the co-managed contractual park of the communities. Even this concession, in the contractual park on a beautiful landscape, still faces a hard battle to become financial sustainable. It should prevail, but it is not clear how

extendable this business model can be. In the Great Limpopo, the South African side is approaching the limits to further tourism offerings. Kruger National Park is approaching its tourism capacity with 1.3 million visitors annually (SANParks tourism, 5/18/2007). In addition to the park's limits, the hostelry industry in the area already has an overabundance of lodging options, particularly at the five-star level (SANParks executive, 2/13/2007). The ramifications for community-based projects are two-fold. First, they face high levels of competition at all price points. Second, if they choose to drop to a lower price-point, say a three-star lodge instead of a five-star, the size of the project required to earn similar profit goes up exponentially. For a community project, attempting to provide sustenance for a group of people this is the worst of both worlds. It requires a bigger up-front investment, a larger ecological footprint, and, ultimately, may not make the necessary operating profit.

The opportunities in Mozambique and Zimbabwe both provide different dilemmas and prospects in the GLTP than across the border in South Africa. In Mozambique, development in and around the park is immature and underdeveloped, at best. The infrastructure within the park is rough, which can be good or bad for tourism, depending on the style, although rugged camping typically has less profitability. The one current concessionaire in Mozambique struggles to deal with government bureaucracy and the challenges of pioneering businesses in an underdeveloped setting. The community lodges in the area both suffer from lack of training, insufficient levels of tourism for profitability, and lack of supporting infrastructure from the government and other businesses and services in terms of roads, restaurants, and other amenities. The case for development in Zimbabwe, likewise, has waxed and waned over the past twenty years due to ongoing political events. In the past, tourism infrastructure in Gonarezhou National Park and the surrounding conservation areas offered a range of options from rustic campgrounds to high-end lodges (Saunders, 2005). Additionally, luxury resorts and safari outfits worked in and around the southeast lowveld of Zimbabwe. Current political and economic conditions in Zimbabwe have wreaked havoc, and all but a few of these lodges have since ceased to exist. Holiday options are now limited to camping and lower level lodging, and turmoil in civil society has eliminated almost all tourism in Zimbabwe, excluding border crossings around Victoria Falls in the Northwest. Tourism ventures in Mozambique and Zimbabwe may exceed expectations in the future, but current prospects appear more limited than many claims.

One further challenge that the transboundary parks face in attempting to stimulate rural economic development involves resource access and usage (Jones, 2005). Because the creation of a protected area often reshapes local land tenure arrangements, often bringing communally held land under the jurisdiction of the state, access to resource bases may be limited

(Ramutsindela, 2003). In southern Africa, these resources include firewood, medicinal plants, game (both hunting and fishing), fodder and rangeland for livestock, and building materials, among others. Reduced access to these materials often further complicates the induced switch from a subsistence rural livelihood to a money-based service economy. Without the safety net of traditional resources from within the protected area, local communities struggle to survive without outside intervention. Changes in land tenure by fiat may not be understood and are often difficult to enforce. Re-gazetting of land as a protected area has resulted in paper parks around the world and does little for conservation initiatives or improved rural livelihoods (Brandon et al., 1998).

The economic case for transboundary conservation has many strong arguments in its favor. Advocates provide examples of beneficial increases in ecotourism and of stimulus for rural economies. However, these benefits do not always occur and often bring problems along – problems of shifting land tenure, reduced resource access, and induced changes to rural livelihoods. While transboundary protected areas may make a valid economic case for their creation, we should take care before adopting yet another development panacea. Before returning to look at some of the unique challenges that transboundary protected areas create, it is imperative that we examine one more topic that will draw us away from the ecological concerns for conservation – environmental peace-making.

1.3.3 The Political Case for Transfrontier Conservation

Perhaps the way in which transboundary protected areas are most different from other types of protected areas is in their occasional use as parks for the promotion of peace. I know of few other national park or protected area which make a similar claim. The main line of reasoning from the environmental security literature regarding Peace Parks is a functionalist argument laid out by Arthur Westing (1993). By working together, officials from adjacent countries must resolve differences on an issue of relatively low political importance (Budowski, 2003). Through this work, however, government officials get to know how their counterparts work, some of the similarities between them, eventually become friends and colleagues, and find areas of agreement. In this manner cooperation and friendship grow.

Odegaard (1990) makes a similar argument that TBPAs can foster peace in two ways: directly cultivating peace and indirectly through the promotion of understanding of other cultures, which in turn leads to the promotion of peace. Fall (1999) expands on Westing's comments and sees transboundary cooperation emerging by using environmental management for fostering good relations and reinforcing confidence between states. In examining these claims in more detail, McNeil (1990) identifies four different types of Peace Park. The first type of Peace Park is

similar to Glacier-Waterton International Peace Park between the United States and Canada that celebrates the ongoing peaceful relationships between two countries. The second type, like La Amistad International Park between Costa Rica and Panama or the Great Limpopo Transfrontier Park encompassing parts of South Africa, Mozambique, and Zimbabwe, occurs where international relations may be slightly strained, but the park serves to ease tensions. A third type of Peace Park is similar to the very first Peace Park, between Czechoslovakia and Poland after the First World War as a means to ease border disputes after a war. A more recent example would be the international park, La Cordillera del Condor, between Ecuador and Peru in the Amazon jungle where fighting and border wars had gone on for long periods of time. Finally, in rare situations, like the Korean DMZ, a Peace Park can be used where the goal is to foster peace in a war-like situation (Westing, 1993). In its use to facilitate or foster peace, transboundary protected areas are perhaps most different from their domestic counterparts.

Related to the rural development argument, other advocates view TBPAs as a means to mend torn communities and tribes. Still others argue that the rationale for the creation of TBPAs is for cultural integrity. Building on the bioregionalist argument that many international borders are arbitrary political devices that divide previously contiguous areas, advocates claim that many indigenous communities were divided unjustly by colonial demarcations (Odegaard, 1990; Wolmer, 2003). By "eliminating" the border between nations in traditional landscapes, such divided communities can be reunited. Of course, others argue that the process of creating a transboundary protected area creates multiple borders in place of the one international frontier (Fall, 2002). In addition, the divide between communities widens to include the area under conservation rather than an often permeable, lightly monitored international border (Jones, 2005). It is not clear whether transboundary conservation efforts have ever led to cultural continuity or the reunion of communities. Likewise, no studies have gone beyond the rhetoric to see if peace parks have ever advanced peace in a region. Similar to the now-discredited functionalist arguments promoted by Haas in his international relations studies of post-war Europe, little evidence supports the argument that conservation efforts lead to peace.

1.4 Theoretical and Practical Questions about TBPA Governance

In what follows, the two case studies and the challenges confronting them serve as the foundation for studying some of the theoretical and practical questions emerging in transfrontier conservation governance. Whether responses to large-scale disturbances influence the actions of a protected area's joint (international) management group, involve only management at the level of the national park service, or include narrower levels of management depends on several factors. These include the size, location, and salience of the disturbance, the social surroundings

and its interlinked ecosystem, the existing governance system, the path dependency of prior institutional arrangements, and many others.

1.4.1 The Theoretical Challenges

With this in mind, the first, theoretical puzzle that I will explore consists of how to manage within a multi-level, polycentric governance system where multiple levels of representation are consistent with the underlying goals of peace parks (biodiversity conservation, regional development, and the promotion of peace and good neighborliness). In this case, a polycentric governance system is one where many elements are capable of making mutual adjustments for ordering their relationships with one another within a general system of rules where each element acts with independence of other elements (Ostrom, 1999). In other words, decision-making is not all top-down or hierarchical, but one in which there is "coordinated" autonomy between governance groups at various levels as is the case in the transfrontier parks. Decisions arise from within the sovereign states, and the Joint Management Boards seek to coordinate action rather than dictate it. Rather than viewing the governance of the transfrontier parks in the typical manner of a hierarchical structure of national government agencies, a more appropriate view would take the perspective of a network of interconnected entities working for the collective advancement of the park. The network goes beyond national governmental actors, although they remain many of the main players. It also includes the international management bodies – the Joint Management Board in the case of the GLTP and the Bi-lateral Committee for the KTP. In addition, international NGOs and international organizations play key roles in the on-going advance of TFCAs. At a more local level, park officials and local NGOs play an active role. Yet, as mentioned earlier, local communities and their representatives often do not participate in decision-making surrounding park governance issues or natural resource management. From the complexity of this polycentric, multi-level system, this analysis intends to provide insight into managing between, across, and through such a disparate group of policy actors.

In studying this theoretical puzzle and the other intellectual queries below, an institutional perspective guides the way, taking a view of institutions as products of collective interests that serve to increase cooperation (North, 1990). More specifically, institutions are the rules, norms, and codes of conduct for specific social interactions (Ostrom, 2005; Young, 1994). The second theoretical puzzle under examination is how to improve the robustness of governance institutions in general. In doing so, I seek insight into what enables long-lasting institutions to withstand the shocks and pressures encountered over time. In the words of Popper, "Institutions are like fortresses. They must be well-designed and manned" (1966, p. 126). In the design of

institutions for transfrontier conservation, many have emerged from the experience and knowledge of intelligent and seasoned park experts. Few of these experts, however, have had the luxury of time for reflection or purposeful re-design of sub-optimal institutions. My humble hope is that the findings of this study may help to shed light into the improvement of transboundary governance of peace parks.

1.4.2 The Policy Puzzles

In seeking to provide pragmatic advice to policymakers and park officials, this study also intends to address real world management dilemmas as well. In this pursuit, the policy puzzle concerns making explicit what roles the joint management board of a transboundary protected area could play vis-à-vis the national park staffs. Particularly due to the higher transaction costs inherent in negotiating and coordinating decisions by consensus across an international border, not all decisions should be made through the international governing body. Instead, decisions made at the national park level or within groups of technical specialists can often lead to more efficient and effective outcomes. The challenge lies in determining the appropriate level at which to resolve crises and the appropriate degree of cooperation at these levels of governance.

In ordering relations within a TFCA, the national partners may choose to work together on interests vital to both parties (such as current efforts on veterinary disease control in the GLTP), may decide to keep the other parties informed about other issues (like ongoing KTP research initiatives) and completely do their own thing at a national level (as is the case with local community relations in both the GLTP and the KTP). As one of the GLTP officials stated, "We don't manage across the border. Both sides manage their own areas, and we (the Joint Management Board) try to coordinate their work." (SANParks interview, 04/19/2007).

A second practical challenge that this project intends to inform is how to improve transboundary cooperation in areas so desired. In addressing these questions, I will focus primarily on the capacity of institutional arrangements to be robust in environments with shifting ecological, political, and demographic challenges.

In exploring these puzzles, I seek to generate understanding and contribute to the study of three distinct endeavors. First, in understanding how to respond most effectively to different sizes and types of disturbances at different scales and how to coordinate ecosystem management at multiple levels of governance, I hope to contribute to our theoretical understanding of polycentric systems and situations of multi-level, cross-scale governance. This will then manifest itself practically in when and how to most effectively create and coordinate policy between multiple levels of governance and across borders between multiple sovereignties. Second, by examining responses to social and ecological disturbances, I plan to add to initiatives that apply

the concept of ecological resilience to coupled social-ecological systems (SES) and the related endeavor of exploring the use of institutional robustness with the goal of improving institutional design. By investigating institutional responses to disturbances in social-ecological systems, I hope to contribute to understanding the relationship between these terms and how to put them into practice. Third, in looking at transboundary cooperation, I intend to take a more holistic view of the international relations of nations at many levels beyond the unitary state across a variety of issues far beyond simplistic, single-minded notions of security.

1.4.3 The Research Question

In addressing these questions, I will focus primarily on the capacity of institutional arrangements to be robust and long-enduring in environments with shifting ecological, political, and demographic challenges. As a consequence of these theoretical and pragmatic puzzles, the principle research question that I hope to answer is "how does the institutional design of transboundary protected areas manage or change in response to various types of disturbance".

1.5 Introduction to the Case Studies

The two featured cases in this study are frequently mentioned in the history of transfrontier conservation in the southern African region (de Villiers, 1998; van Amerom and Büscher, 2005; Hanks, 2003; Singh, 1999; Wolmer, 2003a, 2003b; among others). The first of these is the original southern Africa transfrontier park – the Kgalagadi Transfrontier Park or KTP (Figure 1.3). As will be discussed in more detail later, this transfrontier park provides an example of a relatively smoothly run system of transfrontier management. This high functionality arises, in part, from the unique circumstances that created the park and the relative simplicity of the park in terms of a generally uniform climate, geomorphology, and ecosystem, coupled with a remote location which minimizes tourism levels and conflict with neighboring communities. In the words of one interviewee, "the KTP is a very low intensity management. It's a simplistic ecosystem, very homogeneous." (South African researcher, 10/24/2006).

The second case, regarded as the flagship transfrontier park of the region, is the Great Limpopo Transfrontier Park or the GLTP (Figure 1.4). In contrast to the Kgalagadi, the management of the Great Limpopo is always challenging and often contentious (Büscher and Schoon, forthcoming). In what follows, the historical introduction to the two parks will be augmented with a brief presentation covering their biophysical environments, the populations surrounding the parks, and a few of the key issues of concern to park management.

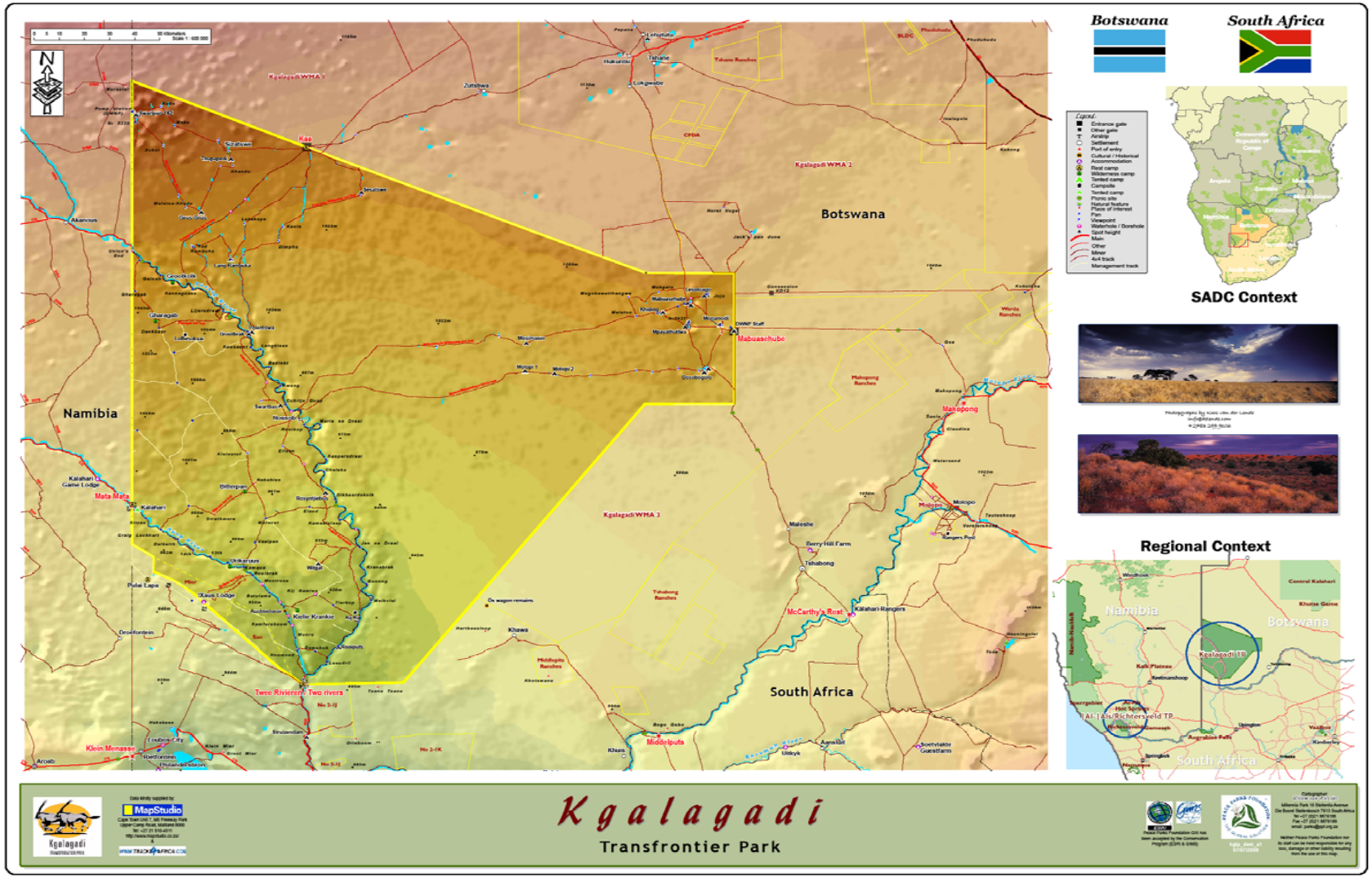

Figure 1.3: Map of Kgalagadi Transfrontier Park

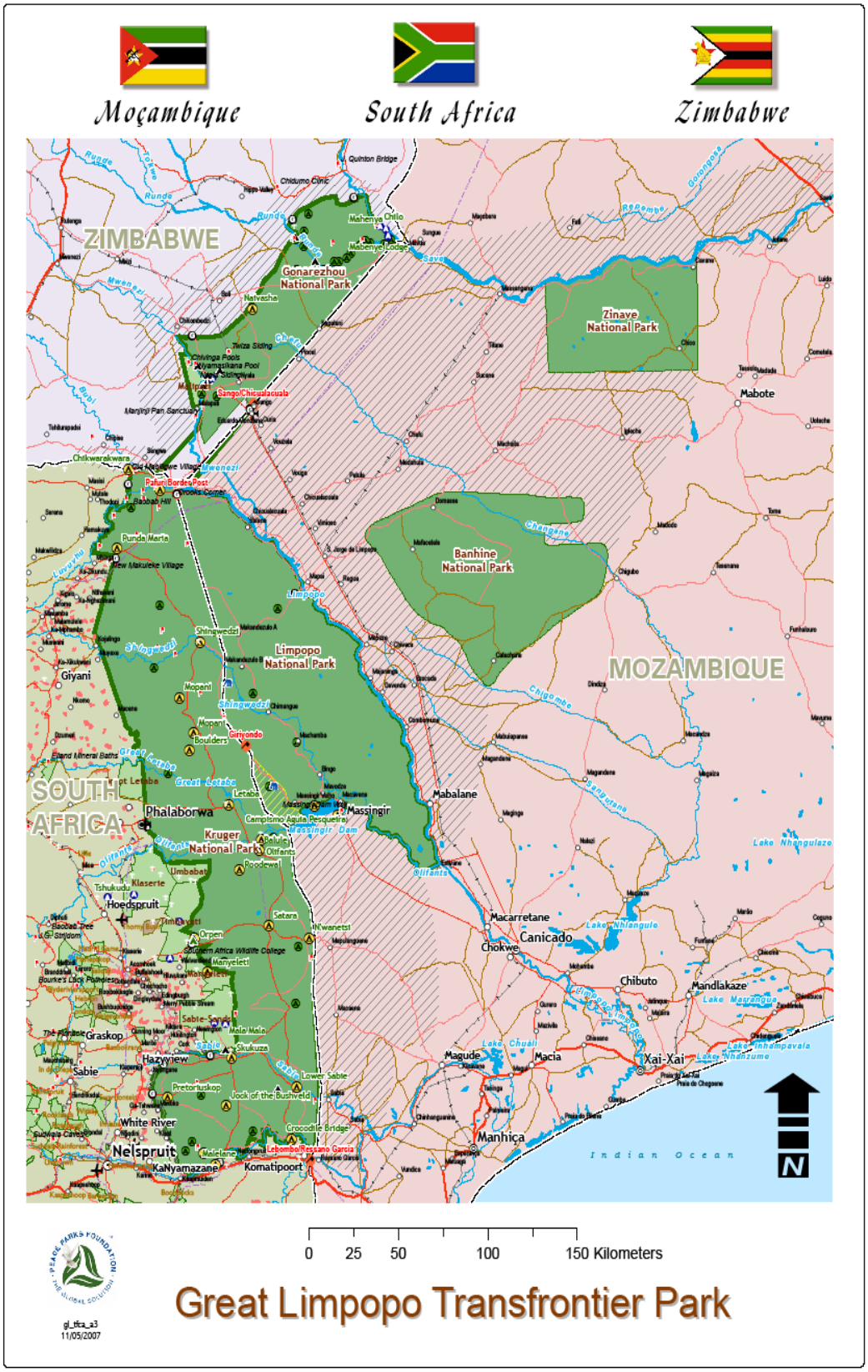

Figure 1.4: Map of Great Limpopo Transfrontier Park

1.5.1 The Kgalagadi Transfrontier Park

The KTP has existed in one form or another since the 1940s but was only officially proclaimed as a "peace park" in 2000. One important feature of the park's inception is the grassroots or bottom-up movement in the creation of the park, with local rangers and on-site park managers working across the border to collectively manage a borderless park from the very beginnings of the adjacent national parks. By contrast, most other transfrontier initiatives come from top-down movements within the national governments or from international conservation groups. This unique beginning, along with many of the exceptional physical characteristics of the park, has helped to build a stable situation and relatively simplistic transboundary circumstances for park managers to work under. Likewise, it has resulted in relatively high levels of cross-border cooperation at an operational level.

The park encompasses relatively large tracts of land, with the South African contribution comprising 9,591 km^2 and the Botswana portion of 28,400 km^2. In perspective, the total area roughly equals the Netherlands or the combined area of New Jersey and Connecticut (US Census Bureau, 2000). Biophysically, while often described as the Kalahari Desert, the area is more appropriately denoted as an arid savanna, and the park crosses two distinct eco-types – the Kalahari duneveld in the southwest and the Kalahari plains thornveld in the northeast, as shown in Figure 1.5 (SANParks, 2006). Rainfall, in this dry region, typically averages between 150 and 350 mm per annum, while temperatures range from winter lows of -10°C to summer highs of 45°C in the shade (ibid). While neither ecoregion has high levels of endemism and the biodiversity figures are not extremely high, the fence-free system contains one of the few large-scale migrations remaining anywhere (Cumming, 1999).

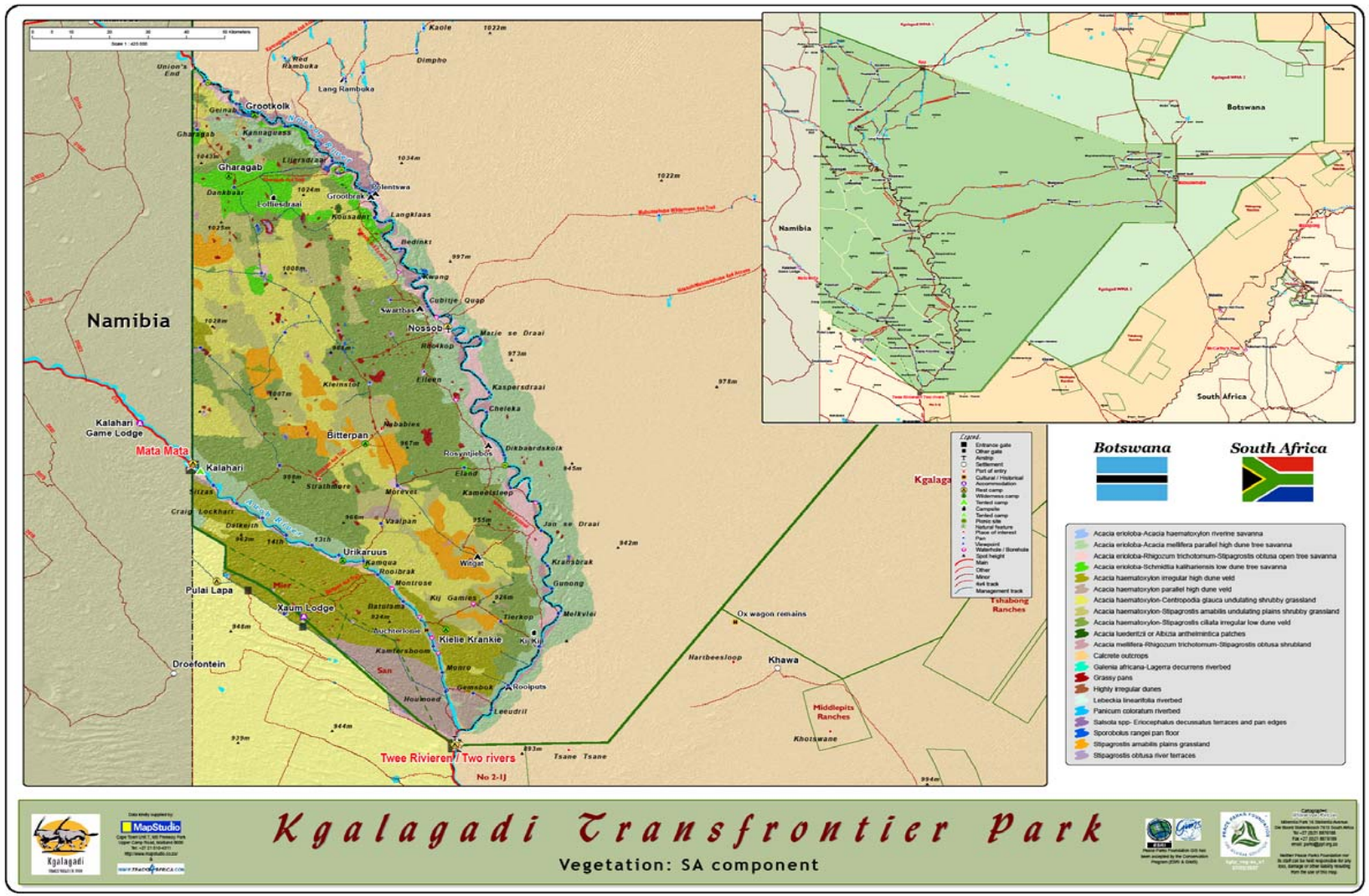

Figure 1.5: Map of Kgalagadi Transfrontier Park Ecoregions

Due to the arid landscape and the low levels of soil productivity in this area, animal populations require very large tracts of land to support themselves through the dry times. This movement and seasonal migration makes the well-being of the KTP vitally important. The migratory paths for thousands of gemsbok oryx (*Oryx gazella*) and springbok (*Antidorcus marsupialis*) range from the southwestern region of the park in South Africa, through the Botswana section of the park and continue through Wildlife Management Areas to the Northeast of the park, ultimately culminating in the Central Kalahari Game Reserve (CKGR) in Botswana. The introduction of cattle fences in the corridor to the CKGR is believed to have contributed to declines in springbok populations in the past 15 years (SANParks staff, 3/19/2007). The fauna of the region, as expected, are generally less water-dependent, with larger ungulate species including eland (*Taurotragus oryx*), gemsbok, and springbok predominating. These are accompanied by the "charismatic" predators of the region – the Kalahari black-maned lion(*Panthera leo*), leopard (*Panthera pardus*), spotted hyena (*Crocuta crocuta*), brown hyena (*Hyaena brunnea*), black-backed jackal (*Canis mesomelas*), the ever-present meerkat (*Suricata suricata*), and one of the few remaining genetically pure populations of the African wild cat (*Felis lybica*). In total, the region holds populations of 66 mammal species, over 280 bird species, 55 reptiles, 5 amphibia, and hundreds of flora species.

The Kgalagadi Transfrontier Park lies in a sparsely populated, remote area centered around the point where Botswana, Namibia, and South Africa all meet – the place called Union's End. The entire border of the park with Namibia is fenced, with commercial and communal cattle farms along the western edge of the park. The Botswana section of the park is partially fenced, with the southeastern border separated from the nearby cattleposts by a fence from the park entrance running northeast past Khawa to the Wildlife Management Area KD/15. This border of the park has 6-10 cattleposts in the vicinity and is the area with the most problems from damage-causing animals (Funston, 2001). Wildlife Management Areas (WMAs) surround the remainder of the Botswana section of the park, clockwise from the North – KD/1, KD/2, KD/12, and KD/15. These are all considered multiple-use zones, often filled with free-range cattle, but they are very sparsely populated with people.

Historically, the region also housed Basarwa or San people, but the population has not lived near the park in Botswana in recent years (Wilmsen, 1989). The same is not true in South Africa. The creation of the original national park in the 1930s intended to provide the resident San population with the opportunity to continue to live traditionally as hunter gatherers, with the park patronizingly seen as a refuge for flora, fauna, and indigenous populations (Holden, 2007). This policy changed over time, and in the mid-1970s park management forcibly removed the last

of the Khomani San from the park. With the governmental regime change in South Africa in 1994, the San and the local colored or *baster* community, known as the Mier, filed claims demanding the return of historical land holdings forcibly acquired by the government.

In 1999, on Human Rights Day, 21 March, the litigants settled their claim with the government, acquiring title to six farms totaling 36,000 ha near the KTP and an additional 25,000 ha plot to each group within the KTP. The 50,000 ha inside the KTP became a contractual "heritage" park under the collective management of the communities and SANParks (Hughes, 2005). Under the terms of the contractual park, community members have specific use rights and access to the park, however, the heritage park must remain under conservation. The joint management of the contractual park falls under the jurisdiction of a Joint Management Board comprised of representatives from the community and the national park staff. In addition, the two communities have recently opened a community-owned resort, !Xaus Lodge, within the heritage park, as a means of earning rent from the concessionaire, providing jobs to community members, and teaching traditional lessons to both community youth and tourists (Community representative, 8/12/2007; www.xauslodge.co.za).

In general, the management of the transfrontier park has advanced relatively smoothly. Much of the ease of cross-border management stems from the long history of partnership between the two countries and the view of the landscape as a single borderless system from the beginning (SANParks staff, 3/21/2007). No doubt the relative simplicity of the park from a management perspective helps as well, with relatively low levels of tourism, few surrounding communities or adjacent neighbors, a homogeneous ecosystem, and a *laissez faire* management approach (Botswana park staff, 11/16/2006). Current transfrontier management decisions have focused on creating a joint logo and re-branding and marketing the park solely as a transfrontier park rather than individual national parks (SANParks official, 3/20/2007). However, a few key disturbances continue to surface in discussions with park staff, community members, and NGO officials working in the area. On the South African side, many mentioned the difficulties in coordinating between the two communities and the park staff in the contractual park.

Past contentious relations between park and local residents, differences in management styles and techniques, and differences in both world views and management goals have led to many challenges for all parties in the collective governance of the contractual park. In addition, while not yet a problem, the joint management of a contractual park within a transfrontier park puts SANParks in the delicate situation of having to play a two-level strategic game (Putnam, 1988). In these two tiered negotiations, SANParks tries to achieve its organizational goals while

at the same time appeasing its management partners at both the community/contractual park level and the transfrontier level.

A second disturbance, the problem of damage-causing animals, frequently emerged in discussions with both South Africans and Batswana. Particularly along the southeastern border of the KTP, several cattleposts lie directly against the park border. In spite of the park fence, lion and leopard can quite easily leave the park and often end up preying on what are known as "slow eland" or cattle. Because of the proximity of grazing animals and the difficulties and expenses of maintaining hundreds of kilometers of fence line across terrain of constantly shifting sand dunes, the parks' response has been to recapture escapees and relocate them to areas in the park far from the border. Offenders are also branded to allow rangers to identify frequent offenders. However, this solution requires ranchers to find the animals, generally losing livestock and risking attack in the process. It also involves a great deal of time, expense, and expertise on the part of the rangers (Funston, 2001). Differences also arise between South Africa and Botswana on the payment of cash restitution for lost livestock, with only Botswana providing any compensation (DWNP, 2006). Human-wildlife conflict creates one of the largest and on-going challenges facing the joint management of the KTP.

A third disturbance, frequently mentioned from the Botswana side of the park, concerns unequal levels of tourism between the South African and Botswana sides of the park. The South African side of the park boasts nine lodges and several campsites while the Botswana side has little tourism infrastructure other than primitive campsites. As a result many tourists stay exclusively on the South African side, resulting in higher revenues for the South African park. While the two countries share gate revenues equally, discrepancies still arise over how to proceed with tourism development. These management challenges and many others will be revisited in more detail in the following chapters.

1.5.2 The Great Limpopo Transfrontier Park

In 1898 the South African government, under the leadership of Paul Kruger, created the Sabie Game Reserve as a place to preserve the lowveld natural environment (Carruthers, 1994). In the following years, the reserve expanded to cover an area of 20,000 km^2 and, following the National Parks Act of 1926, became one of the world's first national parks – Kruger National Park (Carruthers, 1995). Spanning an area of roughly the size and shape of Israel, today the Kruger Park hosts over one million visitors per year, many with the hopes of spotting Africa's Big Five – lion, leopard, Cape buffalo (*Syncerus caffer*), white rhinoceros (*Ceratotherium simum*), and the African elephant (Apps, 2000). Meanwhile, Zimbabwe created the Gonarezhou National Park in 1975 along the southeastern border of the country out of game reserves and

forestry land place under conservation in the 1940s. Known as the "Place of the Elephant" and blessed with beautiful cliffs and rock formations running along the Save and Runde rivers, the park soon became popular with sportsmen and tourists alike (Saunders, 2006). By 1980 several thousand tourists visited each year. However, with the ongoing collapse of the government and lack of emphasis on conservation, the park had slowly drifted into its present state of decline. Today fewer than 1,000 people visit each year, and the national park staff looks to the transfrontier park as the only way of rehabilitating itself back to its previous glory. Mozambique took steps toward the creation of a national park in partnership with Kruger and Gonarezhou, establishing the Limpopo National Park in 1999 (DNAC, 2003). Using the former hunting concessions, Coutada 16, as a starting point, the government hoped to rehabilitate the flora and fauna in an area decimated by decades of civil war. In the late 1990s, under the guidance of several non-governmental and international organizations, including the World Bank, the Peace Parks Foundation, and the African Wildlife Foundation, the three national governments began working toward the establishment of a transfrontier park. As reported earlier, in 2002, the governments of Mozambique, South Africa, and Zimbabwe signed a treaty formally creating the Great Limpopo Transfrontier Park.

Building off of the well-known Kruger National Park in South Africa, the long-established Gonarezhou National Park of Zimbabwe, and the newly created Limpopo National Park in Mozambique, the combined entity spans over 35,000 km^2 and is home to 146 mammal species, 114 types of reptile, and over 550 bird species (DuToit et al., 2003). The new park, primarily southern savanna woodland and grassland, encompasses 17 distinct ecozones, ranging from relatively open acacia lowlands to thick scrubby mopane bushveld. Yet while the transfrontier park, in aggregate, places enormous tracts of land under conservation, the significance of the ecological benefits is not fully clear. As mentioned earlier, basic conservation biology outlines the benefits of reducing landscape fragmentation and increasing a park's perimeter to area ratio, and conservation biology theory indicates that larger areas under conservation will more effectively prevent local species extinctions. However, with huge amounts of African savanna landscape already under conservation and few, if any, additional endemic species protected by enlarging the previously existing parks, it is unclear if the newly formed GLTP furthers conservation goals more effectively than previous plans. Furthermore, unlike the migrations in the Kgalagadi, it is not readily apparent whether significant migrations or large-scale seasonal movements historically took place between any of the three national parks. In fact, from an ecological perspective, few baseline studies have been conducted to ascertain the true biodiversity benefits to the transfrontier park (van Aarde and Jackson, 2007). This fact is not

meant to discount other political, social, or economic benefits arising from park creation but rather to indicate current knowledge gaps and flaws in the argumentation of park promotions.

Another significant difference between the KTP and the GLTP, and one of the major challenges facing park management, is that the GLTP has much more contentious relationships with neighboring communities. Unlike the sparsely populated areas of the Kalahari, the lowveld land of the GLTP is densely populated. The western border of Kruger has several million residents in dozens of communities immediately adjacent to the park. Additionally, Kruger continues to negotiate several land claims with communities previously displaced in the creation of the park, covering roughly half of the park. One of these has resulted in the creation of the Makuleke park, an area in the north of Kruger now owned and managed under the guidance of a communal property association (Reid, 2001; Reid et al, 2004). In Zimbabwe, communal land, a populated area known to park managers as the Sengwe Communal Corridor, comprises the area connecting Kruger, Limpopo and Gonarezhou Parks. This area encompasses several villages with thousands of inhabitants. Likewise, in Mozambique, the newly proclaimed park still has over 28,000 people living within the park, of which several thousand are undergoing the process of relocation. These tight quarters create challenging relations between local communities and park management.

Compounding the challenges of working, managing, and collaborating within this crowded environment, two other disturbances frequently arise. The first, similar to the problems in the Kgalagadi, arises from human-wildlife conflict. In particular, the communities adjacent to the western border of the park and the villages still living along the Shingwedzi River within the Limpopo Park, continually face the risk of predation of livestock to predators; the destruction of crops by elephant, warthog (*Phacochoerus africanus*), chacma baboon (*Papio ursinus*), and other sources of crop raiders; and direct risk to their lives in living side by side with dangerous animals.

Another risk further threatening such lives and livelihoods also comes from close interaction between humans, their domestic stock and wild animals (Cumming et al, 2007). The threat of transmission of veterinary diseases between wildlife and domestic animals worries veterinary authorities in each of the three countries and has resulted in the formation of a working group, the Animal Health for Environment and Development or AHEAD group for Southern Africa and the GLTFCA. The threats of veterinary disease and damage-causing animals directly link to one of the most challenging and problematic issues facing the GLTP – removing fencing and the subsequent threats to border security (Peddle et al, 2004). With the GLTP, security officials had multiple disturbances to address regarding the transboundary nature of the park. First, in addition to the problems of human-wildlife conflict and veterinary disease control, the

need to remove fencing created problems for border control with respect to smuggling, illegal migration, and general border security. Second, security officials and tourism leaders disagree on how to allow for the flow of park visitors between the three national parks. Questions arise about whether the transfrontier park should be internally "borderless", whether border posts should be placed along the external border of the park, or whether border posts should be placed within the park. Third, beyond the flow of animals and tourists, park management wants to know whether staff may freely travel across the border in the course of the daily business of following poachers, researching and tracking animals, or other routine tasks. Each of these disruptions and many more specific security issues continue to create debate and dissention over how the transfrontier park should operate.

Similar to the situation in the KTP, tourism provides additional challenges for transfrontier park managers. With 23 rest camps and over 3000 kilometers of road in Kruger, at one extreme, and only one camping concession and a few 4x4 tracks in Limpopo, at the other extreme, tourism infrastructure in the three national parks is highly unequal. While Kruger Park hosts over a million tourists per year, Limpopo hosted roughly 15,000 day visitors in 2006, and less than a few thousand currently visit Gonarezhou (DNAC official, 11/21/2006). Like the KTP, the GLTP has vastly unequal levels of tourism development between the partner countries. Unlike the KTP, however, park officials believe that tourism numbers in Kruger are at the park's carrying capacity (SANParks official, 5/18/2007). As a result, Mozambique and Zimbabwe hope to share in Kruger's largesse. In the words of a Zimbabwean representative, "We want Kruger's tourists, not their animals." (DWLNP official, 6/19/2007). The resulting debate has pitted the national governments against each other in the sharing of gate revenue, the development of infrastructure, and the joint marketing of the transfrontier park.

These disturbances, and the ones facing the Kgalagadi, challenge management and form the heart of this study, with managers confronting classic collective action problems of a complex nature. The task remains to determine how to effectively manage disparate visions for the resolution of these 'wicked' problems in transfrontier parks through their collective management (Rittel and Webber, 1973). The following chapters will study these disturbances and managerial responses to them in the process of testing the hypotheses outlined below.

1.6 Hypotheses

Using institutional responses to disturbance, this research seeks to test several hypotheses in an effort to provide answers to the research questions and puzzles outlined earlier. The first hypothesis, H1, states that large disturbances, or disturbances of immediate concern to multiple countries, will generate greater degrees of transboundary cooperation. This hypothesis directly

links to the theoretical puzzle regarding cooperation in a multi-level, cross-border governance system, the desire to flesh out the concepts of resilience and robustness, and, when connected with the following two hypotheses, provides a link to studies of polycentricity by looking at how different governance levels may cooperate and under what circumstances. While at first glance, it may seem self-evident that large disturbances may generate greater levels of cooperation, these may also serve as flash points of conflict (Büscher and Schoon, forthcoming). Often these disturbances serve as issues of conflict, as in the literature on water wars and environmental scarcity (Homer-Dixon, 1999). Instead small, incremental challenges may prove easier areas in which to build cooperation through either the slow, progressive building of trust and social capital (Coleman, 1998) or through a more functionalist path of harmonizing legislation and moving forward on smaller issues first (Haas, 1964).

The second hypothesis, H2, asserts that cases of bottom-up transfrontier conservation, such as in the creation of the Kgalagadi Transfrontier Park, will have higher degrees of operational cooperation than situations of top-down TFCA origination. Basically, when ground-level workers begin working across a border on issues of concern to them, this type of work will continue. In the case of the KTP, rangers began collaborating on cross-border issues prior to 1948. The recent "inauguration" of a transfrontier park builds on the foundations established over the past 60 years. Juxtaposed with that, rangers and scientists in the Great Limpopo have had little cross-border interaction until recently. Rather, efforts in support of border security have inhibited cross-border relations at the operational level. By contrast, the third hypothesis, H3, takes the opposite approach. In cases of top-down transfrontier conservation, such as in the origins of the Great Limpopo Transfrontier Park, higher degrees of political cooperation will be found than in cases of bottom-up TFCA origin. With high-level political actors working for the GLTP from the very beginning, we would expect political involvement to remain high. The GLTP emerged from the efforts of the World Bank, influential policy entrepreneurs like Anton Rupert, and the presidents of South Africa and Mozambique. The challenge will be to avoid conflating cooperation levels within a dynamically shifting policy process with other factors contributing to or limiting the success of institutional responses to crises.

In studying these hypotheses, I posit that the higher transaction costs of international coordination and the lack of direct enforcement abilities will minimize the amount of institutional development at the international level relative to national and sub-national levels. As mentioned earlier, this possibility often gets neglected in many discussions on peace parks (Sandwith and Besançon, 2005). Rather than assume that it makes little difference in cost to bring activities to the international level or not, we can compare costs associated with different choices of

institutional design. Similarly, we can further speculate that transaction costs will decline over time as levels of cooperation improve. This may be due to increasing trust, allowing for the specialization of tasks, or the streamlining of international administration. Finally, we can conjecture that different types of disturbance may lead to different degrees of cooperation at either a political or an operational level depending on whether the disturbance is a shock or a pressure, whether the issue is politically salient in its timing (Kingdon, 1994), or is a recurring issue. To test these hypotheses, the paper turns to the institutional responses to several of the key disturbances mentioned earlier.

To operationalize this framework and provide insight to the theoretical and practical puzzles, I intend to focus my study on the two transboundary protected areas discussed earlier, viewing them each as social-ecological systems. My pre-dissertation research looked only at the South African side of the parks, but the refocused interest on transboundary cooperation requires the examination of each side of the transboundary parks. In addition, looking at TBPAs holistically and as collections of separate national parks will provide more observations for understanding ecological and institutional outcomes. To mitigate some threats to validity, I have chosen two transboundary park complexes that share commonalities on a variety of potentially important variables yet differ on a few variables that theory suggests as being critical to institutional design. The Kgalagadi Transfrontier Park (KTP) and the Great Limpopo Transfrontier Park (GLTP) are both very large, well-established protected areas. Each is made up of large national parks on all sides of the border – the GLTP with the Kruger National Park in South Africa, Limpopo National Park in Mozambique, and Gonarezhou National Park in Zimbabwe and the KTP with the Kalahari Gemsbok National Park in South Africa and Gemsbok National Park in Botswana. With the exception of the Limpopo National Park, each national park has been in existence for many years. Additionally, both transboundary parks are proclaimed through international treaties. Each transboundary park also encompasses a predominantly savanna ecosystem – the Kgalagadi, an arid savanna, and the GLTP, a moist savanna. While each ecosystem presents unique circumstances, the two cases will be similar enough to provide valid comparison.

My research will focus on a few of the crucial differences between the two transboundary parks. Flowing from my previous work, decentralization theory, and early work on polycentricity in municipalities, I believe that the most important difference will stem from the unique sources of origination of the two parks, with the KTP evolving from the work of local park officials, a bottom-up beginning, and the GLTP initially being pushed by the national governments, a top-down origin. Drawing more on international relations literature, I also anticipate that the different

partner nations working with South Africa – Botswana in the KTP and Mozambique and Zimbabwe in the GLTP – will affect specific policy creation and influence the level of transboundary cooperation. Differences in national governments lead to differences in governmental structure, varying levels of financial and human capacity and experience levels, and different types of working relationships. Other differences between the two protected areas which could lead to unique disturbances, different levels of cooperation, and divergent policy outcomes include the different ages of the transboundary park (the GLTP was created in 1999, while the KTP was a de facto transboundary park in 1948 and formalized by treaty in 1999) and very divergent social surroundings (the area around the KTP being sparsely populated, while the area neighboring the GLTP is densely populated with population densities increasing rapidly). As discussed in more detail in the third chapter, the hypotheses, as tested by the two case studies, are over-determined with several causes potentially determining the observed outcomes. However, focusing on the top-down and bottom-up originations of the parks and the evolution of the parks offers insight across dozens of disturbance observations and provide explanatory power in the study of the hypotheses.

Although no case selection is perfect, I believe that these two cases will enable comparisons along similar variables and provide interesting contrasts which will provide insight into the puzzles of interest. The two differences that will form the heart of the study will be the different origins of the transfrontier parks – the bottom-up genesis of the Kgalagadi and the top-down inspiration for the GLTP – and the different lengths of time that the two transfrontier parks have had to develop – the slow, unforced institutional evolution of the KTP and the fast-paced development in the GLTP.

1.7 Structure of the Dissertation

In what follows, the dissertation will proceed to test the hypotheses presented above and begin to address the practical and theoretical puzzles described earlier. The process for doing so is organized in the following manner. In Chapter Two, I will lay out some of the theoretical groundings that undergird the study. I draw upon theories of resilience that were originally developed in the ecological literature. These focus on how social-ecological systems respond to disturbances and view systems as having multiple equilibria. With changing conditions (the fast and slow variables in a system), systems can respond in nonlinear ways, resulting in unexpected changes in the system. When combined with similar theories of robustness, drawn from the engineering literature, this study focuses on the role of institutions in social-ecological systems. When these institutions are sufficiently robust or long-enduring, one can then begin to understand how the governance mechanisms of social-ecological systems respond to disturbances, the

adaptive capacity of a system in the face of different types of disturbances, and how responses vary with the type of disturbance. The chapter also draws upon theories of cooperation to see how governance systems that cross borders work together to solve mutual problems collectively. These theories seek to answer such questions as "when does cooperation emerge, and when do governments elect to respond unilaterally". This leads the study to theories of governance and polycentricity. The notion of polycentricity supports the idea that successful institutions, however we choose to define success, match the level of the scale of effects of the situation that they try to manage. It is the governance version of the adage that we should "use the right tool for the job". To close the chapter, a recent trend in the literature on adaptive governance will also be examined.

Chapter Three begins to discuss some of the methodology behind the study and introduces a typology for studying disturbances by drawing on the theories of the previous chapter. From hundreds of key informant interviews, the data show dozens of disturbances confronting the transboundary protected areas and institutional responses to the disturbances. By looking at the types of disturbances and when and where cross-border collaboration and cooperation emerge, the chapter begins to test the first hypothesis regarding the types of disturbances that engender cooperation and those that do not. By looking at several disturbances, both social and ecological, the study compares empirical results from what is expected from theory. Some of the disturbances have no formal response. Others have responses from one governmental group. Still others have more coordinated responses. Interesting findings emerge in comparing these response patterns between the two cases.

Chapter Four proceeds from the analysis in the previous chapter and starts to look at the two cases and where cooperation emerges in both. In doing so, we test the second and third hypotheses, comparing levels of operational and political cooperation between the two cases. Again, assessing the hypotheses comes from in-depth analyses of several disturbance-response events in both transfrontier parks. It draws on several of the most frequently mentioned disturbances. The study builds on these findings to delve into how bottom-up and top-down processes interact and influence social capital, institutional evolution, and cooperation. In doing so, the study intends to inform our understanding of robustness and long-enduring institutions and how different types of structures enable effective responses to some types of disturbances while struggling to deal with other disturbances.

The final chapter has three primary goals. First, it summarizes the findings from the previous chapters. Here, I revisit the key research questions and hypotheses. The chapter then re-examines the evidence for and against the hypotheses. Second, I make some broader

generalizations about polycentricity and multi-level governance, the robustness of institutions, how disturbance-response events influence institutional evolution, and conversely how institutional evolution creates path dependency which in turn can lead to fragility in response to some types of disturbances. The study concludes by returning to some of the practical questions asked by park scientists and managers. The intent is to provide some insights into the governance of transboundary protected areas and to give preliminary answers to the questions of when, where, and how to work cooperatively across a border.

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2. Chapter Two: Exploring Theories and Concepts in Transboundary Conservation

"Institutions are like fortresses. They must be well-designed and manned" (Popper, 1966, p. 126).

"I have one great fear in my heart, that one day when they are turned to loving, they will find we are turned to hating." Alan Paton, Cry the Beloved Country (p. 40)

In the pursuit of understanding how institutions change in response to disturbance, this thesis draws insight from multiple theoretical backgrounds. The foundation for this research is based on four theoretical approaches – theories of resilience and robustness, theoretical perspectives of cooperation and coordination from several disciplines, game theory, and the concepts of polycentricity and adaptive governance within the institutional analysis and development (IAD) framework. In this setting, I refer to theories as positing "relationships among the variables and mak[ing] predictions about likely outcomes" (Schlager, 1999, p. 240). By contrast, frameworks are devices to discern the elements and relationships between the elements within a system. The challenge emerges from drawing on ideas from diverse disciplines, some of which refer to worldviews and philosophies as theories. In what follows, theories will refer to explanations of phenomena that allow for prediction and that can ideally be tested. "Theories" that are more speculation or belief than testable explanation are labeled as concepts or ideas. The goal for this study of transboundary conservation is to connect theory to praxis empirically.

The core of the study draws upon the literature of resilience and robustness in examining how actors use institutions to respond to disturbance. An orthodox fit for any study of a complex social-ecological system, theories of resilience play a large part, particularly in examining the impacts of disturbance upon the system. Also, in differentiating between the two case studies, theories of resilience facilitate examining these cases as distinct states of similar systems. In this way, important control variables emerge from the data through the analysis, enabling insights previously hidden in the minutiae. As the heart of the study focuses on changing rules, norms, and strategies in response to these disturbances, recent developments on the robustness of institutions serve to highlight when and how man-made conventions for organizing social interactions and relationships in some places impede "progress" through inertia and resistance to change while at other times they may collapse and facilitate the transition to different institutional arrangements. These transitions can be partially explained by drawing on engineering ideas and

theories of robustness which enable us to see how people optimize institutions in the face of particular types of disturbances while becoming increasingly fragile and vulnerable to other types of disturbance. Studying the resilience of a social-ecological system and the robustness of long-enduring institutions, in turn, links directly to system sustainability, the central tenet of biodiversity conservation.

The second theoretical approach uses theories and concepts of cooperation, coordination, and collaboration from both the international relations literature and the geography literature to understand the institutional responses mentioned above and to compare how, when, and to what extent cooperation between actors occurs as a reaction to various types of disturbances. Previous studies have demonstrated that cooperation in transboundary conservation depends on the creation of social capital and the building of trust through open communication, collectively working toward common goals, and focusing on realistic levels of collaboration (Zbicz, 1999; Fall, 2005). This study hopes to build upon these past works when used in conjunction with theories of robustness and resilience.

In expanding our theoretical grasp of institution building in transboundary conservation, game theoretic analysis provides a third conceptual approach not often used in studies of conservation (Lejano, 2006). Using games as simplified metaphors for what happens in reality, we will attempt to explore and explain levels of policy level (collective-choice level) and operational level cooperation and multi-level games that interact between these two levels. Adaptations and transformations in responses to disturbance can arise as policy entrepreneurs help to reshape the games played.

The final theoretical approach used takes the opposite tack of the international relations theories mentioned earlier. By looking at the ground-up development of institutions and multiple seats of authority and sources of power, polycentricity links many of the theoretical findings of the above mentioned explorations within the IAD framework and aggregates them in such a way as to move towards actionable ways forward for managers and practitioners working from the local-level and expanding to broader levels of governance. One way forward uses adaptive governance as a foundation for future transboundary conservation advancement. According to Brunner et al. (2005), adaptive governance relies on open decision-making, local level support, multiple points of view, and the incorporation of science into management.

2.1. The Resilience of Social-Ecological Systems

Literature on the resilience of systems emerges from Holling's seminal piece, "Resilience and Sustainability of Ecological Systems" (1973), which provides the starting point for current inquiries on how systems respond to disturbances (Schoon, 2005). Drawing on cybernetics and

systems theory, the definition for resilience takes shape as "[a] measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables" (Holling, 1973, p. 14). In simplified language, resilience is "the ability of a system to absorb disturbance and still retain its basic function and structure" (Walker and Salt, 2007, p. 1). Since Holling first described resilience, researchers have expanded the concept from its ecological base to study the interrelationships of social and ecological (and linked social-ecological) systems, particularly with respect to adaptive management and sustainable development (Berkes and Folke, 1998). However, the challenge of applying the concept of resilience to social-ecological systems lies in moving beyond metaphor, to operationalize the ideas into measurable variables and systems. It took decades for ecological studies incorporating resilience to begin moving beyond description and identify thresholds and tipping points, moving from concept to testable theory. It seems reasonable to expect the same with social-ecological systems. Although there is grounded, empirical research on resilience in ecology (Scheffer et al., 2001), even today a great deal of social-ecological resilience research still consists of hand-waving and theorizing with little empirical analyses. In Carpenter et al. (2001), the authors discuss the need to do more than simply describe but also to identify systems configurations and specific disturbances of interest. This research program attempts to move in the direction of quantification and empiricism.

The keys to unlocking the mysteries of resilience in coupled human-environment systems are threefold – identifying system states or stability domains, defining thresholds and regime shifts, and isolating fast and slow variables. The first part lies in the careful specification of the various states, regimes or domains of attraction that the social-ecological system may reside within. Each of these terms refers to particular characteristics that define the "identity" of a system, the values of the key variables that identify the system. Often systems have multiple possible stability domains, each of which have their own identity or values of identifying state variables. A basin or domain of attraction is when the state of the system is at an equilibrium position. One of the biggest difficulties in applying resilience concepts to social or social-ecological systems lies in viewing the state of the system at an equilibrium position, even as one of multiple equilibria. It is not clear that many social systems ever reach any kind of equilibrium and instead flow along paths, often dependent on history, but with few discernable local maxima or minima and few "resting" states. For this reason, this analysis will often refer to stability domains, a mathematical term that refers to a system residing in a stable condition but not necessarily ever at equilibrium. Because social-ecological systems are open, complex adaptive systems that span multiple temporal and spatial scales and levels of governance, system analysis

depends critically on careful delineation of these state variables. Here, a complex adaptive system, as defined by Axelrod and Cohen (2000), is one in which multiple agents within a network act and react to what other agents in the system do. In turn, broader level system behavior arises from the collective behavior of the individual agents (Axelrod and Cohen, 2000; Levin, 1999). Agents can be individual actors in the political sphere or the market, firms and organizations, species, or other interactive entities. In attempting the identification of multiple equilibria or basins of attraction, we need to understand what differentiates one basin from another and what thresholds exist in crossing from one to another.

Second, maintaining resilience in the face of surprises and crises determines whether or not state shifts occur and what these shifts would entail. These disturbances can often be quick and dramatic, leading to sudden regime shifts (Scheffer et al., 2001). As well as carefully defining the system and multiple regimes, we need to understand and identify the types of disturbances confronted by the system. Gunderson (2003) explores several types of surprises, depending, in part, on the scale of the phenomena – local, cross-scale, or true novelty. In examining system responses to disturbance events, we can attempt to identify thresholds or tipping points where fundamental, defining characteristics of the system change from one stability domain to another. The challenge lies in extending this theoretical discussion to real world application. Directly related to the mystery of identifying thresholds and regime shifts is the third cornerstone of resilience. In defining the system and its responses to disturbance, our understanding of the system and its resilience depends on the identification of both fast and slowly changing variables. The interaction between these variables at multiple scales often results in the nonlinearity of system responses, the creation of thresholds and multiple basins of attraction, non-equilibrium dynamics, and hysteresis effects when switching states.

In addition to resilience, two other attributes of social-ecological systems, in the resilience literature, determine the future trajectory of a system – adaptability and transformability (Walker et al., 2004). Adaptability is the capacity of actors to influence resilience. Moving beyond the ability of a complex adaptive system to self-organize without intent (Levin, 1998), adaptability also incorporates the actions of human actors within the system to act reflexively to given situations. In studying the adaptive capacity or the capacity of a system to react when undergoing change of the actors within a social-ecological system, human interaction and self-organization may lead to the evolution of institutions in response to disturbances to the system (Nelson et al., 2007). The paper returns to the evolutionary responses of institutions and the existence of mechanisms promoting novelty and learning in the examination of robustness to follow. Adaptive capacity can prevent or encourage a system from

flipping from one regime to another in several ways – by actively moving thresholds, by moving the state of the system in reference to thresholds, by making the thresholds harder or easier to cross, or by crossing to a higher or lower scale (Walker et al., 2004). In crossing to higher or lower scales, Gunderson and Holling (2002) make reference to the adaptive cycle and panarchy. The adaptive cycle refers to the progression of a system through four phases of organization and function, with changing levels of resilience, potential and connectivity (Gunderson and Holling, 2002). Panarchy builds upon the adaptive cycle of any particular social-ecological system by placing it within a nested set of adaptive cycles at multiple scales (See Figure 2.1).

Transformability, in contrast to adaptability, refers to the capacity to create a fundamentally new system when the existing system is untenable (Walker et al., 2004; Walker et al., 2006). One of the significant challenges in applying the ideas of adaptability and transformability is in moving from theory to practice. While the two concepts have distinct meanings – with adaptability about modifying characteristics (state variables) within a regime to stay within that stability domain while transformability requires shifting to a new domain – actually determining whether the decisions of actors and the response of a system involves movement within a stability domain or moving towards a new attractor depends on very specific delineations of the state variables, the system thresholds, and definition of alternative states. While certain social-ECOLOGICAL systems, such as lake eutrophication or grassland-shrubland system flips, may clearly involve adaptations or transformations, the study of SOCIAL-ecological systems, such as irrigation institutions or the cases presented here, often are not so clear (Anderies et al., 2004).

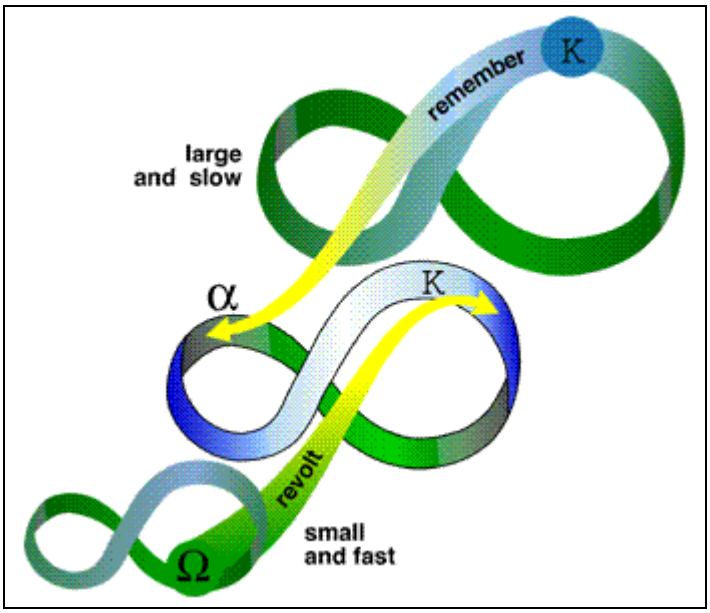

Figure 2.1: Panarchy Cycle (From *Gunderson et al., 2002*)

In what follows in the rest of Section 2.1, I will apply the concepts and ideas of resilience to the study of transfrontier conservation in southern Africa, specifying the social-ecological system studied, the two distinct states of transboundary protected areas in a landscape devoid of readily-defined equilibria, and the threshold that separates them. A significant part of this research project involved identifying the significant disturbances affecting the system, ranging from predominantly ecological perturbations like fires and floods to mixed cases like veterinary disease transmission to predominantly social perturbations like troublesome relations between park staff and local communities and political regime shifts. In the process of understanding disturbance interactions, fast and slow variables critical to system definition emerge. Ultimately, the study examines several institutional responses to key disturbances in an attempt to understand them. Some could be classified as adaptations while others will be more transformative.

2.1.1 The Resilience of What to What – Governance Regimes in Transfrontier Conservation

The first steps in a resilience study, as outlined above, require the identification of the system of interest and identifying distinguishing states of that system. We can then continue the resilience analysis by looking for possible thresholds between the different equilibria. Part of the challenge in applying resilience beyond purely ecological systems is due to the need to look beyond the visible and tangible parts of a physical system. Instead, as in all institutional work, an analysis including the social section of the resilience spectrum includes the physical evidence plus what people say and write and more importantly, what their actions and interactions demonstrate. The subtleties and shadows often do not form clearly defined equilibria states.

2.1.1.1. Defining the System

The systems of interest to this study are transfrontier conservation areas in southern Africa. The two cases carefully delimit the conservation areas as officially gazetted with transfrontier parks and their surrounding multiple-use buffer zones, designated as the greater transfrontier conservation areas. The areas are cross-scale both because of their extremely large sizes (the parks are over 30,000 km^2 each and the conservation areas more than double the total area) and our interest in both grand and minute subsections of them, but also because of the multiple governance jurisdictions crossed. They incorporate government officials at local, provincial, and national levels, civil society, as well as NGO workers and researchers from around the globe. I define the system temporally from the creation of the national protected areas through to the present time with a particular focus on the past ten years of more explicit transfrontier collaboration. Not all details over the time and space will receive equal

examination. Instead, I focus on the ultimate objectives of the transfrontier parks and conservation areas to facilitate the movement of animals, officials, tourists, and local resource users across an international border.

2.1.1.2. The Two States of TFCAs

Levels of cross-border cooperation in achieving the goals of the transfrontier park vary, in part, as we contrast political time horizons vis-à-vis conservation time horizons. The differences between the political and operational timelines manifest themselves through my two case studies. The result is two transfrontier parks that exist in two very different system states. One, the Kgalagadi, represents a transfrontier park with high levels of social capital and a great deal of trust. After decades of working together, the transfrontier park approaches the goals permitting the easy movement of animals, tourists, and officials across the international border. The other, the Great Limpopo, has enacted many of the policies required and has the political backing to build a transfrontier park, but it still lacks the accumulated social capital and capacity for operational collaboration in many areas. The stark contrast outlined above between these two cases has been greatly simplified, but the details for why the two exist in two different states and many of the extenuating circumstances make the two cases compelling. All of the state variables are difficult to measure with high specificity, rendering exact state or regime definitions and boundaries undefined. Similar troubles emerge in identifying thresholds between the two systems. The state boundaries do not only rely on differences in the levels of cooperation or in the achievement of transboundary conservation goals. Instead, the states are defined by different levels of two key variables that lead to varying levels of transboundary cooperation – the creation of trust and social capital on the one hand and political will and policy promotion on the other. This, in turn, leads to different levels of transboundary cooperation and different degrees of success in the achievement of transboundary conservation goals.

2.1.1.3. Slow Variables – Building Trust, Social Capital and the Capacity for Operational Collaboration

In transfrontier conservation, one of the most important pre-conditions for success also happens to be one of the most frequently overlooked. Working across international boundaries, often with previous competitors and contentious partners takes much more effort than signing treaties and shaking hands across a border in a political photo opportunity. It is often assumed that a transfrontier park will ensure peace and close working relationships, but this result is not guaranteed, and the parks, instead, may result in disagreements and competition (Büscher and Schoon, forthcoming). This pessimistic scenario is similar to the concerns of Paton in the opening quote, that peace is not always guaranteed (Paton, 1948). Building the relationships

between partners at multiple levels, taking the time to meet counterparts in different parts of the neighboring organization, knowing who to call about different complications and problems, and partnering at multiple levels and in various roles and positions all take time. Part of the complexity of transboundary conservation and the reason that transaction costs increase so quickly comes from the multiplicity of relationships and the time it takes to develop them.

Social capital, what Putnam defines as the connections among individuals (2000) and Coleman refers to as the way people relate to and draw upon one another's capabilities (1988), needs time to develop. It emerges from long-term relationships and working together to achieve mutual goals, building trust and partnerships over time, and helping each other resolve individual and collective dilemmas. It is not something that can be created at will or through political edict. The slow and gradual accretion of social capital in transboundary conservation projects is a necessary, if not sufficient, condition for success in cross-border collaboration. I posit that the slow growth of social capital at multiple levels in a transboundary conservation project is a precondition to the project's long-term viability. Further, it helps to weather the ebb and flow of political and donor support over the policy lifecycle.

2.1.1.4. Fast Variables – Policy Decision-making and Time Horizons

In contrast to the slow build-up of social capital and trusting relationships at an operational level, the policy decisions to engage in transfrontier conservation often appear to spring up quickly. We refer to the policy decision-making phase as the prescription function of the policy process. Park advocates that labor for years to get TBPA projects initiated may disagree, but, once the political will is found, policy decision-making can move quite quickly. Here we must contrast the speed of implementation of political agendas and policy enactment with policy implementation, which takes time. In differentiating between transboundary conservation advocacy, the formation of political agendas, and the implementation of policy, three points may provide insight. First, as will be discussed in greater detail in the following chapter, policy promotion – the recommending and garnering of support for a policy – often moves in fits and starts, and months and years of incrementalism may be followed by rapid change, a punctuated equilibrium or a system surprise, leading to potentially large and rapid changes in the political agenda. Park advocates are correct in saying that promotion often takes a great deal of time and effort and that conservation results often do not match with political time horizons. Second, the political will for a policy, in this case transfrontier conservation, and the enactment of political decisions, like the signing of a memorandum of understanding, take place in what Lasswell calls the prescription function of the policy process (Lasswell, 1971). Prescription is the stage where rules and policies are enacted, where expectations and demands

are voiced and communicated (Clark, 2002). The prescription of transfrontier conservation is the fast variable of the system, the place where great changes happen rapidly. The invocation and application phases of transfrontier conservation, the operational level enactment of policy prescriptions that comes later, take time and the aforementioned social capital. This leads to the third point that these rapid jumps in policy may be viewed as arising from the alignment of multiple streams of policy in the agenda setting portion of policy promotion. Kingdon metaphorically describes successful policy promotion emerging from the alignment of three streams – problems that spawn out of conditions that need political resolution, policies or solutions that can resolve the problems, and the politics or political environment (2002). When these three streams align, a policy window opens, and policy advances rapidly emerge. After decades of discussion of transfrontier conservation in southern Africa, a policy window opened in the late 1990s and policy entrepreneurs jumped at the opportunity.

2.1.1.5. Identifying the Threshold – Joint Responsibility of a TFCA as a Complex SES

Defining the state of a transfrontier conservation area in relation to its capabilities to achieve its stated objective provides a starting point for identifying a threshold of concern. In this case, what is important is looking for the joint responsibility in achieving the goals of transfrontier conservation defined earlier. As will be shown in the next chapter regarding the case studies, South Africa played a leading role in the official creation of the two TFCAs studied here, with both transfrontier protected areas officially beginning at roughly the same time. For a variety of reasons, one has proceeded quickly and smoothly toward the removal of operational barriers and the opening of an ecosystem. The other continues to struggle with this issue. At the same time, the situation is reversed with regard to policy advances. One manner of viewing their differences could approach the cases from a historical perspective, looking at the path dependencies of institutional development and historical relationships between the partnering countries. While discussion of the cases will detail many of the confounding conditions inherent in such an approach, a resilience perspective on the capacity for transfrontier conservation examines the interactions between the fast and slow variables discussed above. A threshold exists where the implementing agencies needs a certain level of social capital before much progress can be made toward transfrontier conservation. Growth in the fast variable, political will and policy prescription may help to build social capital, and political decisions can speed the development of the park to some extent. The limiting factor, however, is the requisite amount of social capital at the operational level, which takes time to develop. In turn, social capital can lead to increased levels of cooperation and joint ownership of responsibility for transfrontier

conservation outcomes. This study uses levels of cooperation in working toward transfrontier conservation goals as a proxy for measuring the accumulation of social capital. Like many analyses of resilience thresholds, it is not clear where the threshold exists between the two states. However, the symbol of social capital accrual as a prerequisite to operational advancement helps to conceptualize the divergent pace of progress in TFCA development.

2.1.2 Applying Resilience to Transfrontier Conservation

By first appearances, using levels of social capital and cooperation in transboundary park studies seems self-evident. As TBPAs advance over time, the system gradually moves from an inferior state to a preferred state, that everything is simply time-dependent. But can this system trajectory run in both directions? Can a more fully-functioning state digress to a less-cooperative state? Of course levels of cooperation can vary over time. Depending on the level of project development, the political climate of the park and the countries, the political will of politicians, and the goals of park officials, social capital can increase or decline. Policy prescription can change over time. An important example of how priorities change over time in transboundary conservation takes place in Glacier-Waterton International Peace Park. As the first international peace park, the transboundary managers have had a long history of closely working together, and the two national parks worked closely together for many years. By all accounts social capital was high, and the parks closely collaborated on many issues, including vegetation restoration, education, fire management, and search and rescue (Tanner et al., 2007). However, post September 11, 2001, the situation radically changed (Waterton official, 9/11/2007). Staff relations remain high, and many of the common programs continue. However, security officials have closed the border. Hikes that formerly crossed the international border now require a stop at a border control station in the middle of the forest. Appropriate visas and passports are necessary. Park officials on both sides find their relationships changed by the demands of outside agencies.

For the two cases in this study, both protected areas move toward the goals of transfrontier conservation. The two will probably never reside in similar states due to different histories and context. Progress toward transfrontier conservation goals will continue in both, and we can track this progress by studying the institutional changes in TFCA governance. In discussion of the slow and fast variables and in identifying thresholds, this study begins to qualitatively test the theories of resilience in transfrontier conservation through institutional change. In resilience language, the institutional changes manifest themselves as either adaptations or transformations in the system.

2.1.3 Differentiating Adaptation from Transformation

In resilience parlance, the difference between an adaptation and a transformation is clear. An adaptation is defined as the process and set of actors in a system to maintain the resilience of a system (Nelson et al., 2007). In effect, the actors respond to disturbance or otherwise make changes to the system to achieve certain goals or performance objectives within the system while maintaining the same structure, function, and identity of the system. A transformation, by contrast, creates a fundamentally new system when the existing system becomes untenable (Walker et al., 2004). The difference between adaptation and transformation then are quite straightforward – adaptation works within the current state of the system and transformation serves to morph the system into a new state. Although these definitions seem self-explanatory, the reality of a social-ecological system is that, in spite of best efforts to simply and clearly define our system parameters, state variables, and thresholds, it is often unclear whether or not an action or institutional change results in an adaptation or transformation. Chapter Three will revisit adaptations as the institutional changes that actors make within the system and their interrelationship with disturbances. Then, Chapter Four identifies several institutional changes, looking in detail at a few specific examples, and assessing when, why, and how these changes can be viewed as either adaptations or transformations.

2.2. The Robustness of Institutions

Resilience helps to describe and explain the functioning of a social-ecological system and enables a systems approach. However, adaptive cycles and equilibrium points may paint a simplistic picture of a dynamic, non-equilibria SES. Robustness can help address these shortcomings. In contrast to theories of resilience that arose from the ecological literature, theories of robustness come from engineering research. Similar to resilience, robustness refers to the ability of a system to maintain itself in response to unpredictable perturbations. Unlike resilience, it also looks at a system's ability to maintain itself in spite of uncertainty about design characteristics, an inherent aspect of institutions (Carlson and Doyle, 2002).

The definition of robustness alludes to some of the fundamental differences between resilience and robustness. First, having evolved through the engineering tradition, robustness focuses on designed systems, as opposed to the evolved systems of ecosystem science. In this manner, disturbances or perturbations can come from external sources, as in resilience, disturbances from within the system, or uncertainties inherent in the design of a system. Maximization for robustness occurs through designing around known risks and parameters. Threats to robustness emerge from unknown and unpredictable disturbances. If designers learn more about these risks or such risks become more threatening, designs can change to minimize these risks. This research confronts two fundamental types of unexpected disturbances in the

current study – slow, persistent changes in social conditions (pressures or stressors) and top-down impositions on nested systems (Janssen et al, 2007). Designs can work to address perturbations of low frequency/high amplitude or high frequency/low amplitude or any other combination as long as the characteristics of the disturbance are understood and the designers choose to invest in these design changes.

This alludes to the second difference between resilience and robustness. In the design of a system, system architects cannot optimize everything. The optimization of some components of the system increases its fragility and vulnerability elsewhere, sometimes by increasing the connectivity of sub-systems with each other. In such cases failure in one part of the system can spread to others. Ultimately, in a designed system designers face multiple trade-offs – between performance and fragility, between cost and benefit, and in the time invested in design and maintenance (Janssen and Anderies, 2006). Third, one of the major drawbacks in applying theories of resilience to a social-ecological system, as noted previously, is that such systems are often non-equilibrium systems. Notions of ball and basin-type dynamics, common in visualizing resilience, may not apply. Rather than moving within a system with multiple equilibria, the system may not have any equilibrium. Instead, understanding robustness relies on studying responses to disturbance and the ability of actors to intelligently and consciously modify the system. Novelty and learning become integral parts of the system. A system may be better understood as flowing along a trajectory. History and path dependence identify the past, and design goals and conscientious system design project the intended future direction.

Yet rather than favoring robustness as a terminological advance over resilience, this study hopes to make a link between resilience and robustness in two ways. First, there is the obvious "system response to disturbance" facet. The core of both systems lies in examining how systems change and adapt in the face of perturbation. Second, there is also a link between the resilience of an SES (or at least an ecological system) and the social aspect of a system that is reflexively adapting, learning, and self-organizing. This involves the interaction of humans and the evolution of institutions and (self-) governance. The successful evolution of institutions when confronted by disturbance results from improving the robustness which, in turn, leads to long-enduring institutions. The connection that I want to make here is that the resilience of a social-ecological system and the robustness of long-enduring institutions are both talking about similar issues and that, ultimately, we can view these theoretical ideas as providing a way to think about and operationalize sustainability.

A great deal of institutional research has addressed the related issues of institutional longevity and robustness and has produced many findings relevant for the current study. Of

special importance are findings on some of the problems inherent to top-down interventions and the ramifications for institutional robustness. First, top-down interventions often eliminate or minimize local-level projects, resulting in a loss of institutional diversity (Ostrom, 2005). This impacts the Great Limpopo, for instance, in at least four ways. It eliminated many of the home-grown programs within Mozambique, as the bigger international effort overrode smaller-scale plans (Schoon, 2005). Additionally, transboundary conservation efforts often eliminate previous institutional relationships between cross-border communities. While many see transboundary conservation as a chance to reunite historically divided communities, in many places the opposite holds true. Border communities and the cross-border political economy radically change by the minimization of historic trading and further dividing communities with a conservation area (Jones, 2005). Second, related to the loss of institutional diversity, there is a parallel loss of knowledge of local ecological and social system (Ostrom, 1990; NRC, 2002). This can often exhibit itself in top-down efforts by the lack of local participation, one of the chief complaints in the Great Limpopo (Hughes, 2002; Draper et al., 2004). Additionally, removal of people from the landscape reduces opportunities to pass place-based skills from one generation to the next. Third, shifting from bottom-up, locally driven initiatives to top-down ones may result in the usurpation of local collective action efforts (Gibson et al., 2005; Duffy, 2006), often eliminating opportunities for nested enterprises that are often present in long-enduring institutions (Ostrom, 1990). Duffy, in particular, notes the changing relationship in transfrontier conservation initiatives as the state shifts attention from community-driven natural resource management to the desires of international actors and NGOs. Finally, shifting the local political economy from locally-organized and led programs to top-down projects often erodes levels of trust (Ostrom et al., 1994). This erosion of trust is exactly the opposite of the posited needs for the slow variables discussed earlier. The changes in the Great Limpopo have led to a redirection of benefits toward 'modern' economies at the expense of traditional rural livelihoods (Dressler and Büscher, 2007). Each of these may prove contentious in the future and either lead to reduced long-term robustness or the creation of undesirable, but robust, institutional arrangements.

2.2.1 Adaptation versus Stasis

Building upon the imagery of a transboundary park as a social-ecological system, described above, the next sections will apply concepts of institutional robustness to this system to gain further understanding. The purposeful, guided (designed) evolution of institutions, as institutional actors learn and adapt to their environment, serves to link institutional robustness and the resilience ideas of adaptive capacity. Of importance to the two transboundary protected areas under study, the institutions of the Kgalagadi Transfrontier Park have evolved slowly over time,

allowing for changing environments and political landscapes. The robustness of the KTP's institutions over the past 70 years has emerged from several periods of change. In referring to the system as being robust, we do not mean to imply that the system is in stasis. Rather, the system moves, adapts, and responds to its environment. To use resilience terminology, the system stays in the same stability domain. However, remaining in the same state does not imply that the system has evolved into an equilibrium state. The system has adapted rather than undergone transformation. By contrast, the Great Limpopo has emerged fully formed as a result of top-down, political decisions. The institutional mechanisms, particularly informal relationships and day-to-day management, have not yet had time to evolve, learn, adapt, and respond. Like the KTP, the Great Limpopo is not in stasis, but it has only begun to learn and grow – a newborn rather than a stillborn.

2.2.2 Building/Overcoming Institutional Robustness

The theoretical and practical puzzles guiding this study ask what makes a governance regime more robust and how or if cross-border partnerships work to strengthen institutional robustness. Here, the term regime refers to a governance regime and should not to be confused with the concept of a regime in resilience terminology. A governance regime refers to the governing authority of a political unit or a nested set of governing authorities, as in polycentric systems. Depending on the state of the governance regime, however, we may either want to build robustness or seek to overcome robust but authoritarian or ineffective institutions and change it to a different state. In many ways, this is a normative issue. Theories of robustness are tested empirically in the following chapters through the examination of institutional responses to disturbances. Two examples may help elucidate the matter – the first concerns ongoing efforts and struggles to overcome a robust state in the Great Limpopo, the second in how the Kgalagadi has maintained their desired robustness over time.

2.2.2.1. Legacy of Fortress Conservation in the Kruger National Park

The Great Limpopo has a short history as a transboundary protected area in which to study long-enduring institutions or to try to make sense of theories of institutional robustness. However, some of the components of the transfrontier park have been in existence for nearly a century (Carruthers, 1995). The Kruger National Park evolved over time from a game reserve still populated by native inhabitants in the early twentieth century to a national park with no human habitation in accordance with current IUCN Category II protected area status (IUCN, 1994). During its growth from a small game reserve to an expansive national park, the Kruger Park and its staff emerged as a world leader in conservation, and park management controlled a large swathe of uninhabited (after the resettlement of local communities) low-country savanna.

As Kruger grew in size and expertise, park management led the way in the "fences and fines" mentality of conservation, also known as fortress conservation (Brockington, 2002; Terborgh, 1999). This method of conservation worked very well for many years, and South Africa's conservation leadership and reputation grew globally. However, in the late 1990s, the park increasingly came under fire for their strict ecological approach to conservation, which some saw as unjust and inequitable. Outsiders viewed the park as having discriminated against historically disadvantaged communities, taken away local access to resources and livelihoods, convicted community hunters of poaching, and segregated tourists and conservationists from the indigenous population.

With the fall of apartheid in 1994, the parks service realized that it needed to change (Magome, 2004). The staff in Kruger National Park slowly began to move away from the fortress conservation model toward a more inclusive vision of conservation, working with and through communities. However, some members of the staff resisted and support for the move away from the island conservation model languished. Initially, the parks board restructured staffing and created a "social ecology" group, designated to work to improve community relations, economically empower local populations, promote environmental education, respect and showcase cultural heritage, and facilitate research and modeling of outreach programs (Pollard et al., 2003). Unfortunately, this program made little headway. Relations with the communities did not improve, and community outreach programs instead became "centres of conflict on issues of power and access to resources" (SANParks, 2007). Social ecologists had little support or respect from management and other staff, and their marginalization resulted in high staff turnover and demoralization for those who remained. In short, the fortress conservation mindset refused to go peacefully. Even with changes in the formal institutions, the informal institutions – the norms and operating procedures – continued to support the old method of conducting business. Fences stayed up, fines continued to be levied, and little changed in park management.

A second attempt to change the state of the system began in 2003 with the creation of a new "People and Conservation" directorate (SANParks staff, 10/23/2006). In the few years that the new directorate has been running, park-community relations have started to change, if only incrementally. The management for the new directorate sits on the SANParks executive board along with representatives from conservation, tourism, and scientific services. At the park level, People and Conservation shares equal status with wildlife managers, conservation officials, and tourism. Support from senior management has helped to elevate levels of respect for the group, and relations with other staff at headquarters and within the park is slowly improving. However, progress remains slow and limited in scope. Internal park relations have improved, but the group

still feels somewhat marginalized. A gap still exists between natural and social scientists and between scientists and community social workers, who make up many of the park level People and Conservation staff. At the same time, relationships between park staff and communities appear even slower to change. Previous policies had a long history, and new guidelines and strategies need time to take effect. Great gaps in wealth and power still exist between the communities along the border of the park, many in former homeland areas or Bantustans, and the park patrons and staff. The Bantustans, areas where large numbers of black inhabitants were relocated during Apartheid, were known for overcrowding which resulted in overexploited natural resources, limited economic opportunities, and squalor (Thompson, 2001). Studies on the poverty gap in South Africa show Gini coefficients, a ratio of the inequality in society where 1 is complete inequality and 0 is perfect equality, increasing (worsening inequality) from 0.69 in 1996 to 0.77 in 2001, among the most unequal societies in the world (HSRC, 2004).

The result of this historical predicament, both within the park service and between the park and the surrounding populous, is a highly robust system quite resistant to change. The creation of the new directorate will help amend for past transgressions, but the steadily worsening inequalities between South Africa's privileged and most disadvantaged reinforce the robust regime of the past and the associated problems. The system remains in the same stability domain in spite of some institutional designers' attempts to transform the system.

2.2.2.2. Building Robustness in the KTP over Time

In contrast to the attempts to circumvent the robust fortress conservation system in the Kruger Park, the Kgalagadi has engineered a robust and desirable system for transfrontier conservation. The transfrontier effort began at a local-level and started small, with local (South African) rangers and park personnel adding to their responsibilities and working across the border in an area only loosely governed by their international counterparts. Over time, these responsibilities grew until South African staff became certified as honorary Botswana rangers (de Villiers, 1998). Then as Botswana started to add capacity to their park service, they reclaimed some of the powers distributed to South Africa. However, for a variety of reasons, the Botswana park service still works closely with South Africa. Because of great distances and rugged terrain, the Botswana section of the transfrontier park is very remote from park headquarters in Gaborone and the regional office in Tsabong. The park headquarters does not have land-based telephone lines, internet capabilities, or Botswana cellular phone coverage. Instead they rely on South African telecommunication systems and roads. This communication reliance continues today.

In addition to the communication reliance, there is also a capacity shortage in Botswana. Basic staffing functions in Botswana often draw upon South African staff, especially two of the

most critical jobs. One of the most important responsibilities of the park rangers is in problem-animal control. When large predators (lion, leopard, and cheetah) escape the park bounds and attack surrounding livestock ranges, park rangers have the responsibility to capture the animals, transport them back to the park and relocate them to a more remote section of the park. This takes a great deal of specialized skill and time. It requires tracking skills, accurate shooting, and the bravery to confront dangerous animals. It takes long, difficult hours in the back country and then a dangerous return journey with a sedated animal. It also requires specialized knowledge on where and when to release the animals. South Africa helps in each capture and release as they are the only ones with the skills to consistently perform this operation successfully. The second critical activity closely relates to the first – the maintenance of the park fence. Again the rough terrain, expense of upkeep of electrified fences over and across shifting sand dunes, the maintenance of solar panel energy sources, and the thousands of kilometers of fencing require a partnership between the rangers.

The close cooperation on a local, operational level over decades predates the signing of an official transfrontier park memorandum of understanding or treaty. The history of working together, the slow accumulation of social capital and the formation of collaborative institutional structures prior to international efforts have resulted in a very stable, robust system.

2.3. Theories of Cooperation and Coordination

2.3.1 Conceptual Insights from the International Relations Literature

In seeking to generate some form of structure for understanding international relations research programs and insights that they might provide toward studying governance in transboundary protected areas, I began to think through their contributions within a typology of research programs. In creating a typology for IR research programs my goals were twofold: to create a structure which provides a clear delineation of trends and developments in the field and to allow for an accurate assessment for analyzing individual research programs (RPs) contributions toward cooperation and governance in transboundary conservation. My taxonomy of international relations RPs classifies them along two dimensions: 1) paradigmatic foundations and 2) level of analysis, both of which are somewhat contentious and subject to debate. The following is a purposefully short overview of a vast, sprawling discipline with myriad nuances. The review does not purport to be comprehensive but to allow some basic insights from some of the foundational literature and leading researchers of international relations into the particular field of interest of transfrontier conservation.

In defining the paradigmatic dimension of the framework, I turn to the definitions offered by Thomas Kuhn (Kuhn, 1962; Vasquez, 2003). While Kuhn discusses multiple definitions for

paradigms – shared exemplar and a disciplinary matrix, for example – for my purposes I have used the concept of paradigm to mean "the fundamental assumptions scholars make about the world they are studying" (Hoover and Donovan, p. 23). These paradigmatic frameworks, rather than specific theories, are the insights from this literature. In this manner, the "theories" outlined here are not directly testable explanations of phenomena but instead serve as paradigmatic belief systems for understanding the world. So much of the degenerative argumentation in international relations has been about disputing which paradigm is correct. These are absurd arguments when one realizes that they are debating sets of assumptions on which to base their theories. Multiple sets of simplifying assumptions can be used to build models, theories, and frameworks for examining a complex world. For the purposes of my typology, I will use four paradigms – realism, liberalism, materialism, and a pan-paradigmatic category for research programs that draw on multiple literatures (see Table 2.1).

	Systemic – Image III	**National/State – Image II**	**Sub-State/Domestic – Image IIa**	**Individual – Image I**	**Cross-level**
Realism	Neorealism/structural realism; Power transition	Realism; Hegemonic Stability; Power cycle; Institutional Theory	Allison's Model III – political gamesmanship	Operational Code Analysis	Neoclassical realism; offensive realism; defensive realism
Liberalism	Idealism; International Organizations	Democratic Peace; Enduring Rivalries			Neoliberal Institutionalism
Materialism	Modern World Systems; Historical Materialism; Leninism	Marxism; Mercantilism		Rational Choice Analysis	Prospect Theory
Pan-Paradigmatic	Historico-Structuralists; Evolutionary Theorists; geopolitics	Lateral pressure	Allison's Model II – Organization Process	Holsti's cognitive mapping; JG Stein's schemata theory	Constructivism; Feminism

Table 2.1 – A Preliminary Taxonomy of the Field of International Relations for Transboundary Conservation

In my typology, I define the realist paradigm as comprised of two primary tenets. First, they take the world to be inherently conflictual and in a perpetual state of anarchy. Second, a state's focus on security in an anarchical world forces all states to pursue power above all else. Unlike many "realist" theorists, I make no mention of levels of analysis or requiring a unitary state actor or any type of rationality on the part of the actors (Schweller, 2003). While many view a fundamental component of realism to be the "state as a unitary actor" assumption, by broadening the scope, we will see that many research programs share parts of the fundamental assumptions of the realist paradigm. Examples beyond the different forms of "realism" now included in the paradigm are Allison's Model III of political gamesmanship and operational code analysis (Allison, 1969).

In many ways, the dominance of realism since the end of the second World War has stifled studies of cooperation (Jervis, 1978). Realists' insights on cooperation through transboundary conservation are limited to views that the only cooperation that will arise will be in the self-interest of the more powerful actors. Sharing sovereignty in the collective management of shared natural resources should never emerge as state sovereignty is absolute (Grieco, 1988; Krasner, 2001). Some view TFCAs in southern Africa as the political agenda of the North or of South Africa as a regional hegemon, a position in line with realist assumptions. This, however, neglects the leading role of Mozambique at various points in the process. Although realism clearly discounts the actual progress made in transboundary protected areas, it does help to explain some of the more violent debates such as the argumentation in the park versus multiple-use debate, which South Africa took to be a defining issue enabling control of their sovereign natural resources. Others argue that transboundary conservation provides a mechanism for asserting sovereignty in less controlled hinterlands (Duffy, 1997), in this way supporting the realists' premises. Neorealism also helps to overcome the realists' exclusive focus on power by expanding the focus to encompass the pursuit of wealth as a precursor to power. In this way, we can understand the competition in transboundary conservation over eco-tourism (Büscher and Schoon, forthcoming).

In contrast to the realists, the liberalist paradigm captures the normative beliefs about individual human rights including civil liberties, private property, elected representation, and a fundamentally pacific stance towards war (Doyle, 1997). The liberal paradigm, rather than using the realists' focus on power, views the distribution of preferences rather than of capabilities as the fundamental characteristic that shapes actor strategies (Moravcsik, 1997). While many liberalists assert the cross-level analysis inherent to their paradigm, my categorization again makes no mention of levels of analysis in classifying research programs within the liberal paradigm.

Examples of liberal research programs include work on international organizations (Rochester, 1986; Martin and Simmons, 1998) and the democratic peace program (Owen, 1994; Russett and Starr, 2000). The liberalist researchers make the largest contribution to understanding how cooperation can emerge in transboundary conservation through three overlapping schools of research – the multilateralism of international organizations, regime theory, and through notions of complex interdependence.

One of the most important observations from neoliberal regime theory is that regimes can provide states with much needed information about their partners. Here, the word regime refers to a governance regime, an international organization outside of national governments established to provide information, coordination, and regulation on a specific set of issues. In serving as an information clearinghouse, regimes can reduce transaction costs, provide transparency, and minimize enforcement costs (Keohane, 1984). In this manner, all participants benefit, and regime formation can occur beyond the arguments based upon the neorealists' hegemonic stability arguments that regimes only serve the interests of the most powerful states (Keohane, 1980). Instead of viewing hegemons as forcing their position upon their "partners", neoliberal theory suggests that a hegemon may instead act as the leader of a privileged group and take up the costs of regime formation, creating a public good (Olson, 1965; Keohane and Martin, 1995). Neoliberal regime theory also builds upon the earlier functionalist arguments that by working together on day-to-day activities (functions), cooperation would emerge from collectively solving problems and building friendships over time (Haas, 1964). Similarly, Keohane and Nye introduced the phrase "complex interdependence" as a means of suggesting that as relationships between nation-states become more intertwined and connected through partnering on joint endeavors, building regimes, and economic co-dependence, the costliness of breaking these complex, reciprocating relationships creates incentives for countries to work together to resolve disputes and prevent conflict (1977).

Transboundary park developers make similar claims that by working together on a low pressure situation (a park), peace and cooperation will emerge (Westing, 1993; Fall, 1999). The concept of peace parks takes this argument one step further, arguing that environmental conservation can contribute to conflict resolution and peace-building, even in zones of dispute (Ali, 2007). A recent branch of environmental research views peace, rather than conflict, emerging through the resolution of environmental dilemmas (Conca and Dabelko, 2002). Several studies apply the concept of transboundary conservation as a means of eventually fostering peace through cooperation. Swatuck discusses the manner of this happening in common-property

regimes in southern Africa (2005). Similarly, Turton et al. look at how cooperation may or may not emerge in transboundary water regimes (2006). The emergent properties of peace through environmental cooperation comes through at least four channels: fostering trust and building social capital (the slow variables mentioned in the discussion of resilience), creating habits of cooperation, lengthening the time-horizons of decision-makers, and creating shared, cross-border identities and norms. In parallel to the regime theorists arguments, state self-interest may motivate partnership in transboundary cooperation. Economic benefits may accrue to all participating countries through the claimed improved biodiversity outcomes. Improved biodiversity may lead to profit gains from sustainable harvesting and from eco-tourism (Spenceley, 2006). Additionally, as explained in the first chapter, economic arguments for peace parks focus on the financial gains through ecotourism due to the larger, collective area.

The materialism paradigm encompasses much of the political economics literature. It focuses on how the world is shaped by the pursuit of wealth. Wealth brings with it other Lasswellian value realizations – power, well-being, and respect – but the main scope value is wealth. Leninism, historical materialism, and mercantilism each offer examples of the paradigm (Gilpin, 1987). This research sees all developments and changes in human society, such as the emergences of social classes and political structures, as emerging from the economic base of society. The insights from historical materialism, Leninism, mercantilism, and other research programs provide few direct insights into transboundary conservation, although political ecology draws on many of the foundations of Marxism in studying how economic, social, and political power sources affect environmental outcomes (Robbins, 2004). A great deal of current anthropological work in the field draws upon political ecology to describe ongoing transboundary park developments. Hughes, for example, views the outcomes of community-based natural resource management programs around the Great Limpopo Transfrontier Park as legacies of the imperialism of African colonists (2001). Several other studies examine the power of the elite over the masses and the effects of neoliberalism on transboundary conservation in southern Africa (Draper et al., 2004; Dressler and Büscher, 2007). Many other authors identify legacies of colonialism within the park systems and class struggles over conservation and development outcomes (Ramutsindela, 2004; Büscher and Whande, 2007).

Finally, the pan-paradigmatic category is not simply my attempt at a catch-all category, but rather it captures the research programs of many theorists and scholars who long ago abandoned the insular security offered by exclusively paradigmatic programs and began to work using specific assumptions that were needed in support of their particular theory development rather than forcing their theories into conformity with previously established assumptions. An

example would be the structural theories relating global war and the political economy proposed by Rasler and Thompson (2000). Because of the nature of their analysis, their research combined assumptions from what I have labeled as the materialist paradigm (for instance, the role of long-term economic growth and the pursuit of wealth) and the realist paradigm (e.g. the importance of naval capacity in the pursuit of power). A second example would be the evaluation of regimes by Hasenclever et al. (1996) who study the topic from a neoliberal (interest-based motives) and a realist (power-based considerations) perspective before discussing their own technique called knowledge-based cognitivism and then attempting to synthesize the three approaches in a wonderful example of pan-paradigmatic inquiry. I hypothesize that an increasing amount of work will be in the pan-paradigmatic category in the future as scholars continue to rebel against paradigmatic rigidity. I know that many scholars likewise will revolt against my segregation of paradigms and will challenge the assumptions that I have used to split the field. My goal, however, is not to stir further debate but to provide a framework for studying cooperation in a niche corner of international relations – the environment.

Similar to the paradigmatic divides, the taxonomic division of research programs by level of analysis does not allow for clean, neat delineations between categories. I begin by splitting the field using Waltz's three images (2001), with systemic analysis as Image III, national or state-level analysis as Image II, and individual analysis as Image I; but I realized that such a subdivision neglected a necessary intermediate level between the state level and the individual that is very necessary for examining cooperation in transboundary conservation. I have called that the sub-state or domestic level. Putnam (1988) discusses the need for this briefly in his reaction to Gourevitch's "Second Image Reversed" (1978) and the need to understand the relationship between international and domestic, and Ray (2003) also comments on lack of a fourth level between states and individuals. In addition to these four "image" levels, I have added a cross-level category necessary for the classification of many systemic research programs. For an example of a systemic program, a good choice would be any of the historico-structuralist RPs, Wallerstein's Modern World Systems program (1974), or the international perspective of Leninism. As an example of a state level program, institutional theory as expressed by Keohane and Martin (1995) or Doyle's (1983) assessment of Marxism provide good illustrations. At the sub-state or domestic level, either of Allison's alternative models to rational choice theory, his Model II Organizational Process approach or his Model III political gamesmanship approach, provide strong examples (Welch, 1992). Finally, Image I, individual level analysis encompasses research programs such as the cognitive mapping or the schemata theory approaches elaborated

on by Ole Holsti (1968) and Janice Gross Stein (1995) respectively or operational code analysis (George, 1969; Walker, 2003).

To further elaborate on the level of analysis breakdown, two major causes for confusion lie, first, in the overlap between systemic and state-level analyses and, second, in the similarities and differences between state-level and domestic/sub-state categorization. This confusion is caused to a great extent by traditional IR writings asserting a "systemic" analysis but looking at state behavior and by "state" level analysis which instead focused on sub-state institutions. Numerous examples of the former come from the realist literature which often claims a systemic focus but instead studies phenomenon of the state rather than the system. Under my proposed typology, the neorealist or structural realists focus on the international system *would* be categorized as an Image III or systemic RP. Morgenthau's classic version of realism would, however, be considered an Image II, state level RP (1985). Schweller, in contrast to Morgenthau or Waltz, claims that his neoclassical version of realism should be considered a cross-level RP involving Image I, II, and III analyses (Schweller, 2003), but the majority of this literature still appears focused on unitary state analysis and interactions between states at the national level.

In the second situation, the confusion arising between the state and domestic/sub-state bifurcation, an Image II focus on state activity is separable from domestic activity. The role of the sovereign government of a state is different from the role of institutions within a state or society. In contrasting state (Image II) analyses from domestic studies (Image IIa), I view the democratic peace as an Image II analysis with the focus of the research program being on the study of interaction between unitary state actors (Chan, 1997). While some of this study on transboundary conservation may drift to systemic issues, the majority focuses on phenomena at the state level or on dyadic analyses between states rather than at a total system level or at lower levels of analysis. Contrasting this state-level analysis with the neoliberal institutionalists, the difference between a state and a sub-state or domestic level analysis is clear. The neoliberal institutionalists focus on the role of institutions at various levels of government representing institutions ranging from supranational regimes to national level governments to sub-national bureaucracies (Keohane, 1984). Examples of cross-level studies would include the neoliberal institutionalists mentioned above and work in prospect theory which Levy (2000) shows to cover a range of analysis levels, expanding from individual-level experimentation to domestic level and bureaucratic decision-making to hypotheses on state-level policy behavior.

Combining this categorization of research programs into five levels of analysis with a breakdown of the field into four paradigms (Table 2.1) allows us to structure our examination of the field of IR and enables us to see how various international relations research programs relate

to each other and to transboundary conservation. Before moving on to talk about cooperation from the perspective of other fields, Robert Keohane (1984) provides a final word from IR on what cooperation actually means. He defines cooperation as when "the actions of separate individuals or organizations – which are not in preexistent harmony – be brought into conformity with one another through a process of negotiation" (p. 51). In this manner, cooperation entails working together to solve collective problems.

2.3.2 Beyond the IR Literature – Cooperation Theory

Before moving on to talk about conducting research at multiple scales, a few more comments on cooperation are applicable from other fields. First, Zbicz demonstrates varying degrees of cooperation through an ordinal scale in her early work on transboundary conservation (Zbicz, 2003). Here, Zbicz differentiates between several levels of cooperation – communication, consultation, collaboration, coordination, and cooperation. Each of these entails an increasing level of interaction with specific definitions that enabled her to measure cooperation levels in a large-N study. In contrast, the geography literature often takes a more constructivist approach to the study of cooperation. For instance, Fall studies cooperation in transboundary conservation as a link between self and Others (Fall, 2005) where "cooperation was about negotiated identity construction in which Self and Other were distinguished before being put into contact" (ibid, p. 166). Cooperation requires an "Other". One of the most important roles of external organizations, such as the World Bank and the Peace Parks Foundation in southern Africa transboundary conservation, is to minimize differences in "Othering" to acceptable levels and serving as bridge organizations that link the disparate parties. Often the "Other" may become hard to identify, especially for individual conservation managers looking for a counterpart on the opposite side. In this case, TBPAs become the bridge (Fall, 1999). But TBPAs also redefine boundaries. Boundary definition in conservation between nature and society already exists. This is a challenge for a movement that seeks to minimize the artificial political boundaries dividing ecosystems. However, protected areas, by their nature, put up additional boundaries – hard borders for a park, buffer zones, transition areas, and so on. Transboundary parks do so as well, just shifting them around, but they are still viewed as removing the international boundaries (Fall, 2002). Both the work of Zbicz and the work of Fall provide a foundation for understanding the role of cross-border cooperation in transboundary conservation. Zbicz attempts to quantify and operationalize cooperation, and Fall strives to understand the philosophical aspects of borders and boundaries. Both provide useful insights into the further study of cooperation in transboundary conservation.

2.4 Multi-scale and Multi-level Analyses

One of the most challenging and interesting aspects of transboundary conservation lies in the multiple scales of the system and the multiple levels of governance involved. Much of the current natural resource management and environmental governance literature focuses on either the local or the global scale. In drawing comparisons between and across scales, however, some important differences emerge. Likewise, however, some insights from both local and global scales hold across the spectrum, and the findings at one end often get ignored by researchers at the other end. The previous section draws a great deal upon the international relations literature. The subsequent section will draw upon local level common-pool resource (CPR) studies. The goal here is to address the theoretical differences across the spectrum and then to compare similarities and see what can be learned.

In examining some of the key differences between local and global CPR dilemmas, Auer (2000) compares local level "Tragedy of the Commons" studies with global-level climate change problems. He notes that local level governance is often built upon spontaneous governance and informal institutions that occur between individual actors. By contrast, global governance often emerges through very structured and formal negotiations, resulting in international treaties created by collective actors on the behalf of nation-states and other groups. This contrasts self-generating institutions with complicated, negotiated outcomes. Delving into more detail, Young (1994) comments that the narrower-scale governance issues often tend to be CPR-specific analyses, whereas the broader scale issues tend toward more general collective action problems. Also, at a smaller scale, property rights already exist or can often be created. Conversely, at the global level there are fewer property right options available. One way to view this is as a contrast between jurisdiction and ownership. Many IR scholars note that global dilemmas are complicated by the two-level games described succinctly by Putnam (1988). In Putnam's game, which will be revisited shortly, institutional fixes to collective action problems are subject to two concurrent negotiations – from regime to state and from state to national-level actors. Two rounds of collective-choice rule-making occur before operational rules can be put in place. Negotiations that take place between international actors are then subject to ratification at the national level. As a result, international negotiations must stay within the win-sets of each of the nations. Researchers at narrower levels of governance rarely study cross-border interactions using two-level games, a shortcoming to be addressed below.

Other frequently mentioned differences between the global stage and local come from a few of the core attributes of institutional analysis. First, no international community exists like local "communities". While heterogeneity of local communities and the problems of this term at

the local scale are frequently noted (Agrawal and Gibson, 2001), the use of this term at the global level is particularly troublesome and often devoid of real meaning. Similar problems emerge with "culture". Resolving local-level collective action problems within a common culture contrasts sharply with the variety of worldviews, mental models, and cultural variations of the global level. Again, this is a matter of degree, not absolutes, with heterogeneity also found at small scales as well. Local and global governance may also differ on compliance and enforcement. Global level resolution may prevent effective enforcement of policies which instead require high levels of compliance through mutual benefit in the negotiation phase of governance. Likewise, the global scale may prove difficult to monitor. Often, regime formation at the international level comes with a requirement of unanimity which is often not relevant or necessary at national and sub-national levels (Perrez, 1996). Ultimately, in comparing local and international governance, Young summarizes the "dangers of simplistic reasoning" by stating that "macro-scale systems are not merely smaller scale systems writ large. Nor are micro-scale systems mere microcosms of large-scale systems…Any effort to transfer propositions from one level to another should be treated with a healthy sense of skepticism" (1994, p. 444).

Not all scholars agree that the relevant learning from studies at multiple levels is that they are so different. Keohane and Ostrom, for instance, challenge this assumption and perceive many similarities among the challenges across the spectrum (1995). They do not argue that there is complete congruence between the local and global, just that there are more places that cross-level hypotheses may have validity than commonly thought. To begin, hierarchical authority often plays a relatively minor role in both domains. While local-level dilemmas often allow a potential appeal to higher authority, in many cases this appeal does not exist, is irrelevant, or is avoided. As a result, the mutual benefit, consensual approach of negotiation is often necessary at all levels of governance, in contrast to Perrez's requirements of unanimity as a distinguishing feature of international governance. As well, state action in both domains is often ineffective. Often in both the local and global cases there are no formal constitutional rule-making opportunities. In the two transboundary cases here, the single largest challenge facing the transboundary park, according to one of the joint management board advisors, is how to incorporate local-level representatives into an international governing authority (JMB member, 6/23/2005). Another commonality between the two ends of the governance spectrum is that both may deal with common problems associated with large numbers of actors. While the global scale may cover more individuals, often the rule-making may involve few participants. The local-level rule-making process may, by contrast, have hundreds or thousands of individual participants. Both processes may ultimately affect many individuals. Also, both may deal with a great deal of

heterogeneity among actors. The types of heterogeneity may be different, with heterogeneity of preferences, of decision-making power, of culture, of economic power, and so on, but both scales need the flexibility needed to handle heterogeneous predilections (Bardhan and Dayton-Johnson, 2002).

In spite of the commonalities noted above, a variety of challenges emerge when scaling up from local and regional levels to the international level. First, the larger scope of many international policies generally increases the difficulty of organizing when compared with narrower levels of governance (Olson, 1965). Of course, a privileged group may minimize this effect, as is the case with the creation of transfrontier conservation initiatives in southern Africa (Snidal, 1995). In transfrontier conservation, key governmental actors, powerful NGO representatives, and World Bank officials combined to ensure that collective action dilemmas were resolved and the projects continued. Of course, as pointed out above, the number of actors at a local level may dwarf the number of actors at a broader level that actually participate in formal governance. This is one of the reasons why the national governments in southern African transfrontier conservation eliminated local representation from the formal process, even in areas that directly impacted local livelihoods, resource usage, and land tenure (DEAT official, 9/27/2006). The "privileged" group in southern Africa TFCAs wanted to make decision-making quick, which resulted in the decision to allow a minimal number of actors to participate in the institutional design process. A "congress" of local representatives would slow the decision-making process down too much, even if it would provide a higher degree of legitimacy at the community-level.

Other challenges in scaling up governance levels include increasing levels of diversity. This may provide more solutions for solving environmental dilemmas and highlights the importance of cultural diversity (Young et al., 2006) , institutional diversity (Ostrom, 2005), and functional and response diversity (Elmqvist et al., 2003). The challenges of scaling up and down governance levels will form the crux of the fourth chapter, looking at how the genesis of transfrontier conservation areas affects cross-border cooperation levels and the longevity of institutions. In general, this body of research states that increasing levels of diversity may offer more solutions for solving environmental dilemmas.

However, increasing diversity may also "decrease the likelihood of finding shared interests and understandings" (Ostrom, et al., 1999, p. 281), resulting in a diversity tightrope between too much and too little for long-term sustainability. Much of the drama between local-level actors and national representatives in transfrontier conservation is emblematic of Young's increasing levels of institutional density and the complex "vertical" interplay between institutions

at multiple levels (2002). In addition to the increasing complexity of the institutional arrangements, by scaling up to broader levels, complications emerge from the interlinkages of CPRs on the ecological side (Ostrom et al., 1999). As we scale up, it becomes harder to understand the increasingly complex interactions between resource and between resource and governance systems. It becomes difficult to understand the specific problems and the complex causal relationships within the systems. So in spite of the benefits of increasing diversity by scaling up, many contend that the added complexities often negate these benefits. In addition, many link scaling up with globalization and argue that this increases the homogeneity of the world and effectively negates any benefits of diversity through scaling up (ibid). In effect, globalization has reduced diversity and scaling up no longer increases diversity enough to outweigh the increased transaction costs of increasing scale. Others argue that globalization does not necessarily reduce diversity and that it may instead provide opportunities for issue linkage, combining groups that previously had no relationship with one another (Martin, 1995).

In addition to potentially reducing diversity, some feel that globalization, by increasing economic and cultural interdependence, accelerates the rate of change (Keohane and Nye, 1977). In effect, "learning by doing is increasingly difficult as past lessons are less and less applicable" (Ostrom et al., 1999, p. 282). Rapid changes in population, economic development, and capital and labor mobility all make trial-and-error learning at a grand scale more difficult. The escalation in the pace and magnitude of change also increases the likelihood that social-ecological changes push systems past thresholds and tipping points. The broader scale also may limit adaptive management practices due to the inability to provide control cases and test cases and the difficulty of experimentation at a large scale. The adaptive management practices of Kruger Park, for instance, will face challenges from the broader-scale Great Limpopo Transfrontier Park of which it is a part. Ultimately, global issues only allow one earth on which to experiment.

While the challenges of scaling up or down are quite clear, it is equally evident that the importance of cross-scale linkages continues to grow. The ascendancy of transboundary conservation over the last decade ties directly to the awareness of the growing importance of cross-scale linkages. Transboundary conservation looks for how to bridge borders, how to cooperate and collaborate across boundaries, and how to scale up to regional plans, creating conservation corridors and large-scale protected areas. But in many places, practitioners are bumping up against invisible barriers – increasing transaction costs, lack of clear lines of responsibility, weak institutional arrangements, and shifting goals and objectives set by the myriad stakeholders. Berkes (2002) identifies a variety of scale-spanning institutional arrangements and how to improve vertical linkages. Most important for this study, Berkes points

out the possibility of improving co-management linkages through adaptive management and concepts from resilience theory. In contrast to the views that adaptive management becomes more difficult with larger areas, Berkes sees the views of policy as experiment, the important interrelationships crossing scales, and the view of systems as complex with alternative paths and states as crucial to modern management. Scaling up "intensifies [institutional] coupling and renders local institutions increasingly vulnerable" (ibid, p. 294). As a result, management institutions need to be linked horizontally across space and vertically across levels of organization. This is the current approach to transfrontier conservation in southern Africa, but struggles arise in working through the complexities and operationalizing these ideas.

In particular, the institutional arrangements in southern African transfrontier conservation, echoing struggles everywhere, strive to balance power between the local and international level. Higher level institutions have strong effects on local institutions including the centralization of decision-making, shifts in systems of knowledge, nationalization of resources, increased participation in markets, and so on (Berkes, 2002). The two case studies in this study contrast how institutional arrangements may vary the impacts of national and international governance on local and regional institutions. In the Kgalagadi, the longevity and relative strength of local-level arrangements has minimized the centralization of decision-making and is helped by its particular context (remote location, low strategic importance to the national governments, and smooth, long-term operations at local, national, and international levels). As a result, collective-choice arrangements are pushed down to local levels. By contrast, the building of cross-scale linkages in the Great Limpopo is being led by national level actors. As a result, many complain of neglect at local levels. Many local institutions lack what Ostrom (1990) calls a "minimal recognition of rights to organize". Berkes (2002) notes five methods for strengthening local-level institutions for more effective cross-scale interaction. These include legitimizing local institutions, legally allowing for a nested system of institutions, revitalizing and empowering diversity in cultural and political ideology, building capacity at a local level, and creating an environment favorable for institution building.

Young introduces a two-dimensional taxonomy for understanding and making sense of cross-scale institutional interactions, or interplay in his terminology (Young, 2002). Along the first dimension, he contrasts between horizontal (at the same level of social organization) and vertical (across levels) interplay. He notes that moving to higher levels can often increase efficiency in resource use, but it may entail substantial costs, especially in the initial stages. However, paralleling polycentric calls for matching institutional jurisdiction to the scale of effects, Young values the Subsidarity Principle, which "calls for management authority to be

vested in the lowest level of social organization capable of solving pertinent problems" (p. 284). If there is a move to higher levels of social organization, there may be normative concerns of equity and efficiency as different actors, such as multi-national corporations, INGOs, and others that may not reside in a single, specific place or have long-term interests in the location, become involved in the process. The second dimension of the taxonomy focuses on functional and political interplay. Here, functional interdependencies "arise from inherent connections and strategic links arising from exercises in political design and management" (p. 264). Meanwhile, political or strategic links "arise when actors seek to forge connections between or among institutions intentionally in the interests of pursuing individual or collective goals" (p. 264).

This second dimension is particularly important for this study in that it focuses on two types of motivation for institutional interplay. In a similar manner, the next section will focus on two types of cooperation – operational cooperation and policy cooperation. Moving from states as rational unitary actors to institutions to individuals, this section examines cooperation at all different levels. Operational cooperation focuses on horizontal interlinkages, primarily at the grassroots level. Policy cooperation, by contrast, focuses on the policy-level decision-making, or what has been called the collective-choice level (Kiser and Ostrom, 1982). Subsequently, we will revisit Putnam's two-level game and look at the application of game theory literature to transfrontier conservation.

2.4.1 Policy Cooperation and Operational Cooperation

In her dissertation on cooperation in transboundary conservation, Zbicz (1999) finds that "cooperation is taking place on at least two different levels simultaneously and may proceed at different rates at each level. Sometimes the cooperation is mandated from the capital as central governments agree between themselves that cooperation on a 'transboundary peace park' would provide a worthwhile symbol of regional cooperation and peaceful relations. At other times, the transboundary ecosystem-based management originates from the bottom-up, as protected area managers find themselves addressing common problems and threats requiring their cooperation." (p. 80). One example of the difference between policy and operational cooperation in transboundary conservation is outlined by Agrawal in his study of adaptive management in the Polish/Belarusian transboundary protected area and the contrast between top-down management and bottom-up "adaptive" management (2000). Rather than taking a linear, centralized approach, the author sees greater local-level cooperation leading to superior results to due a longer-term focus, the benefits of locally-produced knowledge, the acknowledgement of systems complexity, and the need for experimentation.

The current study draws upon this dichotomy of cooperation as well as the three levels of institutional analysis envisioned in Kiser and Ostrom (1982). In their examination of rules, differences emerge between operational, collective-choice, and constitutional levels of analysis (Ostrom et al., 1994). Operational choice focuses on problems of appropriation, provision, monitoring and enforcement. These are the daily decisions that managers make on the ground. In transboundary conservation, these are the decisions made by rangers and park officials formally through park policies and informally in their everyday operating strategies. This study focuses on where, when, and why these operational decisions result in cooperation with cross-border counterparts and when it does not. These decisions are, in turn, ordered by a set of collective-choice rules that are used in making operational policies and determine who is eligible to make and change operational-level rules. The collective-choice level is what I am studying under the name of "policy cooperation" in this research. In southern African transfrontier conservation, this is the level of rule-making that has limited the involvement of local communities in the parks. Local-level park officials can make operational rules, but community involvement is substantially restricted, with important exceptions in the co-management of contractual parks in South Africa. Even the co-managers, however, have no jurisdiction in the transfrontier conservation initiatives. The collective-choice rules and policy cooperation in this study are crafted by senior managers within the parks and, more often, by officials within the respective ministries and park headquarters in the capitals. Many of the NGO actors also play an active role at the policy level, helping to design and craft collective choice rules. Other NGO advisors work at an operational level helping resolve day-to-day practical issues. Cross-border cooperation at the policy level happens through discussions within the joint management board and the ministerial committees. Operational cooperation happens in action-oriented sub-committees and informally on the ground. Constitutional level rules, in turn, determine who is eligible to participate in the design of collective-choice rules. The following section builds on these discussions of multiple level analysis by looking at the use of game theory to study transfrontier conservation, using games as metaphors of cooperation.

2.4.2 Two-level Games and the Study of Transfrontier Conservation

While game theory is a vast and complicated field, it allows a few insights into cooperation in transfrontier conservation that might not otherwise emerge. I will focus the discussion on game theory on three reasonably limited observations from games. The first is the previous development of games to understand transboundary conservation initiatives. The second expands Putnam's two-level game to sub-national levels, which is further elaborated elsewhere (York and Schoon, forthcoming). The third focuses on the ability of political entrepreneurs to

change the common perspective on the type of game being played. In game theory, we can view games along a continuum from zero-sum games of pure conflict, where one side wins and the other loses, to games of pure collaboration where both sides win or lose together. In transfrontier conservation, cooperation emerges from a game somewhere in the middle – it is neither purely conflictual nor collaborative. In these mixed-motive games, where both sides want to work together but do so in such a way to get the most benefit for their side, negotiations become critically important (Schelling, 1980). All three observations draw upon the rules and realities of mixed-motive games.

The most prominent direct application of game theory to transboundary conservation, or more specifically the creation of transboundary parks, theorized about when and how peace parks could resolve conflict (Lejano, 2006). It views parks as using territorial instruments for peace rather than as a source of conflict. The article contrasts two means of doing this – by using parks as a buffer zone between conflicting parties or as a zone of active cooperation. It is this second point which makes the findings so relevant to the current study. The author focuses on two models of peace parks. The first describes a game theoretic model and shows that peace parks can emerge from rational self-interest. If the cost of conflict between two states is higher than the productive value of the land for other purposes, it makes sense to create a neutral, empty buffer zone. In this case, the emergent park is no more than a buffer, rather than an active zone of cooperation. By adding a second model, a model of care, to the analysis, however, the author shows how parks can begin to function as intermediary devices toward greater degrees of cooperation. They begin to break down barriers of self and other, as described above in ideas from geography about cooperation. The buffer zone begins to shift identity from two contiguous parts to a single park. The contrast between the two models forms two idylls for the comparison of the Kgalagadi and the Great Limpopo Transfrontier Parks. In the Kgalagadi, most participants view the transfrontier park as a single collective unit. By contrast, the Great Limpopo still acts as a buffer created for a wide variety of reasons, not necessarily as a zone of cooperation. Of course, cooperation in the GLTP has increased gradually over time, and collective management in the Kgalagadi still breaks down on certain issues. The theoretic insight of games, however, provides a simple metaphor for the complexities of real-life transfrontier conservation.

Discussions of two-level games often revert to Putnam's work describing negotiations at the international level (1988). In this work, Putnam shows how international negotiators face a restricted win-set or range of options due to outcomes seen as acceptable at the national level. Because the international representative must answer to national bodies, their options are limited. A classic case of this is the signing of the Kyoto Protocol by the USA in 1998. However, at the

time of writing, the American Congress had still not ratified the agreement. McGinnis and Williams (1993) highlight many examples of the application of this type of game at the international level. The importance of the two-level game to this study is that it may also be applied at narrower levels of governance. National agencies may rely on the approval of provincial governments, local communities, or civil society in general. One particularly challenging dilemma faced at present is the international management of transfrontier parks through the joint management boards without direct participation from representatives from the communities in co-management arrangements with South Africa's national parks. While no major crises have arisen to date, many officials interviewed in this study expressed concern over co-management arrangements at multiple levels with SANParks in middle.

Returning to the differences between collaborative and conflictual games, Fearon builds on Schelling's work and describes how many international scenarios can be described as games of one of two types – a coordination game and a prisoner's dilemma game (1998). The political entrepreneurs, in some cases, have a chance to switch perceptions of the type of game being played from a zero-sum prisoner's dilemma to a collaborative game seen as a win-win opportunity. One of their most important examples in transboundary conservation was in shifting the common governmental perspective toward peace parks from one of losing sovereignty to a position of mutual benefit environmentally, economically, and politically. This has been described as a shift in the meaning of international borders, with the result that international relations has moved to a local-global level centered on international frontiers (Rosenau, 1997). Political entrepreneurs have played an important point in the development of southern African peace parks. Instead of viewing neighbors as competitors for tourists and donors, by collaborating, both sides theoretically benefit. Game theory can be used to describe these shifts in actor payoffs.

2.5 Governance and Polycentricity

The final theoretical foundation that this study draws from is literature on governance, institutions, and polycentricity. By governance, I refer to resolving collective action problems through creating, adopting, and adapting institutions for settling conflicts and engendering cooperation (Young, 1994). In this work, discussions of institutions refer to the rules, norms, and operating procedures used by actors in ordering relations with each other, creating self-governing arrangements (North, 1990). Further, polycentricity refers to a political system with multiple centers of decision-making that function autonomously on some issues yet are part of an interdependent system for others. The polycentric jurisdictions participate in cooperative arrangements to more effectively govern (Ostrom et al., 1961). The importance of polycentricity

in the current study is the goal of matching institutions to the appropriate level to manage the scale of effects of diverse sets of governance dilemmas (V. Ostrom, 1999). Perhaps more than any other theoretical foundation or set of concepts, institutional analysis and the struggle to understand governance of complex social-ecological systems undergird this study.

An immense amount of literature discusses governance and institutions, far beyond the scope of this text. In what follows, I will focus on two aspects of the field that are apropos for the current study. The first is a broad overview of institutional analysis. This study, in its entirety, is an in-depth institutional analysis of transfrontier conservation in southern Africa. It does not, however, follow a step-by-step approach through the Institutional Analysis and Development Framework or any other methodology (Ostrom et al., 1994; Ostrom, 1999). Instead, it draws on this literature and incorporates it into a broad study of the robustness of institutions in the governance of social-ecological systems. The second set of literature, on adaptive governance, links the institutional analysis and governance literature to the work on resilience and robustness. Studies of adaptive governance are relatively new, but the field is growing rapidly with more and more using the term. One challenge is that no one has specifically defined what adaptive governance means. Instead, it builds on adaptive management writing, combining it with institutional analysis studies and environmental governance literature.

2.5.1 Institutional Analysis

At the heart of this study is the analysis of institutions. A great deal of this work draws on frameworks of New Institutional Economics and the importance of institutional frameworks in structuring the actions and behavior of humans and the role of transaction costs in economic performance. One of the early drivers of this project was the complete disregard for the increased transaction costs in moving from national-level conservation to transboundary conservation (Singh, 1999; Sandwith, 2003). In this mindset, all transboundary conservation efforts are considered to be improvements, regardless of the resulting changes in costs and benefits. In seeking to understand the governance of transfrontier conservation areas, this study examines the rules, norms, and operating procedures that create the underlying structure for governance – the institutional foundation – and enables a means of examining when, where, and how transboundary conservation happens.

Alston et al. (1996) note several methods for studying institutional change including quantitative analysis, temporal comparisons at a single location, spatial comparisons between two or more sites, and case studies focusing on the details at a specific site. While the next chapter will describe the methods used in this study in detail, the research project is essentially two case studies comparing similar transfrontier conservation initiatives that have a few key differences.

Alston et al. comment on how most institutional studies rely on case comparison at some level due to the importance of the historical record and of context in any institutional analysis. History matters. Institutions evolve, adapt, and change, but there are often path dependencies that affect the range of changes available at any given time. This study focuses on institutional responses to disturbance and what causes institutional change.

To understand the complexities of institutional change, this work will draw on the Institutional Analysis and Development framework, developed over several years at the Workshop in Political Theory and Policy Analysis, as shown in Figure 2.2 (Ostrom et al., 1994; Ostrom, 2005). Given the number of studies that have highlighted, described, and applied the framework in a step-by-step fashion (see Ostrom, 2005 for a concise overview and Imperial, 1999 for a nice example of stepwise application), this section will mention briefly a few of the components and their importance in transfrontier conservation.

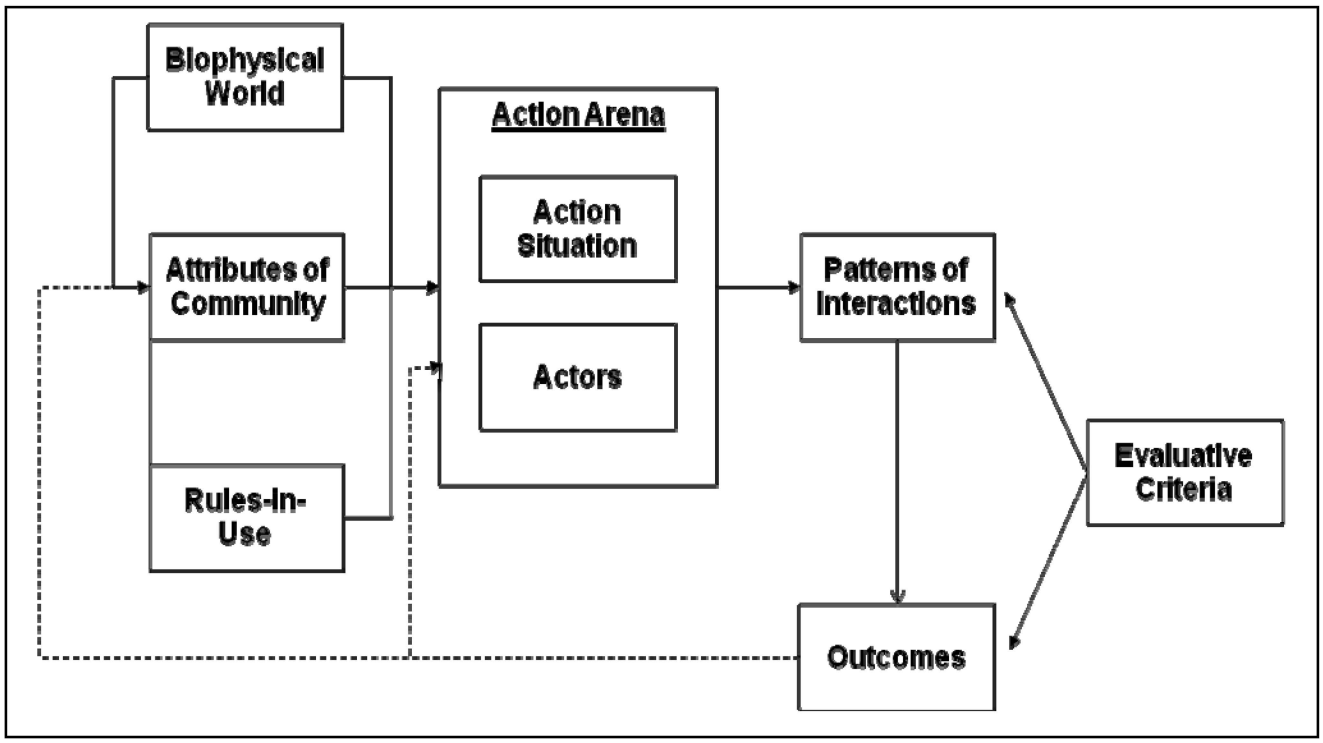

Figure 2.2: Institutional Analysis and Development Framework (From *Ostrom, 2005*)

Of the three exogenous variables shaping the context of the action arena (the environment in which participants interact within an action situation in the focal point of an institutional analysis), each influences transfrontier conservation initiatives greatly. Because of the concern with sustainability and conservation of the biophysical world, this aspect of the framework has

undergone intensive study by many TFCA researchers. As it relates to this study, one of the key differences between the two case studies is the different biophysical contexts – an arid savanna with very low productivity, sparsely populated by either humans or wildlife and a moist savanna with more wildlife in an area with higher population densities. These differences shape the design of institutions in both cases, leading to diverse outcomes. One of the greatest sources of consistency between the two studies lies in the common set of rules, at least at a constitutional level. Both case studies have been greatly influenced by South African park officials and the South African Environmental Ministry. This has created a great deal of consistency in spite of the switch in partner countries. Likewise, a similar group of international organizations and NGOs has participated at various times in both transfrontier parks, including the Peace Parks Foundation, World Bank, and Conservation International. Both have also benefited from an active epistemic community of researchers active in both locations. The result of the overlapping participation has been a similar set of constitutional-level rules and to some extent similar collective-choice rules. At the same time, the different contexts of the two cases provide the impetus for diverse sets of operational-level rules that form the heart of this study. The third exogenous variable, the attributes of community, of course also plays a role, partially described in the discussion of rules above. Because a great deal of the institutional design and evolution occurs within the park service and government offices, this study focuses less on aspects of culture within local populations and more on organizational culture, the challenges of different languages between countries, and, most importantly, the building of social capital and mores of trust and reciprocity between newly-created partnerships.

The action arenas in this study are comprised of institutional responses to disturbances (both exogenous and endogenous, as described in the proceeding chapter). Social-ecological disturbances create action situations to which a variety of actors, including park employees, government officials, and NGO representatives, respond or choose to do nothing. These responses, shaped by the three groups of exogenous variables, lead to the institutional changes that form the basis for this study. The outcomes of these responses can then be assessed using a range of evaluative criteria, although that is not the purpose of this study. With this very brief overview of institutional analysis, the discussion now turns to one final topic of theoretical interest – adaptive governance.

2.5.2 Adaptive Governance

In the past few years, adaptive governance has emerged as a new field of study in governance circles. One of the first mentions of the term comes from the article by Dietz et al. (2003), which views the adaptive capabilities of institutional arrangements as necessary for the

successful long-term governance of social-ecological systems. While researchers primarily emerge from resilience literature and draw on adaptive management literature (Folke et al., 2005), others build on research in the policy sciences (Brunner et al., 2005), collaborative and network governance (Schotz and Stiftel, 2005), and institutional economics. In differentiating between adaptive management and adaptive governance, Folke et al refer to governance as the provision of a vision of sustainability while management is the operationalization of this vision (2005). One challenge facing the field is that no one explicitly identifies exactly what they mean by adaptive governance.

In general, adaptive governance refers to the need for governance institutions within and for social-ecological systems to adapt and respond to a rapidly changing world. As in the promotion and prescription of adaptive management, adaptive governance advocates stress that knowledge is invariably incomplete and surprise is inevitable. In addition, the nature of governance as the resolution of collective action dilemmas involves trade-offs between multiple goals (Brunner et al., 2005). Because of the complexity and uncertainty of governance in such an environment, most of the literature focuses on a core set of strategies and principles for creating this type of adaptive arrangement. The remainder of this section will summarize the five key strategies for successful adaptive governance – institutional learning, building trust and social capital, strong leadership, nested or polycentric institutional arrangements, and a multi-scalar approach. Similar to the discussions of multi-scalar analyses earlier, this study uses adaptive governance and polycentricity as concepts and normative beliefs about the world rather than testable theories of prediction.

One of the most frequently mentioned strategies for the successful evolution of institutions in a constantly changing environment is the need for learning through experimentation (Walker et al., 2006). Many talk about social learning as a means of shifting individual thinking and enable them to transcend their own values and traditional ways of thinking to the views of the collective as a means of building adaptive capacity and coping with change. Brunner et al. (2005) discuss the need to draw on both local and scientific knowledge, combining them to solve problems confronting the group. Others discuss this combination of different types and sources of knowledge as sense-making and see it as an integral part of building knowledge (Olsson et al., 2006). As individuals within organizations learn through experimentation and from each other, organizational learning improves and management can direct actions to the testing of hypotheses (Folke et al., 2005). Brunner et al. (2005) stress how learning through experimentation and from bottom-up, integrative processes differs from traditional scientifically managed, top-down, governance structures.

For learning to take place and institutions to evolve with the acquisition of knowledge, the institutional designers must trust each other. Because governance is often contentious and requires the balancing of trade-offs and multiple points of view, without social capital, the capacity to adapt to change and modify institutional arrangements is limited. Some of the key ingredients to building trust include open communication, accountability for actions, diverse participation, and working together over time (Lebel et al., 2006). Building relations of trust and reciprocity enables the formation of common institutional arrangements and links with the next two key strategies, leadership and polycentric institutional structures (Folke et al., 2005).

While strong leadership does not guarantee successful adaptation (Olsson et al., 2006) and others argue that adaptation may emerge without effective leadership, many studies point to the ability of leaders to enable institutional change (Olsson et al., 2004). Leaders form the linchpin of network governance, acting as the bridging individuals between different groups and sets of ideas. They may also serve as catalysts for action when windows of opportunity emerge to allow for institutional transformation (Folke et al., 2005; Kingdon, 2002). As the bridges in polycentric systems, leaders play enabling roles in harnessing the power of networked or collaborative governance (Jones et al., 1997; Koontz et al., 2004). Olsson et al. (2006) argue that shadow networks often self-organize in response to crisis, creating informal connections and institutional arrangements. Building on polycentric literature (McGinnis, 1999), Lebel et al. (2006) argue that one of the fundamental ingredients to build capacity to manage resilience is a polycentric governance structure. By this the authors refer to multi-level institutional arrangements which allow society to respond to disturbance at the appropriate level. This provides opportunities for tighter monitoring, better information on the social-ecological system, the scope to respond at the appropriate level, and a closer spatial and temporal match between the ecological and governance system. Others note that network structures of governance facilitate novelty, innovation, flexibility and diversity of approaches (Folke et al., 2005)

Such multilayered institutional arrangements also provide an institutional match to the cross-scale interactions so important in resilience studies. While the importance of local-level knowledge, monitoring, and participation are often noted in adaptive governance, having institutional matches at the appropriate level of effects are equally important. For this reason, adaptive governance stresses neither centralization nor decentralization. Bottom-up institutional arrangements are favored in certain circumstances, and top-down arrangements in others, depending on the nature of the dilemma. This insight forms a crucial part of this study in comparing institutional arrangements in transfrontier conservation in this study. Critically important in multiple level governance structures is accountability (Dietz et al., 2003). Finally,

institutional diversity and variety within a multi-level governance structure may provide a buffer to system collapse. It may also enable the diffusion of successful policies to others horizontally (Brunner et al., 2005).

More specifically, Dietz et al. (2003) outlines several general principles to meet the five requirements for robust adaptive governance – providing information, dealing with conflict, inducing rule compliance, providing infrastructure, and encouraging adaptation and change. The principles for meeting these draw directly on the design principles specified in *Governing the Commons* (Ostrom 1990). They include clearly defined boundaries, rule congruence, monitoring and accountability, graduated sanctions, conflict resolution mechanisms, nested institutional arrangements, and collective-choice arrangements. It remains to be seen whether these general principles and requirements should be considered the core of adaptive governance or simply the core of "effective" governance.

2.6 Conclusion

In the past chapter, I have outlined four broad theoretical foundations useful in the study of transboundary conservation. In the testing of the hypotheses outlined in the first chapter each of these theories will come into play at different times to various extents. In each review and explanation of the theories, concepts and frameworks, I demonstrated instances of applying the literature to the specific study of transboundary conservation using examples from my two case studies. I began with theories of resilience and robustness and the value of looking at transboundary conservation as a complex adaptive system that responds to disturbances in complicated ways – sometimes absorbing a disturbance and at other times crossing a threshold into another stability domain, resulting in nonlinear and often unpredictable manners. By studying the system through the lens of multiple disturbance-response events, I can begin to identify key fast and slow variables that provide some explanatory power for understanding system responses in the face of perturbation.

In addition, this theoretical foundation contrasts the resilience of evolved systems with the conscientious design of others, such as the institutional diversity of governance systems, for robustness. Again disturbance-response events create windows for the study of the often purposeful, yet still path dependent, evolution of institutions. Ultimately, the robustness of institutions links with the final sections on institutional analysis and development to understand long-enduring institutions. The important points from this section use a similar starting point as the theories of resilience, but rather than looking at multiple equilibria, it is helpful to think of the robustness of institutions by viewing institutional arrangements as on a trajectory. Perturbations buffet them as they proceed along the trajectory, often modifying the course and sometimes

disrupting it completely. Long-enduring institutions, ones that are robust to the disturbances it faces, continue along their trajectory towards the goals set by the designers without being completely disrupted by these disturbances.

The next set of concepts and paradigms draws on some of the vast literature on cooperation from both the field of international relations and similar studies from within geography. The core of this study relates to cross-border governance and how cooperation emerges over time in these situations. A tremendous amount of research exists on cooperation including research on regimes and international governance in general, important studies mentioned earlier from the geography literature, and recent work in collaborative governance (Wondolleck and Yaffe, 2000; Imperial, 2005). In providing an overview of international relations work on cooperation and augmenting this with other theories of cooperation, I lay the groundwork for the remainder of the study.

Due to the complexities of multi-level analyses, I draw on a great deal of literature on scaling up, down, and across scales. The research compares and contrasts literature from the local to the global scale and the importance of cross-scale linkages. An important part of the current research contrasts the differences between cooperation at the policy or collective-choice level and cooperation at the operational level. To clarify the intricacies of cross-scale, multi-level analyses, I use some rudimentary game theory to provide metaphors of cooperation. This is especially important with respect to many of the co-management arrangements occurring at both local and international levels within the two case studies.

The final theoretical base draws on the polycentricity literature which has most often been applied to municipalities and local-level contexts. This study explores the relevance of these ideas to broader levels of governance. Additionally, recent work on adaptive governance and its links to resilience provide the final theoretical cornerstone for this study. This section also draws upon the institutional analysis and development framework, which supports this entire project, even if it is rarely explicit in discussions. Nevertheless, the components from the framework form the backbone of this study on the robustness of governance institutions.

The following chapters will draw upon each of these theoretical worlds at various points. The next chapter will outline the research design and methodology used in the study. It will go into the details of a typology on disturbances, how these apply to the two case studies, and how key contacts helped in the identification of disturbances. Through interviews, I coded disturbances identified by interviewees from different countries and in different roles. I also coded levels of cooperation in the responses to these disturbances. In this manner, the chapter

proceeds to detail the testing of the first hypothesis on the types of disturbances that generate cooperation and those that do not.

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3. Chapter Three: Methodology – Getting from Disturbance to Cooperation

> *"Who knows when some slight shock, disturbing the delicate balance between social order and thirsty aspiration, shall send the skyscrapers in our cities toppling?" (Wright, 1940)*

In addition to improving understanding of the resilience and robustness of social-ecological systems, one long-term goal of this research is to help park management discern the appropriate level and type of cooperation in transfrontier conservation. Because management across a boundary entails increasing transaction costs at the same time that transfrontier park managers work with limited budgets and human resources, they face an optimization problem necessitating difficult choices (Singh, 1999). Many advocates of transfrontier conservation ignore these costly realities and propose transfrontier conservation as a rapid progression towards a single unified, cross-border entity with cooperation occurring anywhere and everywhere. By contrast, this project endorses a careful and detailed analysis to identify key areas for cooperation and helps to prioritize competing and often conflicting choices. For example, should transboundary park management work toward improving relations with communities along its borders, work to prevent the spread of veterinary disease, or improve international river governance? The answer from many sources appears to be an unqualified "yes". However, this answer fails to recommend a prioritization of rapidly diminishing finances and depleted staff ranks. It also fails to acknowledge that management will always reach finite limits both regarding levels of cooperation desired and their ability to achieve this cooperation as well as their capacity to move beyond conflict and contention (Büscher and Schoon, forthcoming).

Instead, the methodology proposed in this study uses the results from 152 key informant interviews and codes them to identify key challenges or disturbances facing park management. By looking at the disturbances facing park staff on both sides of a transboundary protected area and in different sectors of the park (biodiversity conservation, tourism, etc.), we can see what concerns arise most frequently, with what levels of intensity, and whether cooperation occurs in these areas or not. Often, as expected, we see high levels of cooperation in areas of common concern or interest. However, careful examination also shows areas of low interest coupled with high levels of cooperation as well as areas of great cross-border concern with little cooperation transpiring. Ultimately what we find is a hodge-podge of varying levels of cooperation with little immediate discernable order. In what follows, I will introduce a typology of "disturbances" or challenges facing park management, noting how these disturbances vary temporally, spatially,

and at different levels of governance. Next I will introduce the methods used to identify these disturbances as well as areas of cooperation between park administrations across borders. Drawing upon the lessons from cooperation theory, game theory, and institutional robustness introduced in the previous chapter, I will code the disturbances and the levels of cooperation for both parks. These coding exercises then help to test the hypotheses first posed in the introduction. In this manner, I intend to provide useable, scientific feedback to park management to facilitate the prioritization of transfrontier conservation initiatives.

3.1 A Typology for Disturbances

The use of the term "disturbance", rather than simply talking about management issues, challenges, crises, surprises, perturbations, or something else, emerges from literature on the robustness and resilience of social-ecological systems. The previous chapter introduced resilience theory as the concept of a system in a particular state that may then be perturbed by a disturbance. There, the system was defined in detail, basically comprised of the two transfrontier conservation areas in the study. Chapter Two also defined two states or stability domains varying along two variables – the amount of trust and social capital and the amount of cross-border cooperation. Depending on the size of the disturbance and the resilience of the system, the system would either "absorb" the disturbance or be pushed (shift) into another state (Holling, 1973; Gunderson, 2000). In ecology, research sometimes distinguishes between large, infrequent disturbances or LIDs and smaller, micro-disturbances (Turner and Dale, 1998; Dale et al., 1998). These LIDs would include major fires, flood events, and other similar phenomena that occur over a relatively short period of time. As such, LIDs are scale-dependent events, and what is a large disturbance at one scale, may be a relatively minor variation in another. Meanwhile on the social side, political scientists, economists, and other social scientists often discuss policy pressures, shocks, and externalities (Baumgartner and Jones, 1994; Fullerton and Stavins, 1998). Interesting examples of shocks, and pressures in both the natural and social sciences emerge from the work of Gould and Eldridge (1972). In this work, the authors draw upon paleontological records to build a case for punctuated equilibriums in the natural evolution of species. Their hypotheses explore how systems undergo rapid change in response to major disturbances rather than always arising through a slow, continuous process of evolution or, in the case of the policy world, incrementalism, Lindblom's "muddling through" (Lindblom, 1959). Drawing upon this idea, political scientists have re-examined political events, such as elections and the policy process, also looking for punctuated equilibria and key disturbances that may create rapid, fundamental changes in systems, or in resilience jargon – state shifts (Jones et al., 2003; True et al., 1999). Commentators often discuss these events as reaching a tipping point (Gladwell, 2000).

These diverse research approaches raise some basic questions. Are there fundamental differences between the disturbances of the ecologists and the disturbances of the social scientist? Do multiple micro-disturbances impact a system substantively different from LIDs? Can we contrast the effects of shocks occurring over a short timeframe and pressures that build over time? Do we need to differentiate between exogenous and endogenous disturbances? Is there any direct comparison between types of disturbances? Is there any preference or bias in the identification of disturbances (LIDs vs. stressors, for example) by respondents? Is there a hierarchy of disturbances, where one leads, directly or indirectly, to another? Are there concatenations of disturbances that amplify or distort the effects of each other, working in serial or parallel?

One of the first challenges in studying disturbances in a social-ecological system is semantic – how to define and delimit a disturbance. Very few answers emerge from the literature. Some view disturbances as anything that creates a change in policy (Jones et al., 2003) or that can cause a state shift (Gallopin, 2006), but this view can become all-encompassing and results in defining a cause by its effect. Likewise, defining a state or a state shift within social-ecological systems, as shown in the previous chapter, can be easier said than done. Yet for the purposes of scientific study, we need to be able to clearly define a system and hold it analytically constant as we examine one or more disturbances and their effects on the system. In this study, the system under analysis is a transboundary protected area and its affected surroundings and is bounded spatially and temporally to this geographic area over the history of the transboundary park and its component national parks. However, the disturbances, often exogenous to the system, can emerge at multiple levels and multiple scales. These may range from global climate change trends and market globalization effects down to local impacts of alien species invasions and ongoing relations between park staff and local populations. Rather than explicitly delimiting disturbances impacting a transfrontier conservation area, in this study I had park managers, experts on transboundary parks and NGO representatives working with the transfrontier conservation areas and surrounding communities all self-define disturbances as the events, surprises, and crises which challenge either themselves or their colleagues in the day to day management and governance of a TFCA. By talking with people at both an operational level and a policy level, I tried to discern how respondents' level changed the types of disturbances that they identified.

To understand state shifts due to disturbances in a social-ecological system, this study draws upon a typological design to help categorize how different types of perturbations influence a system in diverse ways. The typology must equally handle predominantly ecological disturbances, predominantly social disturbances, and various mixtures in between. Likewise, it

attempts to differentiate where in the policy process and at what level of governance (operational or policy-level) the impacts of the disturbance are felt within the system (Lasswell, 1971; Brewer and de Leon, 1983). In so doing, the intent is to first provide a means of understanding and mapping disturbances systematically in order to more effectively analyze their effects upon a system. The more relevant goal for this study then is to see when and where cooperation arises in relation to these disturbances and if the size and type of disturbance has any relations with the level of cooperation thus achieved or, instead, whether cooperation between TFCA partners tends to emerge due to political considerations, ease of action, or some other reason. From there, my analysis shifts to look at institutional responses to the disturbances and how rules, norms, and operating strategies changed or not.

As the previous discussion alludes, past analysts have identified several factors along which to characterize disturbances, including size, duration of effect, type of system it impacts, where in the policy process its influence is felt, and many others. Of direct relevance to the hypotheses identified in this study, I focus on three of these dimensions – the disturbance frequency and duration, ranging from short, high-impact, acute shocks to persistent or chronic, slow-building pressures that are often denoted as stressors; the level of governance most influenced by the disturbance (either operational or policy); and whether the disturbance is exogenous or endogenous to the system. While the difference between a shock and a pressure seems self-evident, I will delve into more detail with the other two dimensions as well as looking at the responses to disturbances, the disturbance-response events.

Intuitively, the operational-policy dimension concerns whether responses happen on the ground (in this case within the park) or at a broader level of collective action (e.g. in the capital at broader levels of governance). Another way that I identified this dimension initially was in the difference between management and governance. Management actions involved coordinating the day-to-day operations, while governance created the institutional setting for ordering relations between people and how humans relate to their social-ecological system (Olsson et al., 2006). In more conceptual terms, the operational-policy dimension really differentiates operational-level institutions from collective-choice institutions. Operational-level institutions affect the day-to-day management decisions that coordinate interactions between humans and the environment. These rules, norms, and strategies are nested within a set of collective-choice institutions that determine how operational-level policies are formed (Kiser and Ostrom, 1982; Ostrom, 1990). As the explanation of the IAD Framework previously discussed, collective-choice institutions then nest within a set of constitutional-level rules. For the institutional responses to disturbances

viewed here, the concern lies only in changes and developments happening at the lower two levels, which I label operational and policy for intuitive simplicity as I move forward.

I define the third dimension of disturbances as whether they are exogenous or endogenous to the system. The disturbances discussed in most case studies of resilience are "exogenous". They are external forces impacting the system, whether social, ecological or some combination. Examples include the pressures such as the slow addition of phosphorus to a lake system (Carpenter et al., 1999) and increasing human population density impacting a local resource or shocks such as a lightning-ignited fire or a sudden political regime change. Of course the division between exogenous and endogenous depends explicitly on the boundaries of a system and is entirely scale-dependent. Some argue that all disturbances ultimately have an exogenous root, but this stems from literature examining pure social systems where interactions across scale and the reflexivity of people enable cross-scale linkages. Figure 3.1 graphically demonstrates the three dimensional typology of disturbances that I use in discriminating between types of disturbances and their varying impacts on a social-ecological system.

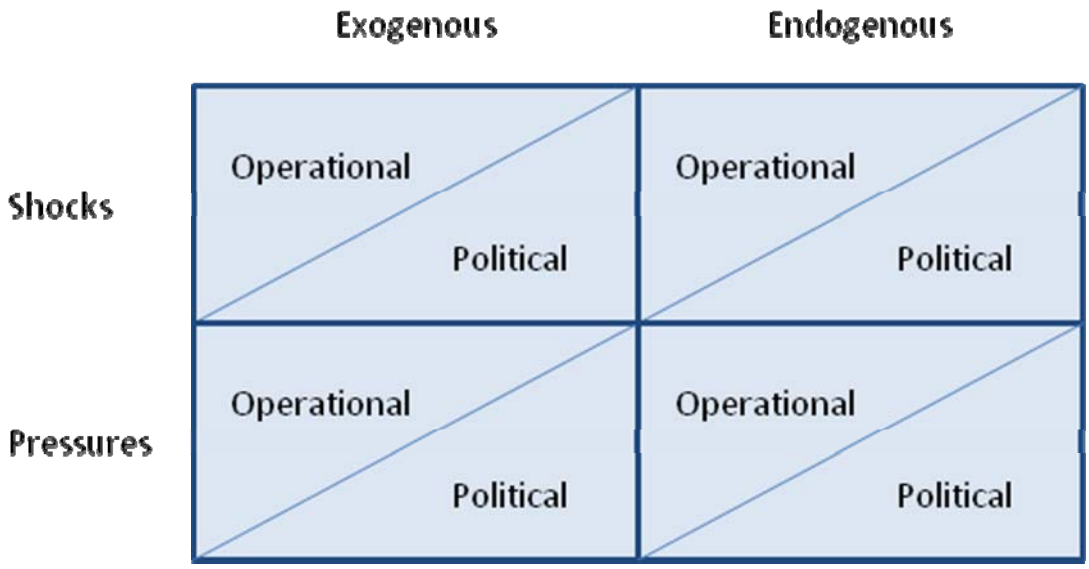


Figure 3.1: Typology of Disturbances

Disturbances exogenous to the system encompass interactions beyond the boundaries of a system that interact with components of the system. The system may then absorb the disturbance (prove to be resilient), adapt in response, or undergo a system transformation. Disturbances endogenous to the system, on the other hand, emerge from within, and analysis becomes more complicated, perhaps necessitating different terminology from exogenous disturbances. On the one hand, exogenous disturbances can be either predominantly ecological, like the lightening-

ignited fire, mentioned above, or predominantly social, like a political regime change. Likewise, predominantly ecological disturbances, such as the burgeoning elephant population within Kruger Park, could be viewed as an endogenous disturbance. Using the quasi-experimental nomenclature of Shadish, Cook, and Campbell (2002), we can denote a system that experiences a disturbance and undergoes a transformation in the following manner: $O_1 – X_2 – O_3$ (Eq. 1), where O_1 represents the initial state of the system and O_3 represents the state of the system after experiencing disturbance, X_2. In a similar manner, we can denote a system that responds to the disturbance, X_2, as shown: $O_1 – X_2 – \Delta_3 - O_4$ (Eq. 2), where the addition of the Δ_3 term signifies a response to the disturbance by actors within the social-ecological system.

While this disturbance-response system appears quite straightforward, as we look at predominantly social disturbances the situation gets messier due to the reflexivity of actors within the system and their capacity to engineer change. Often analysts are confronted with changes to the system in which it is not clear whether the changes are endogenous disturbances, responses to an exogenous or endogenous disturbance, or adaptations or innovations to achieve design goals. As examples, analysts still have endogenous disturbances, such as a leadership dispute within a management board or a rapidly increasing population of a species within a park. However, in addition, analysts also have responses to external or internal disturbances, perceived disturbances, and potential disturbances such as creating a new position to deal with a newly discovered invasive species. These two examples highlight the differences between endogenous disturbances (X_n) and actions in response to disturbances (Δ_n). A third source of change within a social-ecological system requires the analyst to further differentiate between responses to disturbances and innovations or intentional changes within the system to achieve the goals of actors within the system, such as improving efficiency, equity, and so on. This third source of change can be shown as: $O_1 – \Delta_2 – O_3$ (Eq. 3). In this manner, changes within a system could be defined as either an endogenous disturbance (ecological, social, or some combination) or one of two types of intentional human action – a response to a disturbance or an innovation. A response is generally intended to minimize or accentuate the effects of a disturbance in direct reaction to this disturbance, while an innovation is a forward-thinking action to achieve other goals. We can further differentiate the innovation term of Equation 3 by viewing the Δ_n term as either an adaptation or a mitigation, where an adaptation is a conscious change in the system to "improve" it in the pursuit of social goals and mitigation is a forward-thinking response to potential or probable future disturbances.

Just as in law, the distinction between endogenous disturbances, responses to disturbances, and innovations blurs when examining specific cases, but it provides us with a starting point for analysis. This definition of responses and innovations ties back to the design of systems for robustness and the inherent trade-offs that take place in system modification (Janssen and Anderies, 2007). To summarize, endogenous to a system, we have disturbances (ecological, social, and mixtures of the two), responses, and innovations. Innovations, in turn, can be either forward-thinking, mitigative responses to disturbances or simply institutional changes as attempts to improve performance toward achieving societal goals. Figure 3.2 graphically demonstrates the differences between disturbances and responses in a social-ecological system. Figure 3.3, in turn, demonstrates how innovation, whether adaptive or mitigative, differ from responses to disturbances. Figure 3.4 provides a conceptual map for change in social-ecological systems. It highlights three changes in a SES – the disturbances and human actions discussed above as well as background changes. The actions divide into two categories, responses to disturbances and innovations, as detailed earlier. Likewise, the biophysical environment may change due to natural processes and respond to the changes without any perceived disturbance on the social side. Examples of this would include events such as storm-blown trees in a forest. This change may not register as a disturbance to human actors, nor may it result in any social response. However, to continue this example, these biophysical disturbances may cause shifts in species abundance, among others SES changes over time, as pioneering species predominate in the newly reopened landscape. This is an example of a background change where there is a biophysical response to disturbance. Additionally, biophysical innovations, not in response to any disturbance, also occur, paralleling the innovation of the social system. Examples of this would include genetic mutations, ultimately resulting in evolution.

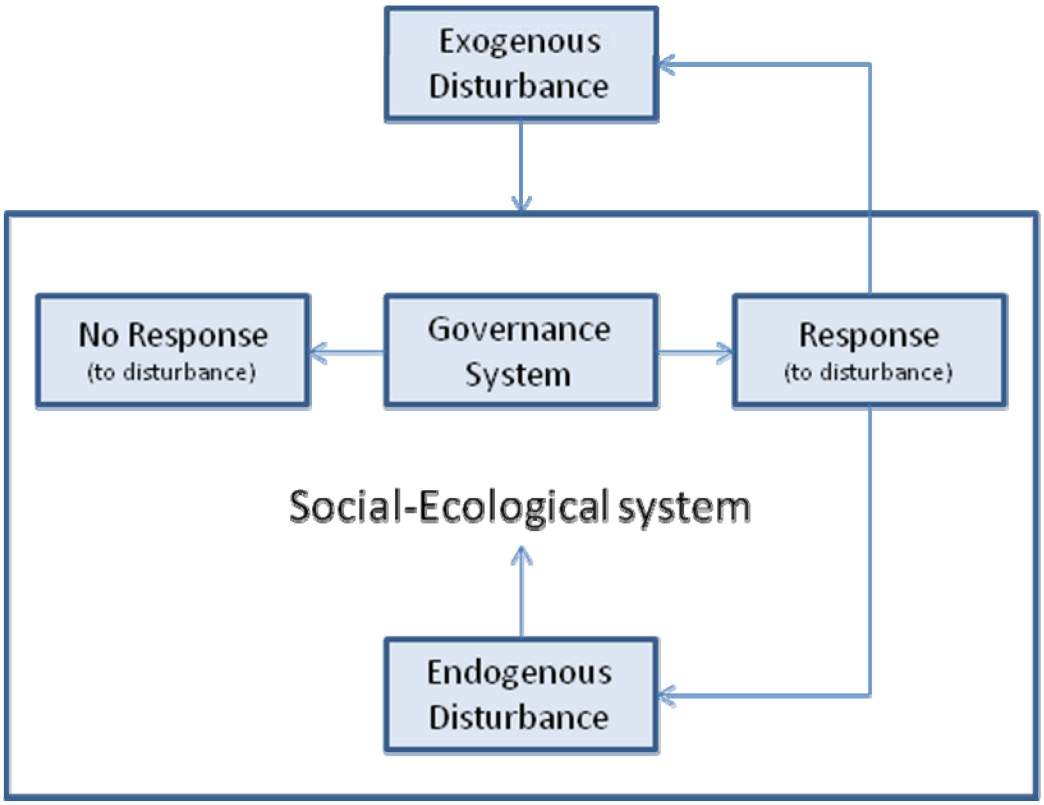


Figure 3.2: Disturbance and Response Events in Social-Ecological Systems

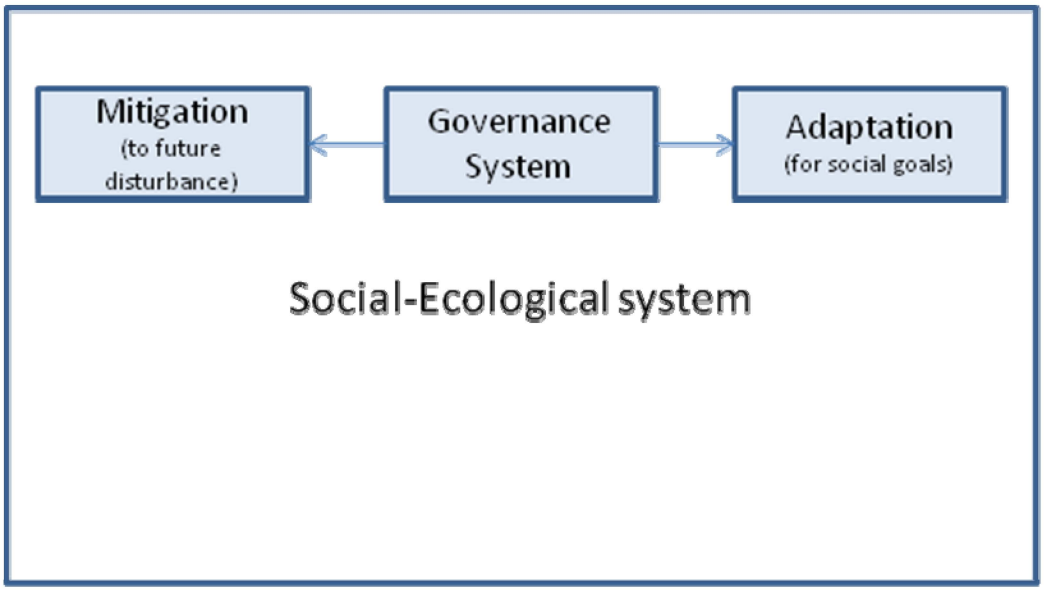


Figure 3.3: Innovation in Social-Ecological Systems

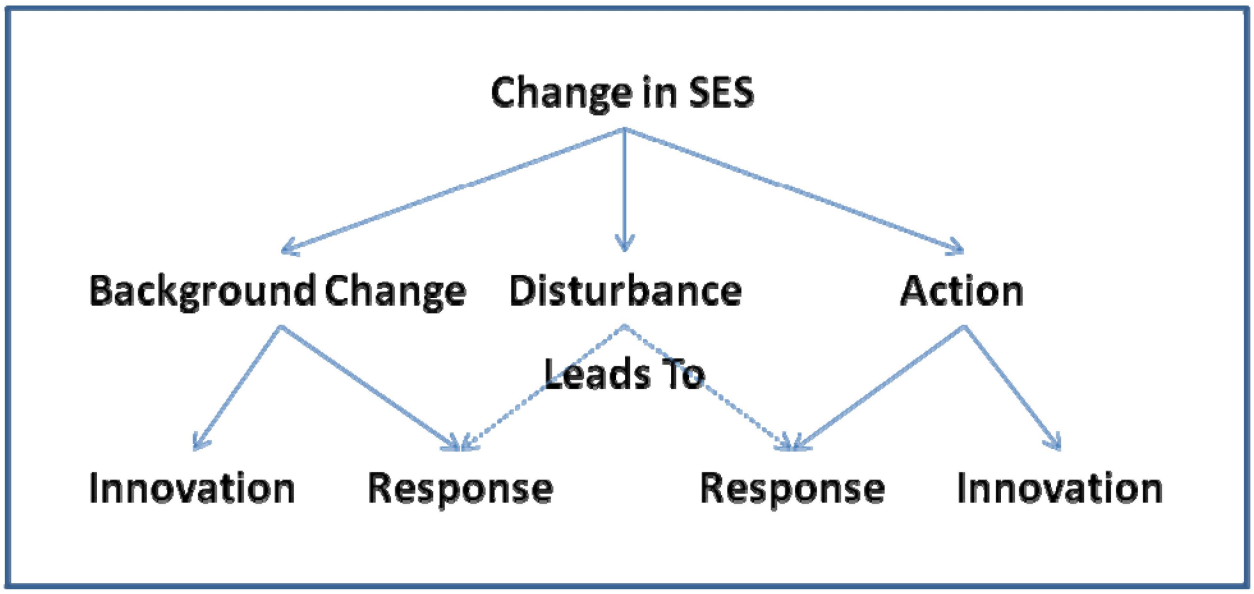
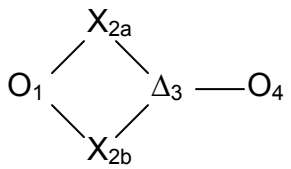


Figure 3.4: Conceptual Diagram of Change in Social-Ecological Systems
(*Developed by the SES Working Group at the Workshop in Political Theory and Policy Analysis, 4/2008*)

To bring the discussion back to transfrontier conservation, I now outline a few pertinent examples of disturbances at opposite ends of these dimensions to gain insight into the categorization. The challenge of veterinary disease control in the Great Limpopo, a predominantly ecological disturbance, provides a continuous pressure seen by park veterinarians in an operational context. When viewed as a disease outbreak emerging from within the park, this is an endogenous disturbance. If the virus is introduced to the park through an outside vector, this would be an exogenous disturbance. By contrast, regime change, as experienced by South Africa in 1994 and Mozambique in 1992, immediately "shocks" the political environment, an exogenous disturbance to our system. And of course, other cases provide examples of shocks felt at the operational level (such as dealing with the aftermath of a one-hundred year flood on infrastructure) or pressures felt at the policy level (settling land claims of historically disadvantaged peoples). Obviously, many disturbances lie between the extremes of this categorization matrix, the dimensions of which are clearly continua rather than dichotomous classifications. Additionally, it may not always be evident as to the institutional level most impacted, nor will disturbances solely affect one level. As the discussions of panarchy noted earlier, disturbances at one system scale or governance level cascade up to higher scales and levels and down to lower ones and what may be an exogenous disturbance at one level is endogenous to another. The dimension only serves to provide an ordinal scale for comparison.

Two final points are worth noting. Complicating the analysis further, we can envision disturbances impacting a system serially or in parallel. When disturbances hit a system sequentially, we can envision additive effects as demonstrated by equation (Eq. 4): $O_1 - X_2 - X_3 - \Delta_4 - O_5$. In this situation, the response only occurs after multiple disturbances have occurred. Likewise, we can envision a system experiencing multiple disturbances in parallel, having an interactive effect on the system. It is possible that the interaction magnifies individual disturbances, creating the need to response or tipping a system into transformation. This example is shown in (Eq. 5):



Most of the disturbances discussed by interviewees fit into these categories, and the intertwining of disturbances and responses make isolated cause-effect relationships difficult to identify. Moving on, I will next explain how the identification of disturbances translates into the introductory answer to the research questions and the theoretic and practical dilemmas posed in the introduction.

3.2. Methodology and Research Design

The first step in answering the research questions regarding how institutions change in response to disturbance entailed gaining background and history on the two cases discussed previously. I read the existing published and gray literature available from the respective national environmental departments of South Africa, Botswana, and Mozambique and met with key officials in these departments. With this accomplished, semi-structured interviews with key individual actors crucial to the management and development of the two parks began. Between 2005 and 2007, during 18 months of field work, I interviewed 152 individuals in the four partner countries. Through these interviews, interviewees were asked about the key challenges, crises, stresses, and problems facing the national park and transfrontier park that they worked in, researched, or were knowledgeable about. These challenges, the disturbances mentioned above, form the heart of this study.

Interviewees disclosed over 700 disturbances, from the trivial to the most vital. These disturbances group into roughly two dozen distinct areas of disturbance confronting the transboundary protected areas. I then identified institutional responses to those disturbances most frequently mentioned. With these disturbances, I looked for areas where rules, policies, strategies

and operating procedures changed in response; at what governance level the response took place; and if any coordination or cooperation occurred between the partner countries either through the JMB or autonomously. In what follows, I will describe in more detail the methodology and research design – the case selection, the interview design and interviewee list, the coding for disturbances, the types of cooperation and coordination achieved, and the institutional responses. This forms the basis for my research. After these discussions, I will move on to highlight some of the shortcomings and challenges of this research design, especially the difficulties of working with an imperfect natural experiment and some of the threats to validity and reliability.

3.2.1 Case Selection

One of the most critical decisions, and an important potential source of bias in the research, comes directly from the selection of the two cases for the project. Early focus on transboundary protected areas came from research for cases which exemplified the potential for cross-border collaboration on environmental issues in general and opportunities to study when and how transboundary partnerships can strengthen institutional robustness and work toward the resolution of environmental dilemmas. Other possible candidates included international regimes on climate change, ozone depletion, and fisheries; international river and watershed management; and ongoing negotiations on the Arctic. The reason that I chose transboundary protected areas rather than these or other topics was because less research efforts had examined this area, a great deal of NGO and government focus has shifted to transboundary conservation in the past decade, and the role of protected areas as part of larger conservation complexes looks to increase in importance in the coming years. In addition, most of the research interest on transboundary protected areas focused on either ecological research or anthropological studies. Few political scientists examined the governance of conservation areas or the institutional designs being created (Agrawal and Ostrom, 2006).

The cases of transboundary conservation in southern Africa are of particular interest for several reasons. First, southern African governments have taken leading roles in transboundary conservation, with 22 TFCA complexes starting in the past decade (see Figure 1.1). Transfrontier conservation efforts have led to massive parks, often the size of American states or European nations, and the number of transfrontier parks has increased rapidly. As a result of government interest and support from a network of international NGOs and organizations, transfrontier conservation is growing faster in southern Africa than any other area of the world. Second, the specific setting for TFCAs in southern Africa allows for vast tracts of land to fall under conservation, while creating several interesting and problematic challenges for conservation. Particularly, rather than creating a "Yellowstone" style park, such as the Glacier-Waterton

International Peace Park between the US and Canada, the TFCAs of southern Africa must balance goals of conservation and development, between biodiversity protection and sustainable resource usage. In addition, these parks need to become financially self-sustaining and work to build peace in areas of historic civil unrest and uneasy relationships amongst neighbors. Third, one of the leading TBPA NGOs, the Peace Parks Foundation, is based in South Africa and works extensively throughout the region. In many ways, government and NGOs of the region are the leaders of the transboundary conservation movement worldwide.

Of the 22 cases in the region, I selected the Great Limpopo Transfrontier Park and the Kgalagadi Transfrontier Park because they were the first two TFCAs created in the region and have developed the furthest. While many researchers have studied the transboundary aspects of the Great Limpopo, few researchers have spent much effort on the Kgalagadi. The two parks also are a study in contrasts for how they originated. The Kgalagadi has always been a transboundary entity with no fence, loose border control, and decades of cooperation between the partner countries. The Great Limpopo emerged from pre-existing national parks that have a checkered history of separation, strict border control and fencing, and a conflictual past between the nations. These two parks, however, do share several traits – South African participation, large areas set aside for conservation, savanna ecosystems (although quite different types of savanna), long histories of conservation, and similar governance structures.

Two of the key differences – the different path dependencies that led to status as a TFCA (top-down implementation in the GLTP vs. bottom-up implementation in the KTP) and time frame for becoming a transfrontier park (70 years for the KTP and less than 8 years for the GLTP) – provide the natural experiment that will help to test the research hypotheses. Other important differences that will be discussed in more detail as confounding variables include different partner countries (Botswana in the KTP, Mozambique and Zimbabwe in the GLTP) and the various influences arising from this difference – different cultures and languages, governmental structures, and legacies of colonialism. The two transfrontier parks also have different historical land use patterns, levels of tourism, population densities surrounding (and inside) them, and resource usage patterns.

3.2.2 Interview Design and Targeting Interviewees

Drawing on pre-dissertation field visits and early archival research, I identified several key individuals in the two transfrontier parks. Building from this base of key individuals, I expanded my interview network upon the start of my formal dissertation fieldwork in 2006/2007. I conducted all interviews personally (no field assistants) and 90% of the discussions took place in person (16 of 152 were telephone interviews). Moreover, I corresponded with 75 additional

respondents via email (a total of 227 people) who had at one point been involved in transfrontier conservation in southern Africa. Initial contacts for most took place via email or a telephone conversation to set up in-person meetings when possible. The script for the initial contacts is in **Appendix A.1**. All interviews, both in person and via telephone, were semi-structured. I started with questions from a research guide, see **Appendix A.2**. Interviewees all received a Human Subjects Review Form (**Appendix A.3**) and if desired a copy of questions that we would discuss beforehand.

Typically, interviews lasted between 45 and 90 minutes, covering a wide range of topics. I would begin by describing my research design and goals. We would then cover the spectrum of issues important to their job, the major challenges and dilemmas they faced, how their work interfaced with my research agenda, and their perceptions of transfrontier park development. Often, we would then move on to talk about areas of cooperation with their colleagues across the international border. The interviewees could talk about whatever they felt was important, and I deviated frequently from the interview guide. While the topics covered closely matched the guide, the interviews were conducted in a conversational style and flowed over a wide-range of themes. If something was discussed off-the-record, I did not note what was mentioned. I never recorded interviews, but I took notes on a pad of paper throughout the meetings. After the interviews, I would immediately type the notes up, adding comments to the handwritten notes. On request, I made the electronic version of the notes available to the interviewee. In accordance with human subjects' procedures, all interview notes are anonymous with code numbers and actual contact information held separately in a single database file. Throughout the dissertation, I reference interviewees by date, country of residence, and general job title (e.g. Mozambican park employee, 11/11/2007). Interviews always ended with a question of other people that should be contacted.

3.2.3 Analysis of Interviews

Interviewees were selected through a snowball sampling method where 25 key players were identified during the pre-dissertation field work for initial interviews and additional target interviewees emerged in the course of the original interviews (Bernard, 2005). I selected the top-level managers of the TFCA cases and key officials within the ministries of environment for this first round of interviews. Each interview closed by asking what other people I should talk with, often generating 5-10 additional correspondents. I would then contact these people under the recommendation of the initial correspondent. This approach resulted in a high degree of participation in the study, with more than 80% of all contacts spending substantial time talking with me.

The interviews broke down into a few topics. First, I would ask a series of questions about the person's background and current job responsibilities. Then, we would discuss their involvement in transfrontier conservation and the particular case or cases of interest. From here, we would move on to talk about the challenges facing them in their work and the transfrontier conservation efforts at a broader level. We would then proceed to discuss areas of cooperation in the transfrontier parks and places where cooperation lagged. Finally, we would talk about others that could further inform my study. The interviewees' backgrounds were quite diverse. I spoke with many people within the partnering national parks and the national park headquarters. Within the parks, I spoke with people working as scientists, in the tourism department, in the conservation group and ranger corps, with community outreach officers, with veterinarians, and with general management. The Ministries of Environment and Tourism, Ministries of Water and Forestry, and other involved government groups drew much of my time as well. I also spoke with many of the key figures in the TFCA movement who worked with NGOs – conservation groups, local community support groups, and tourism groups. Finally, I spoke with several independent researchers, environmental consultants, and academics engaged in conservation efforts and transfrontier parks. In short, I worked with everyone identifiable as having insight into the region's transfrontier conservation with one exception. I did not work directly with local community members but instead worked through community-focused NGOs and local-level officials, and community leaders. Many of the communities exhibit research fatigue and have participated in countless research programs over the past several decades (Tapela et al., 2007). I chose to rely on past research and interviews with researchers and officials with extensive experience in the region. In all, my interviews, by country, broke down to 83 South African representatives, 26 from Botswana, 29 from Mozambique, and 5 from Zimbabwe with the remainder from outside the region. Given South African involvement in both transfrontier parks, I anticipated a heavier focus on their representatives. However, given the size of park staffs and environmental ministries and the number of environmental NGOs based in South Africa, the interviews resulted in more interviews from South Africa. This represents the reality of the region, with more transfrontier conservation people being based there. This overweighting does not appear to have substantively biased interview responses.

3.3 Coding of Disturbances

The main goal of the interviews was to gain objective understanding of the fundamental challenges facing the transfrontier parks. I had an intuition as to the major disturbances from reading the background literature on the two cases and on protected areas more generally. Through talking with a great number of people from various backgrounds, however, some

disturbances were mentioned time and again. Other events, which I thought would heavily influence decision-making, rarely arose. For instance, veterinary disease features heavily in many discussions of transboundary conservation. It also shows up in management decision-making in the GLTP. In the Kgalagadi, however, it plays little or no role. Likewise, the floods of 2000 in the GLTP recur frequently in historical story-telling, but no managers mentioned them in affecting managerial decision-making or influencing the governance of a transfrontier park at all. Through the database created from coded interview notes, I could examine the most important disturbances, or at least those most commonly observed and reacted. Other disturbances may later emerge as more influential, problematic, or conducive to coordinated response, but the most frequently mentioned provide a clearly recognized starting point for analysis.

Rereading the interview notes, I tracked every disturbance mentioned. I noted what type of responses, if any, the interviewee reported. From these notes, I created a database which compared the disturbances mentioned by place (park and country) and by role of the correspondent. I could then identify frequent recurrences, job-specific problems, and whether the disturbance was salient across borders. Likewise, I could see if particular disturbances arose at a policy or operational level, depending on the level of the interviewees. In tracking disturbances by place and level, I could create a basis for testing my hypotheses. I could see if cooperation arose in response to disturbances or not. Did cooperation emerge from areas of mutual concern? Did cooperation instead come from areas with little concern? Did cooperation arise when one country favored a response, a privileged group response to collective action? Did they respond to political whims or to park-level disturbance? Did the cooperation emerge in less politically loaded areas or in situations where the countries formerly competed such as tourism?

3.4 Coding of Cooperation

Similar to the coding of disturbance, the next step in testing the hypotheses was to look at when and where cooperative efforts in the transfrontier parks took place. If I could see who was involved, when the cooperation took place, some of the rationale for why it took place, and at what level of governance it took place, I could begin to answer some of my questions on institutional responses to disturbance. I asked interviewees what cooperative efforts they participated in and what collaboration took place in response to the disturbances they faced. I also perused the minutes of the Joint Management Board meetings from 2004 until 2007, the only years publically available at the time of the study, in both transfrontier parks for areas of cross-border cooperation or areas where they hoped to foster such cooperation. From here, I could begin to address the questions posed above to see what shaped institutional responses to disturbances, what adaptations took place, and how institutions evolved over time.

3.5 The Types of Disturbances where TFCA Officials Coordinate Institutional Responses

Creating a database from the interview notes, several interesting findings emerged. As could be expected, the types of disturbances and the frequencies with which they were mentioned varied between the two transfrontier parks. In some cases, the variance can often be explained by fairly obvious reasons – differences in the ecosystems, changes in population densities, partnering between different sets of countries and so on. The disturbances also varied by the country of the respondent. While overlap existed, in some cases, respondents from different countries often differed fundamentally in discussing the key disturbances of a jointly governed protected area. Similarly, where and when cooperation emerged, does not neatly fit into categories, and, as mentioned in the introduction, collaborative endeavors occur in areas of joint concern, in areas of concern to only one side, and on areas that do not appear important to either side. However, careful examination of the data, coupled with in-depth discussions with park officials, reveals critical insights to the understanding transboundary governance in conservation and begins to test some of the core hypotheses of this study.

Separating the disturbance data by transfrontier park and by country of respondent, I looked for areas of concern that arose in only one country as opposed to those that arose in multiple countries. I could then compare the disturbances with the cooperation that has occurred in the parks or is planned and see how these matched with the disturbances. By counting the number of times a disturbance was mentioned, I could quantify a relative level of importance about particular system perturbations. Of course, a simple count of disturbances is not an ideal measure of the size, importance, or level of potential impact of a disturbance. Nor does it account for ignorance or uncertainty about the disturbances that may affect the system greatly in the future. It does, however, provide a measure for the salience of a disturbance and provide a general perspective of what challenges park managers view as critical to their work in conservation, in balancing development and conservation, in performing community outreach, and in other aspects of their work. Table 3.1 lists the top ten disturbances for each park. As can be seen, while there is some overlap, the list varies a great deal between the two parks, with different disturbances list and a different prioritization as well. Of even more interest, Table 3.2 lists the top disturbances for the Great Limpopo Transfrontier Park by country and Table 3.3 lists the top disturbances for the Kgalagadi Transfrontier Park by country. These lists demonstrate the similarities and contrasts between partners on their concerns in park governance.

Great Limpopo Transfrontier Park	COUNT	Kgalagadi Transfrontier Park	COUNT
Local Community Issues (general)	94	Local Community Issues (general)	57
General Transfrontier Concerns	64	General Transfrontier Concerns	50
Human-Wildlife Conflict	37	Human-Wildlife Conflict	22
River Health	33	Tourism	19
Border Security	26	Contractual Park Co-Management	16
Veterinary Disease	25	Financial Sustainability	14
Community Resettlement	24	Cross-sectoral Bureaucracy	11
Financial Sustainability	22	Conservation vs. Development	10
Capacity Inequality	19	Capacity Inequality	10
Tourism	15	Poaching	10
Total Interviews for GLTP	137	Total Interviews for KTP	88
Total Disturbances Mentioned	476	Total Disturbances Mentioned	266

Table 3.1: Key Disturbances in the Great Limpopo Transfrontier Park and the Kgalagadi

Mozambique & Zimbabwe	COUNT	South Africa	COUNT
Local Community Issues (general)	36	Local Community Issues (general)	58
General Transfrontier Concerns	27	General Transfrontier Concerns	37
Human-Wildlife Conflict	18	River Health	27
Community Resettlement	18	Border Security	22
Financial Sustainability	9	Human-Wildlife Conflict	19
Veterinary Disease	8	Veterinary Disease	17
River Health	6	Capacity Inequality	14
Tourism	6	Financial Sustainability	13
Capacity Inequality	5	Elephant Overpopulation	12
Shift from TFCA to a TFP	5	Land Claims	11
Total Interviews from Moz & Zim	37	Total Interviews from South Africa	100
Total Disturbances Mentioned	163	Total Disturbances Mentioned	313

Table 3.2: Key Disturbances in the Great Limpopo by country

From this point, we can begin to examine where cooperative efforts are underway and how the joint park management responds and, equally important, to what they respond. Lack of a cooperative response does not mean that the joint park management does not view the disturbance as a concern. In some cases, the lack of response is a conscientious choice. In other cases, decentralizing the response to a disturbance to a more appropriate scale of governance may make more sense than trying to respond at a supra-national level. Other cases may prove too

contentious to resolve or come with linked political issues, making joint resolution too controversial. Many reasons and rationale can be provided for every disturbance and the associated levels of cooperation; however, the intent of this research is to identify and test certain generalizable hypotheses about responses to disturbance. In what follows, I examine some of the most commonly mentioned disturbances and see what levels of cooperation have occurred in response to them. The forthcoming chapters will then go into detail about some of the idiosyncratic, case-specific reasons for why cooperation emerges in some areas and not others.

Botswana	COUNT	South Africa	COUNT
General Transfrontier Concerns	26	**Local Community Issues (general)**	48
Human-Wildlife Conflict	11	**General Transfrontier Concerns**	24
Local Community Issues (general)	9	**Contractual Park Co-Management**	16
Tourism	8	**Human-Wildlife Conflict**	11
Poaching	6	**Tourism**	11
Total Interviews from Botswana	27	**Total Interviews from South Africa**	61
Total Disturbances Mentioned	88	**Total Disturbances Mentioned**	178

Table 3.3: Key Disturbances in the Kgalagadi by country

The next three sections highlight some of the findings on the responses to the disturbances mentioned on these lists. The first notes the lack of management response to many predominantly ecological disturbances, what some would call "natural events". The second section looks at a frequently observed disturbance in each transfrontier park that has resulted in considerable levels of cooperation. The third section briefly examines a couple examples of important disturbances where less cooperative behavior has emerged. While not claiming to be a comprehensive look at each and every disturbance mentioned, the fourth section looks at these disturbance-response dyads and begins to explore the explanatory power of the first hypothesis of the thesis – whether or not more prominent disturbances generate higher levels of cooperation.

3.5.1 Responses to LIDs – large, infrequent ecological disturbances

For the past several years, park managers in both the Great Limpopo and the Kgalagadi have taken a hands-off approach to natural events. Whether the perturbation is a large, infrequent ecological disturbance, such as a wildfire or flood, or low frequency weather conditions over relatively long periods of time, like an extended drought, the recent management response has been to do nothing. To date, this *laissez faire* approach has been taken with each of the countries

in the two parks over the last several years. Previous management took more active roles in trying to mitigate the effects of natural events on the ecosystem, using a command and control management approach to maintain a steady-state equilibrium condition (Holling and Meffe, 1996). In terms of cooperation, we can paint the current approach as a picture of perfect agreement to do nothing or one with no collaboration at all. The reality appears to be somewhere in the middle.

3.5.1.1 Flooding in the GLTP

In a semi-arid woodland savanna, like much of the Great Limpopo, riparian systems likely go through a succession sequence that periodically gets reset by floods (Rogers and O'Keefe, 2003). Throughout the history of the Kruger Park, several floods have had major impacts on the riverine environment. Between the 1920s and the 1980s, the system slowly recovered from floods in 1925, passing through several state changes from sandy, sparsely vegetated systems to more herbaceous states which in turn were colonized by trees to form closed-canopy forests near many of the rivers. Smaller floods in the 1980s and 1990s partially reset the successional pattern. Then in February 2000, major flooding swept through Kruger Park and across the Mozambican flood plains. In South Africa, the flood inundated park headquarters. Mozambique, however, absorbed the worst of the flooding. Over 800 people died and 20,000 head of cattle were lost. The country also lost over 1400 km^2 cultivated land and 90% of its irrigation infrastructure (Africa Recovery, 2000). More than a quarter of a million people lost their homes. In a tragic situation, remnants of the past civil war resurfaced in a terrifying way as previously mapped land mines were swept away and redeposited throughout the countryside.

In a time of emergency, it is no surprise that humanitarian aid from Mozambique, South Africa, and nations around the world responded, rescuing over 45,000 people from rooftops, trees, and isolated pieces of high ground. Cooperation between nations, in general, was at an all-time high. However, from the perspective of examining disturbances, adaptations, and responses, few actions were taken to prevent future damage from such flooding (dikes, dams, etc.). The interesting point is that, with hindsight, few park officials viewed the floods as a disturbance that needed a response from within the park. Nor did any view this as a dereliction of duty by other agencies. Several mentioned the floods as an interesting natural event in the history of the park, as shown in Table 3.2, but few saw it as something with which management should be concerned. They simply repaired damaged infrastructure and went on with business.

3.5.1.2 Fires in the Kgalagadi

In the arid region of the Kgalagadi, flooding on the scale of the Sabie River in 2000 is less of an issue. Floods do occur periodically within the two river valleys of the Kgalagadi – the

Auob and the Nossob – rivers which are generally dry on the surface and have historically flowed roughly once a half-century for the former and once a century for the latter. Of greater concern in the dry landscape is fire and drought. In 1995, a massive wildfire swept across the Kgalagadi, ultimately engulfing over 2/3 of the South African park before rain extinguished the blaze. However, park scientists viewed the ecological effects as minor – few animals perished and vegetation began re-growth within two weeks (SANParks scientist, 3/19/2007). But this lack of response to fires is a relatively new phenomenon. Past management philosophies responded by building fire breaks along the length of the river beds from one end of the park to the other, a length of almost 300 kilometers. In the words of park officials, "prior management kept fires out of the rivers, but the last big fire killed 800 year old camel thorns along the river bed. Now we simply let fires run their course" (SANParks official, 3/20/2007). Botswana, however, may not entirely agree with this philosophy. Scientists within the Department of Forestry noted that "fire is one of the big threats to our rangeland management" (Botswana Forestry scientist, 11/16/06). Others in the department felt that fire posed a major threat and that they needed to take a more active role in response. However, given capacity issues, the remote areas of the Kgalagadi, and lack of concurrence across the border, Botswana park managers have not taken any response to fire either. South Africa's lack of response may be seen as a *laissez faire* management approach, but Botswana's decision appears to stem from a lack of resources.

As with flooding in the Limpopo, we see large ecological disturbances viewed, at least in part, more as events than disturbances, from the perspective of current management philosophy. The need to respond is diminished. Rather, scientists encouraging a view of these events as part of a necessary, natural cycle which management should refrain from influencing are prevailing in the debate. They are aided by resource constraints and current trends in the conservation community encouraging a less-intensive, invasive management approach.

3.5.1.3 Fire Policy in the GLTP

Many conflicting views exist as to the role of fire in a savanna ecosystem. Some view fire as a necessity for the maintenance of savannas, without which the woody vegetation will increase and the landscape will transition to a woodland. Others contend that the drier weather conditions of a savanna will prevent this state change and fire simply controls the density of vegetation. Either way, many savanna species are fire-tolerant. In this regard, some viewed past fire policies in Kruger Park as favoring some species over others, depending on their sensitivity to fire. Part of the difficulty of assessing the role of fire in the ecosystem is that since pre-historic times local communities have staged controlled burns. This practice continues through today, when a drive through the southern African countryside will often reveal orange ribbons of fire,

kilometers long, burning off into the distance. Some view these burns as the source of the modern-day lowveld landscape.

Previous fire policies in Kruger have ranged from very invasive to very hands-off with several modifications over time (see Table 7.1 in van Wilgen et al., 2003). From the earliest days of the game reserve, park management did not play an active role in fire control and limited their efforts to occasional controlled burns to provide green fodder for wildlife. In the late 1940s this policy began to shift as management banned burns and instead created firebreaks to control wildfires. This shift entailed a major change from traditional fire management in the region. However, park scientists soon realized that fire served an integral role in ecosystem health. As a result, the park embarked on a prescribed burn policy, conducting controlled burns every spring. This policy stood for the next 25 years. However, scientists and managers began to perceive several problems with this burn regime, similar to the use of controlled burns elsewhere. First, to maintain control, rangers set fires during conditions of optimal control – in the spring, during the day, in ringed patterns. But natural fires generally occur in the driest times, not the wettest. Lightening strikes also create fires from a point source, not in a ring. The results of these differences often affected wildlife. The ring fires often trapped wildlife inside the burn, unlike the point-induced fires. The burning season also affected ground-nesting birds and other animals. Fire intensity also changed due to the nature of the fires, the fuel loads, and the seasonality. As a result, fire policy changed in the 1980s to account for variable rainfall, seasonality, and management objectives. In the 1990s, the park decided to move back to a more "natural" regime and attempted to simulate historic conditions. Anthropogenic fires were suppressed and naturally occurring fires allowed to burn.

After 2002, park management shifted policy to its current status. Like many current park policies, staff scientists realized that while they wanted to move to a more "natural" management regime, human interference in so many facets of the ecosystem made a strictly hands-off management approach problematic. This problem resurfaces in a wide variety of conservation policies whether looking at the use of artificial waterholes in both the KTP and the GLTP, elephant management in the GLTP, and many other ecosystem management issues in part from having a self-contained, isolated conservation landscape amidst multiple divergent land uses. The new management approach sets specific ecological conditions that it hopes to maintain. These conditions allow for variability and are bracketed by thresholds of potential concern (TPCs). TPCs are hypotheses of the limits of acceptable levels of ecosystem change (Rogers, 2003). This management approach adopts a version of adaptive management, which views policy as

experiment, as an iterative decision-making process in the face of uncertainty (Holling, 1978; Lee, 1993). SANParks has adopted adaptive management throughout the organization.

The result of adaptive management for fire policy has been to supplement natural fire with controlled patch burns in areas where fire is viewed as necessary to bring the system back in line with historic ecological conditions. Many aspects of this policy are problematic (setting historic levels, dealing with uncertainty and nonlinear responses, reacting in a timely fashion within a bureaucratic and politicized environment, etc). The important point for now is that fire management policies are evolving toward a minimal involvement level in the South African section of the GLTP but these policies are not yet being coordinated in any meaningful manner with the conservation areas of the GLTP within Mozambique and Zimbabwe. In part this is due to capacity constraints in these countries, and collaborative efforts are further limited by the experimental design nature of adaptive management and the required speed of decision-making. Applying adaptive management philosophies to transboundary conservation may prove problematic due to the increased transaction costs of international negotiations, the longer response time to change policies, and the difficulties in harmonizing policy between countries. Similar to the response to other large ecological disturbances, the transfrontier parks collaborate very little on fire management policy.

3.5.1.4 Working for Water – invasive species in South Africa and the GLTP

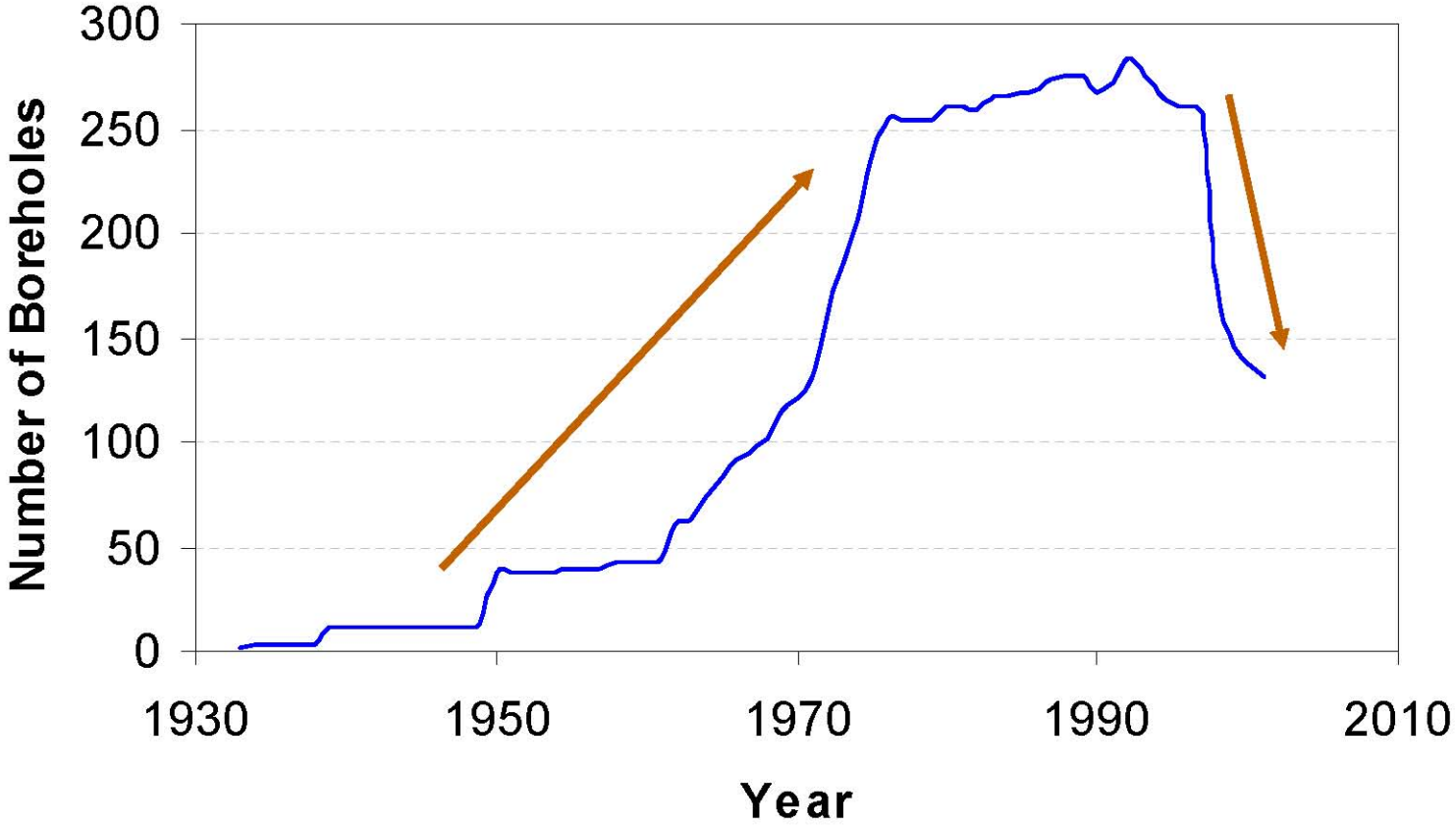
Relatively few interviewees (3 respondents in the GLTP and 4 in the KTP) noted invasive species as a concern for the transfrontier park. None of these viewed them as a serious problem, but those that mentioned it thought that alien invasive species posed a future hazard of potentially great magnitude. Yet one of the largest ecological management programs in southern Africa concerns alien invasive species. South Africa's Department of Water Affairs and Forestry has a program called Working for Water, which has cleared more than one million hectares of invasive alien species from around the country. Of at least equal importance, the program has created over 20,000 jobs (Working for Water, 2004). The same agency report claims that invasive alien species pose the single greatest threat to biodiversity in South Africa. Regardless of the literature, few park officials mentioned it as an especially threatening issue for the transfrontier park. The Working for Water program does not coordinate actions with counterpart agencies or programs outside of South Africa, and few, if any, similar programs exist in Botswana, Mozambique, or Zimbabwe.

Within the Kruger Park, a great deal of research has focused on understanding and minimizing the threat from invasive species. Current mitigation programs use a combination of mechanical, chemical, and biological control methods. As a part of the adaptive management

program, thresholds of potential concern (TPCs) have been set for invasive aliens within Kruger (Foxcroft, 2005). Surveys conducted over the past 70 years indicate that the number of invasive alien plants identified has increased from 6 in 1937 to 367 at last count (Freitag-Ronaldson and Foxcroft, 2003). Most dispersion of invasives into the park comes from the seven major rivers that cross the park in a west to east direction. All of these flow into Mozambique. If the problem of invasive alien species worsens in the coming years, a more formal partnership with Mozambique may be desired. Such discussions have not surfaced in any of the joint management meetings for the GLTP yet. Again, as in the case of fire management, even desired cooperation may be limited by capacity constraints in Mozambique and Zimbabwe.

3.5.1.5 Artificial Waterholes – Response to Drought in the KTP and the GLTP

Considerable controversy has surrounded the use of artificial water sources in both the Kgalagadi and the Great Limpopo since their inception. Initial boreholes in the Kruger Park were drilled to guarantee water in times of drought (Gaylard et al., 2003). However, use of boreholes expanded to help increase the carrying capacity of land, particularly in some of the naturally drier areas. This allowed the populations of more water-dependent species to flourish, often at the expense of less water-dependent species such as roan and sable antelope. At present, less than 20% of the park is now further than 5 km from surface water during extreme drought conditions (ibid). The number of boreholes peaked in 1995, and management has begun to close waterholes and bring the park back to more natural historic conditions, as shown in Figure 3.5 (Farmer, 2007). Current distribution of open water points in Kruger is 0.009 points/km^2. This contrasts with zero artificial water points in the Limpopo National Park. If Mozambique were to achieve the same density of artificial water sources, they would require 89 boreholes scattered throughout the park.



Lange 1969; Aucamp *et al.* 1992; Owen-Smith 1996; Parker & Witkowski 1999

Figure 3.5: Artificial Water Provision in the Kruger National Park (From *Farmer et al., 2007*)

Similarly in the Kgalagadi, South Africa has 89 artificial water points in the park, down from over 180 at its peak. Many of these watering holes have salinity levels of over three times that of sea water (KTP JMB minutes, 4/5/2006). By contrast, on the Botswana side only a few are presently operational and many of these also have problems with heavy salt and mineral content. Most of these boreholes are either powered by wind mills or solar panels. Park officials indicate that the majority of the water sources were installed for the benefit of tourists. The water sources benefit tourists in three ways. First, they allow the wildlife population of the park to artificially inflate. The effects are particularly noticeable in populations of more water-dependent species like blue wildebeest (*Connochaetes taurinus*). Second, it also reduces the need for seasonal movement of animals during times of water scarcity. Third, it tends to group many of the animals around the waterholes. As a result, tourists can drive from borehole to borehole, as marked on tourist maps, to look for wildlife. Beyond the ecological problems, it also creates difficulties between Botswana and South Africa around tourism in the transfrontier park. With the majority of tourist accommodation, road infrastructure, and watering holes in South Africa or along the border, the lion's share of tourism occurs in South Africa. The study will return to look at cooperation and collaboration on tourism plans in the following chapter. Regarding artificial water sources, little cooperation has taken place between Botswana and South Africa.

Ultimately, the use of artificial water sources in both the Kgalagadi and the Great Limpopo is for tourism. It is one of the few management interventions at least nominally in response to ecological disturbances, specifically drought. However, as is quite obvious, there has been little active coordination of goals or management objectives. SANParks has shifted its internal policy from aggressively supplying watering points for wildlife to a more recent gradual decrease of effort. In both parks, water holes are removed rather than repaired and some efforts have begun to remove functional boreholes and earthen dams. For a variety of reasons, primarily due to capacity constraints, South Africa's partners in transfrontier conservation have not engaged in artificial water provision. Again, management response to ecological disturbance is minimal.

As the examples of fires and floods demonstrate, the mutual decision to do nothing can be seen as not working together or agreeing to a common *laissez faire* approach. The reality mixes these two. It appears to be an agreed upon approach. However, beyond the borders of South Africa, the capacity to respond in any meaningful way is very limited. With low levels of staff and few resources in Botswana, Mozambique, or Zimbabwe, it is doubtful that any controlled fire management policy or flood control program could be undertaken. Limpopo National Park's current fire management approach is to allow community-lit and lightening-

ignited fires to burn as long as they are not a threat to park infrastructure (LNP park official, 2/10/2008). In response to major hazards, like the fires of 1994 in the KTP or the floods of 2000 in the GLTP, management has chosen not to respond. In response to everyday fire management, South Africa has pursued a range of policies autonomously, and they currently approach fire management from a relatively minimalist perspective. With regard to invasive species, South African park management plays only a minor role, letting the South African Department of Water and Forestry shoulder the burden. In the other countries, no response exists. In drought response, we see the South African park service moving from previously responding with heavy intervention to a much reduced role. None of the other partner countries has any substantive water supply programs.

In spite of the size of many ecological disturbances, current management practices take a hands-off approach to these disturbances, preferring to allow natural events to "run their course". This philosophy stems from conscientious decision-making in South Africa and from capacity shortfalls in Botswana, Mozambique, and Zimbabwe. In any event, very little cooperation presently occurs in responding to ecological perturbations, regardless of size or salience of the disturbance. Of the major events, shocks to the system, none inspired a coordinated response for conservation managers. Of the longer-run ongoing problems, such as invasive alien species, day-to-day fire management, and access to artificial water sources, little coordination has happened across borders.

3.5.2 Cases of Successful Cross-border Collaboration

While ecological disturbances have not engendered a great deal of cooperation, other areas of concern to park officials have resulted in a great deal of cooperation. In the Kgalagadi, one of the top disturbances (see Tables 3.1 and 3.3) is human-wildlife conflict. Human-wildlife conflict involves the loss of life or livelihood through the attacks of wildlife. These attacks range from the destruction of crops to the killing of livestock to risk of life. Here, we see a great deal of cooperation between park officials in the two countries. In the Great Limpopo, officials view veterinary disease as a major disturbance, as shown in Table 3.1 and 3.2, and have responded collaboratively. In the following section, we will briefly explore how and why cooperation has emerged in these two areas. More detailed study of the two disturbances will follow in the proceeding chapter.

3.5.2.1 Collaboration on Damage-Causing Animals in the Kgalagadi

As one of the major social-ecological disturbances in the Kgalagadi (Table 3.3), human-wildlife conflict, or the role of damage-causing animals, has a tremendous effect on park relations with local communities. The problem is unequally felt by South Africa, Namibia, and Botswana

for a couple reasons. First, the southern border of the park in South Africa and the western border of the park along the South African-Namibian border are completely fenced. South African rangers spend a great deal of time maintaining this fence to protect nearby South African communities and neighboring ranchers in Namibia. Fence maintenance takes a large percentage of section rangers' time and budget, but management views this as a necessary expense. Even with a well-maintained fence, neighboring communities note the loss of goats and sheep to caracal (*Caracal caracal*), black-backed jackal (*Canis mesomelas*), and other smaller predators that are difficult to stop regardless of fence conditions (South African community representative, 3/20/2007). The fence serves its purpose, however, in keeping Kalahari lion and leopard away from the farms. These larger predators not only take sheep and goats, but they also kill cattle and endanger human lives. Second, the fence in Botswana only runs for roughly 100 kilometers along a several hundred kilometer border, and the section that is fenced crosses very difficult terrain and is challenging to maintain (Figure 3.6). As a result, cattleposts and ranches near the southern edge of the park in Botswana face higher threats of loss to predators originating in the park than their counterparts in other areas protected by fence.

Through a series of lion management workshops, park officials, wildlife experts, and ranchers have proposed a wide variety of remedies for the problem (Funston, 2001). Suggestions ranged from extending the fence in Botswana anywhere from 20 to 200 km in length from the end of the current fence. Others suggested simply improving current fence upkeep. Frequent suggestions included moving cattlepost waterpoints further away from the park, improving compensation packages for lost livestock, changing ranching techniques to include kraaling animals at night and using trained watch dogs, and improving response times through closer collaboration between stock farmers and conservation officials. Officials and ranchers have selected the last of these approaches over the past few years.

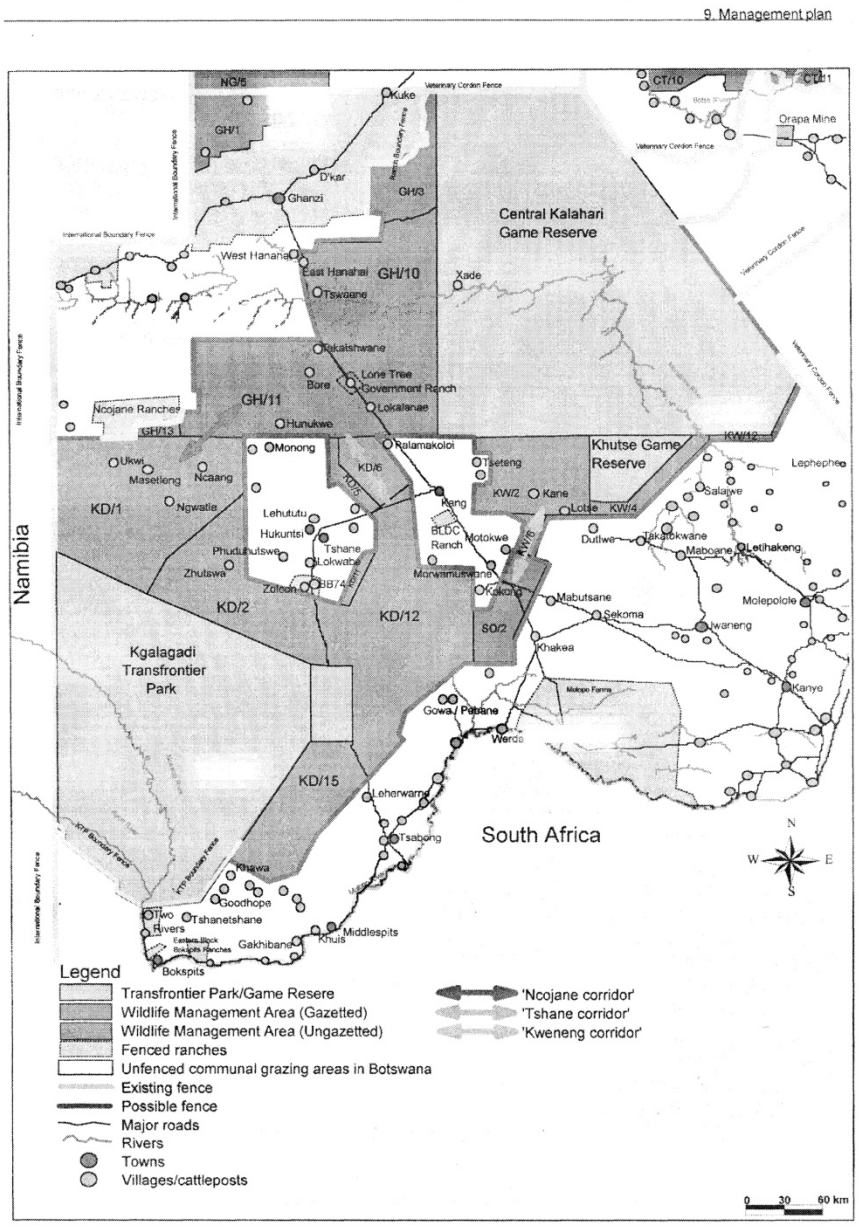


Figure 54. Map showing the relative postions of national parks, gazetted and ungazetted wildlife management areas, and Botswanan communal grazing areas. The existing boundary, national and veterinary fences are depicted as well as the fences that would be necessary to fence off the 'Greater Kalahari Conservation Area', but maintain the integrity of necessary ungulate migration and large carnivore dispersal routes.

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Figure 3.6: Map of Fencing in the Greater Kgalagadi Conservation Area (From *Funston, 1999*)

Due to capacity constraints in Botswana's Kgalagadi district conservation group, close collaboration between ranchers and conservation officials has meant that South Africa's rangers

play a lead role in virtually every incident of damage-causing animals in Botswana. Botswana staff still maintains fencing in Botswana, but SANParks recovers the animals. Botswana officials generally help in the process. The resulting arrangement has required crossing several sticky international arrangements. First, South African officials need to respond quickly in very remote parts of Botswana in challenging terrain. As a result, South African rangers need authorization to work in Botswana. This has resulted in a variety of side issues. South African rangers wanted to receive honorary ranger status in Botswana, as they held in the past, so that they had some legal authorization to conduct their work. However, it was unclear what official jurisdiction this would allow or what type of law enforcement privileges, if any, this would permit. As well, Botswana officials likewise wanted similar status in the South African park, but it is unclear what this authorization will be used for other than as a *quid pro quo* arrangement. This issue has not yet been resolved. Second, wildlife in Botswana is the property of the state, so "extradition" of wildlife for re-release in South Africa, even within the transfrontier park, requires special permission. Botswana obviously showed reluctance for policy that relinquished valuable state property to South Africa. Third, in transporting extremely hazardous cargo (sedated lions and leopards), South African officials need to bypass border security checkpoints. Each of these steps carries with it touchy issues of sovereignty and jurisdiction. In the spirit of the transfrontier park, government officials from a wide variety of departments dealt with each of these issues and enabled cooperation to emerge. As we explore the successes of the Kgalagadi in the next chapter, we will elaborate on these accomplishments, as well as similar areas of cooperation regarding veterinary disease in the Great Limpopo.

3.5.2.2 Vet Disease in GLTP – the role of AHEAD

Bovine tuberculosis has spread from the buffalo population of Kruger National Park into the Limpopo National Park of Mozambique. This raises several concerns for veterinary officials. First, because communities still live within the Mozambican park with livestock, a possibility exists for the spread of the disease from wildlife to domestic cattle. While it is not clear what the likelihood of transmission is, officials weigh the risks substantially (Bengis, 2005). Second, the Veterinary sub-committee of the Joint Management Board for the GLTP estimates that the disease has already spread to wildlife in Zimbabwe as well, although this is disputed by Zimbabwean officials. Veterinarians want to take necessary precautions to minimize spread of the disease into communal areas. In addition to the wildlife-livestock interface, no one knows what the likelihood of inter-species disease transmission is, but close proximity to domestic stock undoubtedly exacerbates the situation. Regardless of the direct disease transmission vectors, wildlife disease directly impacts human livelihoods through livestock health and overall

ecosystem health (Kock, 2005). This possibility threatens both livestock mortality and the possibility of exportation for large-scale producers. While the threat of bovine tuberculosis remains the leading cause for concern amongst veterinarians in the Great Limpopo, several other diseases have had past outbreaks and still require monitoring. These threats include anthrax, foot and mouth disease (FMD), rinderpest, feline HIV, rabies, canine distemper, and many others. Historic outbreaks of rinderpest, FMD, and anthrax have decimated wildlife and livestock populations in the region in the past, and officials view their role as one of containment rather than elimination of disease (South African veterinary official, 11/29/2006). Overall, the risk of veterinary disease ranks as one of the most highly perceived disturbances to the GLTP (see Table 3.2).

Fortunately several collaborative efforts have emerged from the three partner countries. Working as an epistemic community of experts (Haas, 1992), veterinarians of the three countries have taken on the responsibility to respond to the potential crisis. One insisted that the threat should no longer be viewed as a crisis, but as a threat which through these collective efforts and monitoring would keep possible troubles at bay (South African veterinary official, 1/9/2007). One of the main sources of collaboration comes from the veterinary sub-committee of the GLTP, a group that meets underneath the banner of the Joint Management Committee as a specialist working group. State and park veterinarians from Mozambique, South Africa, and Zimbabwe all participate. Through this committee, officials have opportunities to discuss mutual problems and potential solutions. One shortcoming of the committee is that funding must be found for implementation, so some projects are still-born (Zimbabwe veterinary official, 6/19/2007). Some of the collaborative programs that have grown out of the veterinary sub-committee include joint animal censuses with officials from Mozambique and South Africa participating to get accurate counts and locations of wildlife populations, as shown in Table 3.4 (Whyte et al., 2007). Other collaborative efforts include jointly testing wildlife for veterinary disease, specifically buffalo populations in Mozambique and South Africa, with future testing desired in Zimbabwe. A third collaboration has focused on the translocation of animals from South Africa to Mozambique. As shown in Table 3.5, many animals have been moved, including many very large animals such as elephants and giraffes (SANParks Veterinary Wildlife Services, 2/20/2008). Close coordination and collaboration has helped to safely and successfully move the animals.

SPECIES	COUNT	SPECIES	COUNT
Elephant	630	**Lichtenstein's Hartebeest**	7
Nyala	257	**Grey Duiker**	56
Kudu	273	**Ground Hornbill**	50
Waterbuck	86	**Ostrich**	36
Zebra	325	**White Rhino**	16
Giraffe	23	**Steenbuck**	12
Wildebeest	358	**Warthog**	48
Buffalo	225	**Bush Pig**	8
Impala	496	**Bushbuck**	1
Sable	62	**Cattle**	3142
Roan	6	**Goat**	527

Table 3.4: Animal Census for the Limpopo National Park, November 2006 (From *SANPARKS Veterinary Wildlife Services, personal communication, 2007*)

WILDLIFE TRANSLOCATED TO THE LIMPOPO NATIONAL PARK: 2001 - 2007									
No.	**Species**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**Total**
1	Blue Wildebeest	0	264	235	98	98	64	103	**862**
2	Buffalo	0	0	0	49	0	0	0	**49**
3	Eland	0	0	0	0	0	0	0	**0**
4	Elephant	25	48	38	0	0	0	0	**111**
5	Giraffe	0	4	13	15	14	15	20	**81**
6	Hippo	0	0	0	0	0	0	0	**0**
7	Impala	0	588	237	132	369	373	61	**1760**
8	Lichtenstein Hartebeest	0	0	0	0	7	9	0	**16**
8	Kudu	0	0	0	0	0	0	0	**0**
9	Nyala	0	0	0	0	0	0	0	**0**
10	Ostrich	0	0	0	0	0	0	0	**0**
11	Reedbuck	0	0	0	0	0	0	0	**0**
12	Roan	0	0	0	0	26	0	0	**26**
12	Sable	0	0	0	0	0	0	0	**0**
12	Tsessebe	0	0	0	0	0	0	0	**0**
14	Warthog	0	0	0	0	0	0	0	**0**
15	Waterbuck	0	15	9	0	18	6	11	**59**
16	White Rhino	0	0	0	10	0	0	0	**10**
17	Zebra	0	158	361	195	205	100	255	**1274**
	TOTAL	**25**	**1077**	**893**	**499**	**737**	**567**	**450**	**4248**

Table 3.5: Animal Translocations from Kruger National Park to Limpopo National Park (From *Whyte et al., 2007*)

Many of these collaborative efforts are due to the close relationships between veterinary professionals in the three national parks and state agriculture agencies. These relationships have developed a strong network over time through the efforts of individuals, professional organizations, and, more recently, through a voluntary research program, AHEAD, that has strengthened the relationships within this epistemic community. This research program

originated at the World Parks Conference in Durban, South Africa in 2003. Through the collaboration of the World Conservation Society and regional veterinary officials, the AHEAD-GLTFCA (Animal Health for Environment And Development – Great Limpopo Transfrontier Conservation Area) program began operation in the region. AHEAD takes an interdisciplinary approach to looking at several key issues in the GLTFCA including animal health and disease; land use, ecosystem goods and services, and animal health; human livelihoods, animal and ecosystem health; and policy support and capacity building (Cumming et al., 2007). AHEAD has also created a position within SANPark's organization to act as a coordinator and leader on a wide range of issues radiating from a hub of animal health issues to encompass many of the major challenges facing transfrontier conservation areas in the region (SANParks official, 9/18/2006). AHEAD workshops has enabled veterinary officials and other transfrontier conservation workers to interact, share research findings, and find ways to work together. In the process, AHEAD has served as a facilitator and clearing house, enabling many of the multi-national veterinary projects. As a result, the cooperation and on-the-ground activity in response to veterinary disease surpasses most other operational activities in the GLTP.

3.5.3 Cases of Less Successful Cross-border Collaboration

Unlike the cross-border collaboration that occurs in the KTP in response to human-wildlife conflict or the emergent epistemic community in response to veterinary disease in the GLTP, two of the most frequently observed disturbances confronting the transfrontier parks engender much less cooperation. In the case of park-community relations, the transfrontier parks' management boards, as well as the national governments, have deemed this problem a sovereign issue and purely at the discretion of national park and governmental officers, and under no conditions are these issues to surface in international discussions. By contrast to the unmentionable challenges of transfrontier park-local community interactions, an often discussed challenge facing transfrontier conservation efforts that rarely engenders close cooperation comes from border security issues. This disturbance hits at the very heart of transfrontier conservation initiatives.

3.5.3.1 Relations with local communities

Far beyond all other transfrontier conservation disturbances, relations with local communities are the most "prickly" of disturbances. In every country and in both transfrontier parks the challenges of park relations with local communities surfaced as the prominent problem for park managers. However, universally, the managers indicated that relations with local communities were a sovereign issue and had no relationship to the transfrontier parks. The predicament is that the issue does have a direct and important relationship with transfrontier

conservation. The following chapter will delve into detail on community relations. For now, in exploring the hypothesis that large, salient disturbances generate more cooperation, I will focus on two aspects of park-community relations – "social ecology" outreach and land tenure arrangements.

After the fall of apartheid in 1994, South Africa's national government embarked on a transformation of the public service. Beginning in 1995, the National Parks Board, which later evolved into the current SANParks organization, began this transformation and embarked on a program called "Social Ecology" which meant to convert the park service and system from a 'fences and fines' approach to an interrelationship between communities and conservation (Magome, 2003; Ramutsindela, 2007). The new program had five main responsibilities – community outreach, environmental education, economic empowerment, cultural heritage, and social research (Magome, 2004). These functions parallel similar "people and parks" initiatives in protected area management around the world, as park management increasingly moves away from a fortress conservation mentality (Hulme and Murphree, 2001; Wells and Brandon, 1992). Currently there are no parallel programs in Mozambique, beyond ongoing projects to resettle communities outside of the park. Zimbabwe, however, has a strong reputation for community-based natural resource management through its CAMPFIRE program (Metcalfe, 1994; Jones and Murphree, 2001), and community-based conservation previously played a big role in the Chiredzi District surrounding Gonarezhou (Murphree, 2001). However, many past programs in Zimbabwe's southeastern lowveld have collapsed in the face of economic crisis and the opprobrium of the international tourism market toward Zimbabwe. As a result, no complementary community outreach programs exist in Mozambique, South Africa, or Zimbabwe. Likewise, Botswana's community natural resource management programs focus on the large parks and game reserves of the North – principally Chobe National Park and the Okavango wetlands – with no presence in the Kgalagadi district.

In transboundary protected area literature, advocates often claim that transboundary protected areas help to reunite communities historically divided by arbitrary political divisions (Odegaard, 1990; Hanks, 2003). If TBPAs do serve this role, surely some form of community outreach would coordinate social ecology-type programs between countries. Unfortunately, little support for this proposition exists. Instead officials in the transfrontier parks insist on separating community relation-building efforts at a national level. Senior officials commented that they "see no reason why community issues should be discussed at the international level. These are entirely our own issues" (DEAT official, 6/20/2007). In spite of this belief, local community relations do impact the transfrontier park, particularly in the diverse relationships for negotiating

land tenure and resource usage arrangements as well as in the prominent role some groups play in contractual parks.

Due to the colonial legacy of many national parks and the displacement of people that their creation entailed, land tenure and local resource usage continue to be contentious issues today. The four countries in the two transfrontier parks, at present, take quite different approaches to resolving these dilemmas. In their responses, a variety of problems are thrust at the transfrontier parks, and it is here that management is most myopic in their belief that community issues are purely domestic challenges. The transboundary ramifications of domestic policy regarding local communities often ripple and occasionally roar through neighboring countries.

Beginning with the settlement with the Makuleke community in the Pafuri region of Kruger Park, SANParks has embarked on a mission to resolve the land claims filed against it by historically oppressed communities. As a result Kruger National Park now has claims against half of the park's present area (SANParks conservation official, 2/13/2007). The arrangement with the Makuleke resulted in the formation of a contractual park, a co-management agreement that keeps the land under conservation and the day-to-day management stays with SANParks. It provides rent to the community as well as privileged resource access and use, proprietary claims to tourism in the contractual park, and other features (Reid, 2001; Reid, 2002). These policies have two important transboundary effects on South Africa's conservation partners. First, as a result of contractual parks – the Makuleke contractual park in Kruger and the recently proclaimed Ae!Hai Kalahari Heritage Park in the Kgalagadi – SANParks now has a situation in both transfrontier parks where they have management partners at two levels, with local communities in contractual parks and with nations in the transfrontier parks. The problem with the nested arrangements is that neither level has any representation at the other level except through SANParks. This situation has not created any noticeable problems yet, but SANParks has a delicate tightrope to walk to keep their partners at both levels content. The second cross-border ramification of the contractual parks comes from having recently empowered communities on one side of the border and contentious relationships on the other. In the Great Limpopo, the Shangaan communities in Kruger are strengthening their ownership rights and resolving land claims while Shangaan in Limpopo National Park are losing access and usage rights. It is not clear how managers will resolve these challenges.

While Kruger struggles to repent for such past transgressions as resettling communities, Mozambique engages in a modern-day resettlement program of its own. Under the guidance of the German Development Bank, *Kreditanstalt für Wiederaufbau* or KfW, the staff of the Limpopo National Park has begun to resettle communities previously within the national park. A

great deal of literature looks at these resettlements (Draper et al., 2004; Spierenberg and Wels, 2006; Ramutsindela, 2007), and most view the relocation of people as unfortunate at best and often quite tragic. The government of Mozambique, however, views the resettlements as necessary for biodiversity conservation and the improvement of the lives of their citizens. They have taken every precaution recommended by the World Bank in the resettlement of people (KfW official, 6/15/2007). For the purposes of this report, the important point is that regardless of the intended benefit, whether they are needed or not for biodiversity conservation, whether they are socially just or economically sensible, the relocations have caused a great deal of turmoil in local communities and within the NGO community. Especially when compared with the restitution efforts under way in South Africa, the contrast is striking. This contrast shadows many discussions of transfrontier conservation, influencing opinions throughout the region with communities, donors, tourists, and other conservation agencies, not only within Mozambique, but internationally.

Just as the policies toward local populations differ between South Africa and Mozambique, Zimbabwe has a third approach. In 1975 villagers were relocated to create Gonarezhou as a national park (Saunders, 2006). As in Mozambique and South Africa, many of the people were again Shangaan, further dividing a cultural group split into thirds. In the late 1990s, in an effort to strengthen his political power in rural areas, Zimbabwe's President Robert Mugabe began to encourage land reclamation for 'war veterans' (Godwin, 2006). This started a 'moving back' process, leading to fence removal and the invasion of the national park. Residents from neighboring areas reclaimed and occupied land and began using fires for clearing land as done historically (Ferreira, 2004). With the fence down and re-occupation under way, more and more cattle could be found grazing throughout the park. Concerns reemerged that poaching would increase and that veterinary disease would resurface. As the transfrontier conservation movement gained in strength through the Great Limpopo, Zimbabwe's government reversed itself and stepped up efforts to keep people out of the park, minimize grazing, and reduce poaching. For outsiders, it is often not clear what the state of affairs in Gonarezhou at any point in time. Without common knowledge about basic questions in a transfrontier partner, it is difficult to plan on an international level. At various points over the past few years, many officials in both Mozambique and South Africa had little idea of the extent of poaching, the status of people within the national park, and the stage of de-mining efforts along the borders, or many other operational level issues. As the various approaches and national policies indicate, the status and livelihoods of local people within and around the national park are not purely domestic issues when they affect the plans for transfrontier conservation.

3.5.3.2 Border Security

While the approach with local communities in the transfrontier parks seems to follow a "don't ask, don't tell" policy, border security disagreements generate plenty of discussion. Ultimately, however, both park-community relations and border security result in a common outcome – little cooperation in dilemmas inherent in transboundary conservation. In the case of border security, the role of governmental security departments is obviously to maintain and uphold the borders of a nation and protect the nation and its people from outside threats. Several governmental departments engage in border security including immigrations and customs, defense, health and safety, veterinary disease, and crime prevention. In their jobs, these governmental groups attempt to prevent illegal migration and trade, minimize the spread of infectious disease and alien invasive species, stop cross-border crime and smuggling, and many other functions. Because of the responsibilities of many of these groups, they often support a hard border, finding this to be the most effective means of reinforcing sovereignty (Peddle et al., 2004). For this reason, many security departments historically have been against the creation of transboundary conservation. Border security always takes priority over conservation when in conflict. A recent case in point occurred in Waterton-Glacier International Peace Park. A trail network had always provided a remote border crossing point. In the aftermath of September 11, 2001, this remote crossing became a manned immigration point, requiring passports and visas to cross (Tanner et al., 2007).

In recent studies in southern Africa, however, it appears that there has been somewhat of a softening of the hard line stance of the security forces, allowing for the creation and advancement of transfrontier parks. This softening, however, is artificial. The reality is that security organizations have found transfrontier conservation to serve many of their best interests. First, transfrontier conservation often bolsters the role of the state in an often neglected hinterland, remote from the capital (Wolmer, 2003; Duffy, 2001). Others have found that the size of TFCAs can serve as a more effective barrier than a fence. As a result, studies in the Lubombo TFCA between Mozambique, South Africa, and Swaziland have shown that the TFCA has led to a reduction in cross-border trade networks (Jones, 2005). Using TFCAs as a barrier, border security officials view transfrontier conservation as a means to limit smuggling and illegal migration. In general, security officials have worked against the goals of transfrontier conservation of opening borders for animals, officials, tourists, and communities, instead advocating for TFCAs only when they serve to advance border security as a physical barrier.

The lack of harmony between security forces and conservationists is apparent in the Great Limpopo in three ways. For animals, an open border means removing fences. Progress has

occurred, and rangers have removed, as of November 2007, over 70 km of fence between Kruger and Limpopo National Parks. To do this, security officials, state veterinarians and rangers have had to work closely together. This should unquestionably be viewed as a success. However, the road to this point has been long and rough, and the journey is far from complete. Several hundred kilometers of fence still remain standing. The fencing has been removed in sections with the hope that strategic removal will allow for the free flow of animals while still discouraging illegal border crossings (Braack et al., 2006). It is not clear whether this approach will be effective for either purpose. The second problematic area has to do with the border crossing of people. Ideally, a transfrontier conservation area has peripheral border posts – shifting border security to the protected areas outer limits. This enables an unlimited viewing of the landscape and minimizes infrastructure within the park. Border crossings are undertaken only upon leaving the park, and no passports or visas are needed anywhere within. Rather than an unfenced, borderless region, the TFCA simply redraws the borders in more convenient places. The original plans for the Great Limpopo called for this system. However, security officials soon forced a redrawing of those plans, and two border posts, Giriyondo and Pafuri, were placed within the park at the border between South Africa and Mozambique. These border posts were viewed as necessary to minimize the flow of illegal arms and drugs into South Africa and of stolen goods out (Braack et al., 2006). More important than limiting the flow of tourists across the border, the use of internal border posts also impacts rangers and other park officials from both sides, requiring official border crossings. This step affects work in anti-poaching efforts, the suppression of fires when needed, and joint research initiatives. The third border security challenge in the Great Limpopo comes from the lack of a border crossing with Zimbabwe. Currently the border between Zimbabwe and the others is heavily fenced and completely cut off from the rest of the TFCA. Until recently, sections were still mined. Talks about building a bridge and border crossing near or within the park have been going since 2004, but little progress has happened. In effect, the TFCA has split along a path of progress between Mozambique and South Africa and a stagnant dead end with Zimbabwe.

By contrast, the Kgalagadi has always had an open border, and with low population densities, no veterinary disease, and a remote location, border security plays less of a role. The border has never been fenced, and park rangers have historically worked across borders. For many years, the KTP has been held up as an exemplar of transboundary conservation. Animal movement has no limits within the TFCA. Tourists also move back and forth across the border without limits. Only upon exiting the park in a country different from one's starting point is a passport required. However, recent policies have started to move border security to a more

prominent position. First, a joint border post is in planning, a move seen to eliminate the separately housed national immigration units – a progression toward a more unified front. However, to negotiate this joint endeavor several national arguments needed to be surmounted. As a result, the facility will require a construction team comprised of half Botswana and half South African workers, with a high percentage of local employees from both countries in order to satisfy national legislation in both countries. This can be viewed as highly cooperative behavior or alternatively as the enforcement of nationalistic policies. The fact that the joint project appears likely seems to auger well for future cooperation. The project, unfortunately, involved compromising on location and the selection of a site directly on the international border. Normally this mutually acceptable approval would not be problematic, but in this case the border is a river bed. As a result, the new border post will require a more complex design and a challenging foundation built on sand while still being able to withstand the flood forces of the river during its periodic flow (Botswana park official, 4/3/2007). A more pragmatic approach, but one necessitating more negotiation and compromise, might have built the border post on a rock foundation a few meters within one of the countries. The issue of national sovereignty and border security has recently emerged in two other related areas. TFCA officials recognize the importance of joint research programs and encourage such work. But officials on the ground still require research approval in both countries (SANParks scientist, 3/20/2007). Even then, permission to freely cross the border, apart from on the tourist roads, had not been granted as of late 2007. Many officials claim this to be incorrect, but researchers soon discover otherwise. As well, the TFCA had hoped to conduct aerial surveys of the entire park, but differences between Botswana's and South Africa's civil aviation group would not permit cross-border surveying to take place (SANParks staff, 2/19/2007).

3.5.4 Support For and Against H1 – Large disturbances generate more cooperation

In the first chapter, I introduced several hypotheses for testing. Based on the evidence from the disturbance events discussed above, the first of these – that large disturbances, or disturbances of immediate concern to multiple countries, will generate greater degrees of transboundary cooperation – can now be examined.

3.5.4.1 What do we expect from theory

Looking back at Chapter 2, the literature shows how theory may guide our analysis. Of the theoretical insights discussed in the previous chapter, those that provide the most insight for this first hypothesis are theories of resilience and robustness, realist and neoliberal paradigms from international relations, and the concept of polycentricity. If one thinks of simplistic versions of resilience, using the ball and basin metaphor, one would expect larger disturbances to have a

greater impact on a system and possibly pushing it into another state. If park managers intend to keep a TFCA in its current stability domain, keeping indicator variables for various types of disturbances between identified thresholds of potential concern, an analyst might expect collaborative responses to emerge in the face of larger disturbances. Similarly from theories on robustness, institutional designers can learn and adapt in response to disturbances. Improving design in certain areas results in trade-offs, possibly resulting in increased vulnerability in other areas. As a result, designers generally focus on the most pertinent disturbances at the expense of less important or less damaging perturbations. While counts of the most frequently mentioned disturbances may not indicate the most important or most damaging disturbances, it would be surprising if there were not some degree of correlation between level of impact and level of salience. In other words, robustness alludes to more effort devoted to larger disturbances. International relations literature provides conflicting evidence for when and where to expect cooperation. The realists suggest that cooperation will emerge where it is in the benefit of the stronger party – in both cases here, on the disturbances that South Africa sees as important. Liberal philosophies, however, put forward the idea that institutions will evolve and grow in importance. Cooperation should build over time. Finally, in a multi-scalar system with nested levels of governance, polycentric approaches recommend addressing disturbances at the governance level equivalent to the extent of the effects of the disturbance. In other words, cross-border cooperation should emerge in response to disturbances that affect multiple countries and pass beyond the jurisdiction of any single country.

3.5.4.2 No support on ecological side

Some of the most noticeable and discussed events within the social-ecological system include a wide variety of ecological shocks and pressures. The floods of 2000 in the Great Limpopo, the fire of 1995 in the Kgalagadi, periods of abnormally long droughts in both transfrontier parks, and other "natural" disturbances feature heavily in stories about the parks. Signposts throughout the park indicate high water marks. Rangers tell stories of the big flood and of the devastation after a drought. Current park management philosophy in each of the transfrontier parks, however, views these types of events as normal, although infrequent, occurrences in the system. SANParks' application of adaptive management through thresholds of potential concern limits their responses to cases where these types of disturbances reach a point of irreparable damage to a desired state of nature. Because of their reluctance to interfere in the non-equilibrium dynamics of the system, they limit their interference to areas where the size and isolation of the protected area limit natural processes. Examples would include artificial water sources in arid areas where fences limit animal movement or where animal populations (such as

elephant) cannot adjust due to range limitations. Even in these areas, managers exhibit a reluctance to intervene.

Whether this provides evidence refuting the hypothesis about cooperation emerging in response to large disturbances is debatable. However, it does not provide support in favor of the hypothesis. South Africa's neighbors have followed SANParks' lead in not responding to large, infrequent disturbances, but it is not clear whether this is intentional or due to a lack of capacity. Perhaps future LIDs will require a coordinated response, but this remains to be seen. Two areas to watch vigilantly are the burgeoning elephant populations of the Great Limpopo and the rapid decline of springbok populations in the Kgalagadi.

3.5.4.3 Areas of support – DCA in KTP, Vet Disease in GLTP

Two areas that do exhibit a great deal of cross-border cooperation in response to large disturbances are in the collective response to damage-causing animals in the Kgalagadi and in the control of veterinary disease in the Great Limpopo. Because these are both highly discussed and well documented disturbances, they provide some credence to the hypothesis that larger disturbances result in more cooperation. Other frequently mentioned disturbances discussed in more detail later that also exhibit some level of cooperation include responding to tourism challenges, sharing revenues, and compensating for capacity constraints among partners. While the next section will outline several examples of large disturbances with little or no cross-border cooperation occurring, the few examples that do exist suggest that if the size of the disturbance has low levels of causality with respect to cooperation, they at least do not always negate it from occurring. Whatever variables facilitate cooperation in some cases and minimize it in others, cooperation can take place regarding large disturbances.

3.5.4.4 Areas Undermining Support – relations with local communities, border security

The biggest challenge to the hypothesis is that the single most frequently mentioned disturbance in both transfrontier parks is among the areas with the lowest levels of cooperation – relations between parks and local communities. Additionally, other prominent disturbances, such as border security, result in low levels of cooperation as well. A few of the possible explanations for the low levels of cooperation will be explained in the following chapter, looking at different types of cooperation and how policy and operational cooperation emerge on various issues and levels.

Because of the indeterminate support for the hypothesis, it appears that the size of a disturbance has little explanatory power regarding the anticipated level of cooperation in spite of the expectations of theory. Partners in the transfrontier parks do cooperate on a range of issues

both big, like with veterinary disease management in the Great Limpopo, and small, like the collaboration on common logos and uniforms in the Kgalagadi, so the size of disturbance does not appear to be a necessary condition to cooperative efforts. In some cases, as with the relations with local communities, the relative importance of the disturbance and the wide disparity of approaches taken may even be a hindrance to cooperation.

At this stage of research, several alternative possibilities need to be tested to see where and when cooperation emerges. Alternative explanations for fostering cooperation or not include idiosyncratic differences in context – the biophysical setting of the disturbance, the attributes of the actors involved, and the institutional setting – the contextual variables of the IAD framework. Examples of this may include responses to river health between upstream South Africa and downstream Mozambique. The issues and concerns of river health vary significantly, as will be described in the following chapter. Other potential reasons for cooperative responses could include the scope of effects of the disturbance. This is one part of the argument made by national governments regarding relations with local communities. Theories of polycentric governance suggest responding to disturbances at the appropriate level to encompass the scope of effects without unduly raising transaction costs. With the higher transaction costs of international arrangements, the costs of cooperation may outweigh the benefits in many cases, regardless of whether the disturbance is large or small. Instead the important factors are the size of the benefits of cooperation and the offsetting costs. Similarly, salience of the disturbance may arise in only one country. Without similar concerns on both sides of the border, the issue never appears on the agenda of potential partners, and cooperation may be unlikely. This may partially explain the lower levels of cooperation on border security in the Great Limpopo, an issue of greater importance to South Africa than to its neighbors. In other cases, differing opinions on the type of response may result in an issue being too contentious for a collective solution. For instance, revenue sharing in the Great Limpopo has evoked strong disagreement between the three nations on how to equitably divide tourist proceeds. With other disturbance responses the lack of cooperation may simply be a lack of capacity on the part of the partners. While a lack of capacity appears to have stimulated cooperation in the Kgalagadi on damage-causing animals, it may be a hindrance in other areas. If only one side can afford to move forward, collective responses may necessitate waiting for the partner to build up its capabilities, as in the repeated delays in opening a border crossing between South Africa and Zimbabwe. Finally, two factors limiting cooperation that the next chapter will delve into in detail are the lack of trust and social capital necessary for collaboration and the lack of time to generate ideas and implement collective decisions. With

such a long list of potential factors influencing the amount of cross-border cooperation, reality looks far more complex than the originally proposed hypothesis.

3.6 Research Design Challenges

Donald Campbell notes that every research design has inherent shortcomings and weaknesses (Campbell, 1969), and this study is no exception. While attempts have been taken to eliminate these weak points, some flaws remain in spite of best efforts to minimize them. In the following section, I intend to address potential design critiques. Some threats to the research design are inherent in the selection of detailed cases studies rather than another type of study. In what follows, I will address briefly some of the risks inherent in this study focusing on the challenges of conducting a natural experiment rather than a true experimental design. Because the study consists primarily of two in-depth case studies, the degree of support for some inferences is limited by the number of observations available. As a result, threats to validity surface due to challenges of confounding variables, multicollinearity, and model underspecification. Furthermore, the lack of experimental control results in challenges with endogeneity between the explanatory variables and the dependent variables and the omission of significant variables. Finally, the nature of semi-structured interviews and a snowball sampling approach may raise issues of reliability and replicability. In spite of these challenges to the research design, I contend that the methodology used in this study not only is adequate for exploring the explanatory power of the posited hypotheses, but it is also the best means of understanding the intricacies of specific cases and generating more generalized insights into how well different institutional structures work in coping with different types of problems. No single type of institutional arrangement works best in all situations.

3.6.1 The Study of a Natural Experiment

A natural experiment consists of a study contrasting a natural occurring event with a comparison case. In this study, two cases were intentionally selected on the main explanatory variable (the top-down versus bottom-up creation of a transfrontier conservation area), an event that had occurred in the past (King et al., 1994). From these two cases, I test three hypotheses. The first level of analysis, a comparison of the two cases on two hypotheses (H2 and H3) regarding the levels of cooperation that emerge due to variations in the explanatory variable. These were tested by measuring institutional responses to a wide variety of disturbance-response events and then assessing levels of cross-border cooperation. In this way, the study moves beyond the limitations of two cases/observations and expands the number of observations by looking at hundreds of disturbances and institutional responses. Focusing on a large sample of disturbance-response event observations, the study also explores the relationship described in the

previous sections – how the sizes of disturbances influence levels of cooperation in response (H1).

3.6.2 Threats to Validity

Every research design faces threats to validity. King et al. (1994) define validity as whether we measure what we think we're measuring. A more formal definition from Shadish et al. (2002) is the degree of support for an inference. Methodologists often refer to several different types of validity. The three of most concern in this study include: 1) internal validity, which is the validity of an inference about whether covariation reflects a causal relationship (in other words does A precede B, does A covary with B, and do no other explanations fit); 2) external validity, which is concerned with whether a causal relationship can be generalized to other settings; and 3) construct validity, which is the degree to which inferences are warranted from the observed study to the constructs that these samples signify (Shadish et al., 2002). By constructs, the authors refer to the higher level concepts or models represented. In this study, for instance, is the joint response to a disturbance a good indicator of cooperation? Is agreeing to do nothing an equally good indicator of cooperation? These concerns become very real in the attempt to find tangible means of measuring abstract concepts like cooperation and trust.

The one comment to be made about threats to external validity is that the two cases were purposely selected to allow for maximum variation along the key variables of interest in the hypotheses, while attempting to hold constant as many other explanatory variables as possible. Of course, this effort was not always perfect and some confounding variables did vary. The one of particular concern is the length of time as a transfrontier park, as mentioned several times throughout the study. While the conclusions of the study will draw out some ramifications of the findings, the learning will come from the 'force of example' as much as from formal generalization, as the external validity of case studies are always somewhat limited (Flyvbjerg, 2006). The following three sections will identify a few of the most important specific challenges in this research design. The first concerns threats to internal validity due to indeterminacy and model underspecification. The second section discusses threats of construct validity and the challenge of confounding variables. The third section addresses problems of endogeneity in a study with a limited number of cases.

3.6.2.1 Indeterminacy

Indeterminacy asks the question whether we can infer anything from the research design. Due to the nature of working with only two cases, this research faces two serious risks of indeterminacy. The most important risk is that the model is underspecified. Underspecification occurs when there are more inferences than implications observed. In the overall study, I

hypothesize that two different types of transfrontier park origination lead to two types of cooperation. The study looks at the genesis of transboundary protected areas as the leading explanatory factor in the level of cooperation achieved. Others justifiably argue that several other variables influence this as well, including human population densities surrounding the protected areas, the types of ecosystems, the relationships between countries, the length of time that the transfrontier parks have existed and more. The study has tried to minimize these additional factors by holding them constant across cases or by showing their limited effect on the dependent variables. The reality is that they all have some effect. By focusing on details within the cases across a great number of disturbance-response events, I attempt to demonstrate the explanatory power of key variables in my study – the origination of the TFCAs. Others may be more interested in other variables.

In addition to indeterminacy due to underspecification, the study also faces threats to internal validity due to multicollinearity. In the additional explanatory variables mentioned above, the length of time that the transfrontier parks have existed in the case studies perfectly correlates with the type of park origination in the two case studies. Additionally both time of existence and the bottom-up genesis of the park can be theoretically linked to the build-up of trust and social capital, which in turn lead to greater degrees of cooperation, the dependent variable. This represents a serious threat to internal validity because multiple explanations fit. This research attempts to minimize these threats by detailed explanation of the context, comparison with theoretical expectations, and acknowledgement that further research is required to explore the more complex interactions of the multiple explanatory variables.

3.6.2.2 The Challenge of Confounding Variables

Closely related to the challenges of indeterminacy, the study also confronts problems with confounding variables – extraneous variables which covary with dependent variable. This concern parallels the problems of multicollinearity, but instead of concern with the validity of whether the covariance reflects causation the concern is about how well the explanatory variables in the model represent the concepts – a threat to construct validity. As indicated above, the threat emerges from attempts to operationalize cooperation. The study uses levels of activity in response to disturbances as a gauge of cooperation. The study assesses how countries coordinate responses to disturbance in two protected areas that vary on origin and on the amount of time that the partners have worked together. Both greatly influence cooperation levels, and it is not immediately clear how to separate these effects. At this point in the research, the conflation of these variables is unavoidable, but the effects run in the same direction. While the details will be explored more fully in the following chapter, two comments will demonstrate what I mean. At

the operational level, grassroots origination and the time to build up social capital both lead to higher levels of ground-level cooperation compared to top-down initiated actions with less time to engender trust. Conversely, for policy-level cooperation, top-down initiatives require less time but more political will. In other words, the challenge of confounding variables is real, and separating their effects on the dependent variable is impossible at this stage. Ultimately, however, it does not substantially reshape the findings of this study.

3.6.2.3 Endogeneity

Because this research relies on case studies rather than an experimental design, it is impossible to manipulate the explanatory variables. As a result, it is difficult to ascertain whether values of the explanatory variables are a consequence rather than a cause of dependent variable. In the case of the transfrontier parks, the origination of the parks could have been due to levels of cooperation already in place at the time. While the circumstances surrounding the parks indicate that this most likely is not the situation, it is impossible to rule out this effect. Additionally, by looking at operational cooperation and policy cooperation, the two TFCAs exhibit different levels of cooperation which seems to reflect some of the differences in the posited explanatory variables.

3.6.3 Threats to Reliability

Reliability means that by following the same procedure will produce the same results each time (King et al., 1994). Related to reliability, replicability means that the study should be repeatable by other researchers. The difficulties of case studies along both of these fronts come from conducting semi-structured interviews. None of the interviews could be completely replicated. However, by structuring all interviews around an interview guide, threats to reliability were minimized. Additionally, generalizations from the case studies are all based upon the theoretical foundations detailed in Chapter Two. In what follows, I will go into some of the inherent challenges of reliability and replicability in data collection.

3.6.3.1 The Challenge of Data Collection

By relying primarily on semi-structured interviews as a data collection device, several challenges arise in the gathering of data. As mentioned above, exact replication of interviews is impossible. Even though interviews were guided by a list of pertinent questions, the give and take dialogue resulted in much more of a discussion format with a wide range of topics. In addition to the loose structure of the interviews, the quality of the discussions depended on multiple variables – the interactions of the two parties, asking the right questions at the right times to elicit the most information, building good rapport with the interviewee, and maintaining focus and clarity throughout the interview, both in terms of asking good questions and in

recording the answers. As with all discourse, it required an assumption that both the interviewer and interviewee comprehended the underlying meaning of the questions and answers. Because the meetings were not recorded, the data collection remains contingent of the quality of the notes taken during the meeting, the transcription of the notes later in the day, my memory for what these notes meant, and coding of the data at a later point. The data gathered rarely included a simple count or quantification for an answer. Instead, interview responses were complex, multi-dimensional, and detailed, reflecting the situations being described.

3.7 Conclusion

This chapter began with a typology of disturbances and introduced a means for understanding different types of system perturbations. With this in place, the chapter discussed the methodology and research design for the study – how the cases were selected, how interviews were conducted, and how disturbances and cooperation were coded. It then examined several disturbances confronting the two case studies in more detail to address the first hypothesis – whether larger disturbances generate more cross-border cooperation. By looking at disturbance-response events, the study began to ascertain when and where responses were coordinated or collaborative and how the two case studies differed across a wide range of disturbance types. At this stage, the size of disturbance appears to have very little explanatory power with respect to the degree of cross-border cooperation in a transfrontier protected area project.

The following chapter will continue this approach to explore two additional hypotheses. By looking at responses to a wide range of disturbances in two transfrontier parks, the study will first examine whether the bottom-up genesis of a park leads to higher degrees of operational cooperation. It will next use several disturbance-response dyads to assess whether top-down origins result in higher degrees of policy-level cooperation.

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4. Chapter Four: Governance in Transboundary Conservation: The Influences of Scale, Path Dependency and Institutional Evolution

"The great, gray-green, greasy Limpopo River, all set about with fever-trees."
- *Kipling, (1912)*

"Human beings are perhaps never more frightening than when they are convinced beyond doubt that they are right."
- *van der Post, (1958)*

This chapter builds on the discussions of disturbances in the previous one by focusing more detailed attention on the two case studies – the Kgalagadi Transfrontier Park in Botswana and South Africa and the Great Limpopo Transfrontier Park in Mozambique, South Africa, and Zimbabwe. The last chapter directed our attention to where, when and how disturbances within these two cases generate transboundary cooperation. In doing so, we tested the first hypothesis presented in the thesis, whether or not large disturbances generate more transboundary cooperation than others. This chapter, by contrast, takes us in two directions, first to look at the innate simplicity of the Kgalagadi system and then the ingrained complexity of the Great Limpopo. By delving into the details of the two cases, the structure of this chapter works toward testing the second and third hypotheses presented earlier – whether bottom-up park originations result in higher degrees of operational cooperation and whether top-down originations lead to higher degrees of policy cooperation.

The central tenet of the first part of the chapter is that the bottom-up institutional development and the slow, unforced evolution of governance in the Kgalagadi Transfrontier Park over the past 70 years have allowed local-level institutions to learn how to adapt and respond to transformations in the social-ecological system, resulting in more success in transfrontier goal attainment. By contrast, institutional development in the Great Limpopo has stagnated due, in part, to the top-down imposition of the park on local level communities and park officials and the short time horizons permitted for goal attainment. The second part of the chapter flips this perspective on its head and looks at the successes of top-down park formation in bridging international boundaries through policy-level cooperation. The central premise of this section is that the broad-level political commitment to the Great Limpopo results in greater degrees of cooperation at a policy level. Such high levels of policy cooperation without parallel operational cooperation have led to unexpected transformations, adaptations, and stagnation in the ongoing development of the Great Limpopo.

Revisiting the theoretical foundations of Chapter Two, the chapter explained that complex adaptive systems have more than one stable state or regime (Scheffer et al., 2001) and

that such a system may be vulnerable to disturbances which can shift the system from one regime to another. This concept serves to focus attention here on differences in the key variables in the system. In turn, analysts can then make comparisons between the two systems which, in certain ways, differ quite distinctly. The previous chapter noted that one way of applying theories of resilience to transboundary conservation viewed the creation of social capital, the building of trust, as the slow variable necessary for operational cooperation. By contrast, it identified one of the fast variables as the political decision-making process within governments. This is a bit misleading, however. Political decision-making about transboundary conservation, like political decisions elsewhere, occurs in fits and starts. Rapid change comes in the abrupt jumps associated with punctuated equilibrium (True et al., 1999) and through "windows of opportunity" (Kingdon, 2002). What I mean by this fast variable is that once the "solution" of transboundary conservation hits the political conscience as a remedy to various natural resource management dilemmas, policy-makers can react quickly. In turn, they have come to expect rapid results from the natural resource managers. This two-part predicament has led to many of the unexpected transformations and adaptations that will emerge shortly.

With a more in-depth look at transboundary natural resource management (TBNRM), the next step in the study examines transboundary conservation in terms of the objectives of engaging in cross-border endeavors. Ultimately, transboundary conservation is motivated by two principle purposes – the free movement of wildlife and the free movement of people across an international border. In this manner, the Kgalagadi Transfrontier Park and the Great Limpopo Transfrontier Park can be viewed as two social-ecological systems that presently exist in two distinctly different states (of the slow and fast variables mentioned above). Like a system of any complexity, this does not imply that outcomes are contingent only on these variables. Instead, these variables help to guide the system along trajectories that increase the likelihood of certain outcomes. As a result, their performance in the two principle goals of transboundary conservation diverges. In the Kgalagadi, the transfrontier group has a great deal of ingrained trust and a stock of social capital. When combined with contextual factors, the institutional structure allows for the unrestricted movement of both people, including tourists and park officials, and wildlife between South Africa and Botswana. From the viewpoint of transboundary conservation, the system functions quite well operationally. Governance in the Great Limpopo, by contrast, continues to struggle with "on-the-ground" progress toward these goals. The political will exists, but the stockpiles of social capital have not yet accrued. Lack of close relationships at an operational level stymies on-the-ground progress. While park management has taken concrete steps towards these goals, progress has been slow and inconsistent. In the words of one of the

GLTP architects, "progress in the transfrontier park has completely stagnated in the last few years. We made such good advances in the early stages, but nothing happens anymore. We have lost our head of steam." (GLTP JMB member, 9/12/2007). Yet, in contrast to the ground-level challenges, when looking at ministerial government decisions on the GLTP, progress appears smooth and uninterrupted.

In what follows, the thesis will examine some of the major disturbances in each transfrontier park and levels of cooperation associated in the managerial responses. In doing so, the research project will begin to explore the second and third hypotheses presented earlier – that the grass-roots development of transfrontier conservation enables higher degrees of operational cooperation than top-down origins (H2) and that higher degrees of policy level cooperation by higher level government officials will be found in top-down TFCA creation than bottom-up genesis (H3). Through this testing, answers emerge as to why the two case studies have evolved so differently from each other and why their performance on transboundary goals differs.

4.1. Social Capital and the Building of Operational Cooperation

One of the fundamental differences between the Kgalagadi and the Great Limpopo is their different points of origin and the development trajectory that these starting points have launched. As a result, transfrontier institutions and cooperation between TFCA partners has evolved in different manners. I argue that the gradual emergence of the Kgalagadi from the grass-roots, with park rangers working across borders from the very beginning, has led to today's situation where operational cooperation remains high. This is not to deny that context matters, but rather that the early stages of development create a contingent historical event, the creation of a transfrontier park, that shapes its future path in a particular direction (Mahoney, 2000). In this case, working together at an operational level, becoming honorary rangers in the neighboring country, and having the freedom to shape the international cooperation in logical manners as dictated by situations on the ground and at a local level led to fostering trust between partners. In turn, social capital accumulated which continues to facilitate cross-border further collaboration. The following sections will highlight four of the most frequently identified disturbances common to the Kgalagadi and the Great Limpopo – animal control, border security, community relations, and tourism management – and will compare levels of operational cooperation. Each of these disturbances has a substantial operational-level component and cross-border component.

4.1.1. Animal Control in the KTP and the GLTP

One area where the differences in cross-border collaboration at the operational level clearly show is in animal control. Human-wildlife conflict is the second most frequently mentioned disturbance in both the KTP and the GLTP, and, as mentioned earlier, institutional

responses to damage-causing animals in the Kgalagadi evince high levels of cooperation between park representatives from Botswana and South Africa. This contrasts with the approaches taken in the Great Limpopo, with each country handling the disturbance individually and in their own way. Also of concern in the Kruger National Park, park management faces a massive challenge in the control of elephant populations, another top ten most frequently mentioned disturbance in the GLTP. In this endeavor, South Africa must largely deal with this problem alone, with very little help from their neighbors. Of course, very diverse environmental dilemmas do not facilitate direct comparisons between the two. Rather, they both provide circumstantial evidence in support of the hypothesis that operational cooperation is more likely to emerge where strong trust exists and social capital has accrued.

4.1.1.1. Diverse Responses to Damage-causing Animals in the KTP and GLTP

In both the Kgalagadi and the Great Limpopo, damage-causing animals (DCA) concern the populations living in and around the transfrontier park. As discussed in the previous chapter, South Africa provides the expertise and experience for dealing with DCA in the Kgalagadi. Due to capacity constraints, South Africa always helps in the recovery of problem animals, whether the breakouts and attacks happen in South Africa or Botswana. Similarly, capacity constrains responses to human-wildlife conflict in the Great Limpopo. Again only South Africa has the ability to respond quickly and effectively to these breakouts. However, unlike in the Kgalagadi, no cooperation takes place in the GLTP. As the previous chapter discussed the cooperation between South Africa and Botswana in detail, the following will highlight the methods in the Great Limpopo and contrast the differences, primarily focusing on the responses in Mozambique and South Africa.

Similar to the situation in Botswana, the rangers in Mozambique do not have the training or the capacity (in staff numbers and equipment) to respond quickly and independently to human-wildlife conflict. Unlike in the Kgalagadi, however, Mozambican park officials must deal with the problems alone. Because Limpopo National Park in Mozambique still has several thousand villagers living within the park boundaries, human-wildlife conflict presents a constant threat to local populations and a constant challenge for park employees to respond. With the translocation of animals between South Africa and Mozambique, beginning in 2001, and the tearing down of fences, beginning in 2002, interaction between humans, livestock, and wildlife have increased annually (DNAC staff, 11/21/2006). The park has recently tasked rangers to investigate conflict sites, but the quality of data is not always consistent. The data do not have any historical benchmarks either. In the future, in confirmed cases, compensation may be awarded to the family, particularly in the event of crop destruction or loss of livestock. However compensation

will only be awarded for certain animals under very specific conditions. For instance, damage caused by animals that are found both inside and outside the park will not be reimbursed. This includes baboon and monkey damage to crops, leopard and crocodile attacks, and the attacks of most small predators and scavengers. It is not clear if or when such a compensation plan will begin. Beyond tracking data, officials have no control policy for large attacks by lions, destruction by hippos or elephants, or the spread of veterinary disease through buffalo or ungulates. Because many people still live throughout the park, relocation of problem animals is not an option. Local residents also do not see fencing as an option due to the need to access medicinal and edible plants, collect firewood, graze livestock, and grow crops. Along the Limpopo River, the eastern border of the park, no fence exists for the control of veterinary disease or the restriction of animal movement. This zone contains the highest concentration of people, both within and neighboring the park boundaries, with approximately 20,000 people residing along the river (RRP, 2002). Regardless of the problem, the approach, or the solution, South Africa plays no role in Mozambique's response to damage causing animals.

In South Africa, the greatest risk of damage-causing animals occurs along the western border of the park. Studies highlighting the challenges of human-wildlife conflict focus on three features of the current policy – fence maintenance and ownership, post-encounter response, and compensation. Fence maintenance continues to stir up conflict between communities and the park and between governmental agencies. The fence was established as a veterinary disease barrier by the Department of Agriculture, not to prevent human-wildlife interaction. This fact creates a legacy of fence maintenance by veterinary disease control within the Department of Agriculture (Kruger Park staff, 11/29/2006). At this point in time, the veterinarians no longer want the sole responsibility for the fence, as it was built to slow the transmission of disease, not to stop marauding animals. Yet they are reluctant to part with the large budgetary grant from the central government (State veterinarian, 11/29/2006). Likewise, the park service would be happy to take on the fence maintenance program budget, but they are hesitant to take on the liability attached to damage-causing animals.

The situation is further complicated by the fact that animals have *res nullius* status in South Africa, where wild animals have no legal owner. This results in state custodianship of the animals when on communal or private land. Neighboring residents view animals, whether inside or outside of Kruger as the property of the park, but animals outside the park are property of the state and officially outside the jurisdiction of park staff. Although park staff generally assists outside the park, because the wildlife are property of the "state", it is no longer clear who initiates and coordinates the response to the situation. For animals that do escape and result in conflict,

current policy is to have the animal killed or driven back into the national park by Kruger staff or provincial environmental officials. In some cases, however, safari outfitters are allowed to tender and hunt escaped animals (Anthony, 2006). This situation raises several problems. First, no one clearly takes the lead in response. Second, responses vary depending on who responds. Park officials prefer to drive the animal back into the park. Provincial officials often prefer to kill the animal immediately. Hunters often only want to fill their hunting quota with trophy quality animals, not immature, sick, or injured animals. As a result, every situation differs. The various outcomes also affect the compensation awarded to communities. Professional hunters and animals killed by park staff provide the meat to communities. Animals that return to the park on their own or under pursuit result in no benefits to communities. Beyond meat, no direct compensation plans exist for community members affected by animal attacks. The result of these policies is animosity between the park and its neighbors.

In both South Africa and Mozambique, residents in and around the national parks suffer loss of life and livelihood due to wildlife. Both governments respond in their own ways. Of particular importance to the current study is that neither Mozambique nor South Africa provides any assistance to the other in response to these attacks. Furthermore, it is not clear what present policies exist in Zimbabwe, although there is no cross-border collaboration of any kind regarding damage-causing animals between Zimbabwe and either of its neighbors. Park borders and fences are maintained by each country individually. Response to damage-causing animals takes place independently and compensation policies vary by government. In contrast to the Kgalagadi, park staffs in the Great Limpopo have very little cooperation or mutual response policy to one of the most frequently discussed disturbances in the transfrontier park.

4.1.1.2. Elephant Population in the GLTP

Another animal control challenge concerns Kruger's elephants, and the burgeoning elephant population in Kruger Park is a hugely contentious issue. Many park scientists believe that the carrying capacity of elephants in the park is around 8,000. As a result, the park began to cull elephants in 1967 in an effort to maintain population densities around 0.37 elephants/km^2 (Whyte et al., 2003). The policy of culling continued until 1994, when political pressure from animal advocacy groups became heavier and the contradictory views of other scientists began to push back against the scientific rationale for culling. Since the end of culling, elephant populations have increased from 8,000 in 1994 to 10,459 in 2002 to 12,500 in 2006, as shown in Figure 4.1 (Whyte et al., 2003; Koenig, 2007; SANParks, 2008). In an enclosed area with no natural predation, the population of elephants can double roughly every 10-15 years (Whyte et al., 2003). Population growth will continue until the density can no longer be supported by local

vegetation and water resources. In the meantime, however, the landscape will be radically changed as the elephants, as important ecosystem engineers, graze and browse. An adult elephant can devour up to 5% of its body weight in vegetation and consume over 100 liters of water daily (Estes, 1992). In their aftermath, woodlands change to grasslands as the elephants destroy and devour vegetation (Cumming et al., 1997). As a result, ecosystem heterogeneity is reduced, and the conservationists' goal of managing for biodiversity is thwarted. In Kruger National Park, these challenges are amplified by the combination of limiting area through border fences and artificially supplying water.

Other scientists believe that elephant populations may exhibit cyclicality on a several hundred year phase (SANParks scientist, 10/17/2007). Therefore, the argument to use culling to prevent further population growth is two-fold. First, the population pressure of elephants reduces biodiversity and threatens other species as it goes against historical trends. Second, self-correction may occur on longer time horizons than park managers can allow, particularly with current levels of scientific uncertainty. As a former park manager stated, "If elephant populations are on a 100 or 200 year population cycle, management can't wait to see how this turns out when trying to manage an enclosed area." (SANParks staff, 10/19/2007).

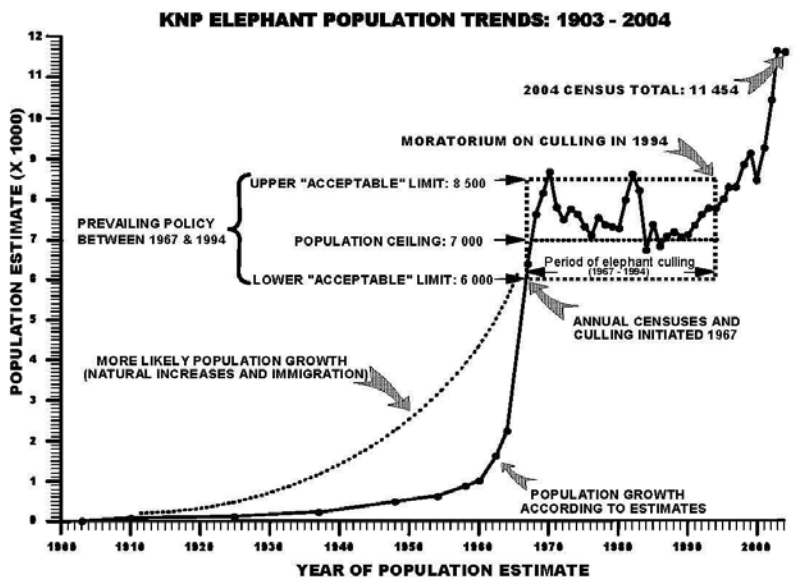

Figure 4.1: Elephant Population in Kruger National Park (From SANParks, 2008)

Other scientists disagree with the assessment of overpopulation and the need to take preventative measures. In the words of one external scientist, "We need to push back against this 'Too many elephants' theory. We don't need to consider culling until it is a last resort." (TFCA ecologist, 1/11/2007). Some view the artificial supply of water, especially in the more arid northern regions of the park, as a catalyst for the current population pressures (Koenig, 2007). Other critics contend that park staff overplays the population pressure argument. Historic studies in other semi-arid savannas point to population densities of up to 1.19 elephants/km^2, a density over three times higher than the park's guidelines (Ambruster and Lande, 1993). Political ecologists contend that the "correct" level of elephant populations and the desired state of the savanna are social constructions that have little to do with objective scientific knowledge (Blaikie, 1999). Still others view the solution as expanding into transfrontier parks, dissipating present day population pressures due to enclosure (van Aarde and Jackson, 2007). It is not clear whether this will provide more than a temporary solution, but many believe that this is one of the rationale behind the rapid push to operationalize the Great Limpopo (DeMotts, 2005).

On top of this argument, park management has a dilemma in that there are no perfect solutions. Over the past two years, an Elephant *Indaba*, a Zulu word for meeting of the elders, has been underway, where park officials and elephant experts discuss the available options for population control. The current options are to revert to culling, translocate (move to another site) elephants, take contraceptive measures, or do nothing. A recent pronouncement of Martinus van Schalkwyk, South Africa's Minister of the Environment, on 25 February 2008, proclaimed that culling would become a legal option again as of 1 May 2008, but that it is a last resort only. The problem is that if the population is truly too great, none of the other options has proven effective. Contraception costs too much and has been relatively ineffective in protected areas the size of Kruger. Translocation provides a temporary solution at best, requires a willing destination, costs a great deal of money, and creates risks to both human and elephant lives. The current option of doing nothing is the source of much of the present debate. Since the pronouncement, many international environmental advocacy groups have responded with vitriolic announcements against the new policy.

While South Africa struggles mightily with this dilemma, their neighbors have been reluctant to help. In the goal of translocation, Mozambique has happily taken some elephants. As shown in Table 3.5, 111 elephants were moved to the Limpopo National Park between 2001 and 2003. The problems with continuing this effort in the future are threefold. First, this massive movement of wildlife did little to budge population pressures in Kruger. Second, virtually all of

these animals were recorded to have returned to South Africa within the following weeks, no difficult feat for animals with daily herd ranges of up to 20 km, and possible daily movements of up to 50 km. Third, with unprotected communities still living within the park, the LNP staff already battle with local leaders over human-wildlife conflict. The addition of maize-craving elephants will only exacerbate the situation. In all other aspects, Mozambique has avoided this discussion with South Africa. Zimbabwe has engaged even less, with one TFCA representative proclaiming that "we want their tourists, not their animals" (Zimbabwe DWLNP staff, 6/19/2007). Furthermore, it is not clear that either country would be able to offer much help due to their far lower levels of capacity at both a ranger level and a scientific level.

In short, there is little evidence in elephant population control that the GLTP has any substantial amount of cooperation at an operational level. This may be due to the nature of the problem, current capacity shortfalls, the fact that the transfrontier park has not yet figure out how to effectively work collaboratively across borders, due to the political imposition of a transfrontier park on operational staff, or other reasons. Once again, evidence supports the idea that operational cooperation does not often occur in the GLTP.

4.1.2. Border Security in the KTP and the GLTP

Because of the nature of transboundary conservation, a great many of the success factors for cooperation or achieving the goals of a TFCA lie beyond the control of conservation officials. This is most evident in border security. The different historical context and geographic location of the GLTP and the KTP shape the security situation of the transfrontier parks. The Kgalagadi lies in a sparsely populated, desolate area, far from population centers. As a result, it has never had to contend with the problems of illegal migration or cross-border crime that the GLTP has. The GLTP circumstance was further exacerbated by the history of rebel warfare in the area, the recruitment of mine workers by South African firms, and the military occupation of the border. As a result, I do not want to read too much into different levels of cooperation over border security between the two transfrontier parks. However, a few differences are worth mentioning, as they appear to be within the control of park officials. Once again indications point to a closer cross-border relationship in the Kgalagadi than in the Great Limpopo, a relationship that I contend is due, in part, to close collaboration from the very beginning and the building of trust and social capital over time.

One of the first things one notices when entering the KTP is the close partnership between the border security officials and the park staff. The staff all sit in the same room, and entrance to the park is a simple one step process. Although there is no need for passport control if staying within the park, the border security and park officials work together to clarify the rules

and regulations. In the event of a scheduled border crossing, the process goes quickly and smoothly. By contrast, crossing the border at the Giriyondo or Pafuri border posts within the GLTP requires a stop at the park office, the South African immigration office and the Mozambican immigration office. My most recent crossing in 2007 also required a full search of the car and an interview with the security guard. Park fees must be paid upon entrance to the new park as well as the applicable immigration fees. The park officials were housed separately from the border officials. In comparing the two procedures, the Kgalagadi process took a few minutes although other visitors were also there. The GLTP process took nearly an hour with no other traffic present. Perhaps this was an isolated incident, but the cooperation between governmental departments within and across the border seemed strained at best. While this does not concretely substantiate my hypothesis, it adds further circumstantial evidence regarding the differences seen at every level within the two parks.

Another area where communication between security and conservation and between South Africa and Mozambique remains weak is the ongoing illegal migration through the park. Mozambicans and Zimbabweans comprise a large share of the 2.1 to 4.1 million illegal residents estimated to reside in South Africa, and some of these migrants transverse the GLTP to avoid border security (Solomon, 2003). Few figures exist for the numbers of illegal migrants through the park, but the numbers have been estimated up to several thousand per year (South African researcher, 8/29/2006). But constant danger accompanies any crossing of the park on foot, a journey lasting up to three days (DeMotts, 2003). The South African park staff worries about predators that have acquired the taste for human flesh, that migrants may startle elephants, and other dangers of the bush (Marshall, 2007). These perils threaten migrants walking through the park at night to avoid capture. Evidence of shoe and clothing remains collected by the author on a bush walk with rangers seem to confirm this macabre story. Park rangers commonly acknowledge this problem and note that certain areas are most often frequented by illegal crossings (SANParks staff, 10/5/2006; SANParks staff, 10/30/2006). From any humane perspective, the state of affairs is tragic. However, the reality of an income disparity where the average South African earns 36 times more than a Mozambican makes migration inevitable (Solomon, 2005). On a practical park level, these crossings result in bush fires, broken fence, and poaching within the park. For these reasons alone, one would expect a high degree of cooperation between park officials and border staff within and across the border. Unfortunately, very few signs of cooperation regarding on-the-ground border security can be found.

The previous chapter highlighted many facets of border security in transfrontier parks and the major differences in response between the two cases – the large open border of the KTP and

collaboration toward improving transfrontier conservation and the taxing, trying borders in the GLTP and the impacts this has on transfrontier conservation. Here, I have focused on operational cooperation between the two parks. Again, the legal immigration procedure seems to have closer collaboration between all parties in the KTP than the GLTP. This is not due to the tighter security in the GLTP, which is understandable, but to the lack of communication exhibited around the park's local staff. The irresolvable problem of illegal migration in the GLTP, a situation not faced in the KTP, likewise is not evidence for poor operational-level cooperation, but the response to the challenge provides evidence suggesting weak cross-border relationships between park officials and immigration agents. These tend to provide support for the hypothesis that the accumulation of social capital and trust in the KTP have led to more operational cooperation than in the GLTP.

4.1.3. Local Community Relations in TFCAs

The most frequently mentioned disturbance in both transfrontier parks involved relations between the parks and surrounding residents. More specifically, the three biggest concerns regarding park-community relationships were the relocation of people, the settling of land claims, and co-management arrangements in contractual parks. In attempting to understand the evolution of the transfrontier parks and the different levels of operational level cross-border cooperation, it appears that relations between a park and its neighbors rarely make a direct impact on park decision-making. By all official accounts, relations between the park and local communities are purely domestic issues and are therefore beyond the purview of any joint planning in transfrontier parks. In the words of a senior official in South Africa's Department of Environmental Affairs and Tourism, "our relations with our citizens have no bearing on our neighbors. What we do or don't do with our citizens is our decision, not theirs" (DEAT official, 9/27/2006). Similar responses were given in each country and at every political level from section rangers to the Ministry of the Environment (DeMotts, 2003). Unfortunately, looking at the situation objectively, park-community relations have both positive and negative externalities that affect all partnering parks and their neighbors on any side of the border – the co-management relationships in a contractual park, the settling of land claims, changes in resource use policy, and so on. Fortunately, in some areas staff members at the park level are beginning to move past the official policy.

4.1.3.1. Land Tenure Arrangements – Co-management, Land Claims and Resettlement

The previous chapter divided the issues of parks and people into two main aspects – a land tenure issue and an outreach issue. Regarding the first of these aspects, few signs of

cooperation emerge in either transfrontier park regarding land tenure arrangements. Following the script of the national governments, neither transfrontier park discusses contractual park relations that are common to both cases on the South African side, the settling of land claims (again in South Africa in both TFCAs), or resettlement plans (in Mozambique and Zimbabwe in the GLTP). Building on the discussions in the previous chapter, these disturbances which managers must work through ultimately affect their neighbors and the working relationships in transfrontier conservation. Contractual parks create challenging multi-level co-management arrangements where decision-making at one level affects choices at another level, similar to the situation described in Chapter Two in Putnam's "Two-level Game" (1988). It is not always clear what the legal ramifications of such partnership arrangements will be in cases of conflicting decisions. The settling of future land claims further magnifies the challenges of co-management partnerships and potentially creates a messy state of affairs for SANParks with up to a dozen different co-management partners. When compounded with the unique criteria for administration under adaptive management (with ever-changing experimentation) and with coordinating decision-making at multiple levels, management post-settlement of claims may prove to be one of the biggest future challenges facing the parks. Resettlement plans affect donor plans, as many are reluctant to take part in such programs.

The fundamental challenge is that land tenure arrangements with local communities form the crux of the most frequently discussed disturbances facing transfrontier conservation, but they also receive the least joint planning, collaborative effort, or supportive policies. The difficulties in the Kgalagadi are mitigated to some extent by the low population densities surrounding the park. The neighboring communities in South Africa have settled a land claim in the park and now participate in the collective management of the contractual park. The neighboring stock farmers in Botswana and South Africa have ongoing problems with damage-causing animals, but they work with the park staff to mitigate the issue. In the Great Limpopo, however, the problems are complex, intertwined, and far from resolution. Relationships with local communities are moving in the opposite direction of partnership and away from engagement between parks and local residents, epitomized by the dissolution of Kruger National Park's Local Community Working Group (Dressler and Büscher, 2008). In general, park-community relationships regarding the transfrontier park have weakened over time (Munthali and Soto, 2001). Repeatedly, the national governments and the joint management board of the GLTP have emphasized that local communities will not have representation on the transfrontier management board, a position further reinforced due to the leaders of past community forums calling for a "manifesto" regarding land usage rights in the park.

As mentioned before, over half of Kruger National Park is now under land claim review through the South African Land Restitution Act of 1994. The settlement of these claims and the co-management arrangements that result are both drawing on the already limited capacity of park staff. As in the Kgalagadi, though, the co-management relationship in the Makuleke contractual park has run very smoothly, auguring well for future land claim settlements. Meanwhile, relations in Mozambique and Zimbabwe become more problematic by the day. Past surveys have shown that most residents do not understand the ramifications of the transfrontier park regarding resource access, land tenure, or livelihood impacts of wild animals (RRP, 2002). Although residents have a better understanding five years later, they still have little say in park governance and are still undergoing resettlement. Every effort is being made in the resettlement plan to accommodate the desires of community members and improve their livelihoods, but the fact remains that the relationship between park and communities is still a paternalistic one, not a partnership. It is a top-down imposition that is meant to be benevolent in spite of still being intrusive and controlling, a relationship that bypasses two-way communication.

For the purposes of exploring hypotheses, the lack of transfrontier cooperation or collaboration on land tenure pervades both parks, irrespective of their different origination or evolution. If anything, a weak argument could be made that Botswana and South Africa have a small joint management group and a close relationship, which at least results in communication about relationships with park neighbors at the national level. However true this may be, any support for the hypothesis that grassroots beginnings for a TFCA lead to more operational level cooperation based on park-community relationships would be weak and circumstantial at best.

4.1.3.2. Community Outreach – Partnership on Environmental Education program

The second major aspect of "parks and people" concerns community outreach. Here we do find a specific example of cross-border collaboration. The one program in park-community relations that has had some cross-border effect has emerged in the Kgalagadi. Working through the People and Conservation program in South Africa, an environmental education outreach project has started to coordinate actions across the border (SANParks staff, 3/22/2007). What started out as a community outreach project designed to teach local students in South Africa about the natural environment also began to use community elders to impart local traditional knowledge about the relationship between people and the natural environment. The success of the project caught the eye of community members and park officials across the border in Botswana. Although no large scale projects have emerged, park officials are eager to share experiences, access the same resources, and adopt a common program. Project coordinators have

only just begun to figure out how to partner together. Prospects appear high as community members on both sides of the border have common social, economic, and historical backgrounds and similar interests.

By contrast the "People and Conservation" program in Kruger has not had any cross-border impact. This is curious because the program has a much bigger scale than its counterpart in the Kgalagadi. Many researchers, community members, and park staff have also commented on the Shangaan communities divided by the three national borders and now by the GLTP. This community stays connected in part through family connections and regular illegal migration. With such a divided community, there are clear opportunities for cross-border collaboration and bringing divided communities together, one of the original selling points of the transfrontier park. Obviously, the situation is complicated (when compared with the KTP) by the radically different relationships between the parks and the people, ranging from land claim settlement to relocation. Undoubtedly the task of community outreach in the Great Limpopo becomes further complicated very quickly with the broad diversity of neighbors, high population densities, and exaggerated expectations along the western border of Kruger. However, park staff note that Kruger has only recently even articulated a clear vision and philosophy for community outreach and has still not yet progressed toward integrated stakeholder outreach beyond park management plans (SANParks staff, 12/5/2006; SANParks, 2007). Critics contend that the only way for the park service to handle such a daunting task of community outreach is through partnerships such as the TFCA, integrated river catchment management groups, and the Kruger to Canyons Biosphere (Pollard et al., 2003). As long as the TFCA management units and the national governments stick to the belief that no cross-border collaboration should be pursued regarding local communities, progress will stagnate. It may take a small-scale endeavor to reach out across the border, similar to the initiative in the Kgalagadi.

4.1.4. Tourism Planning

Similar to how the two TFCAs approach animal control quite differently from each other, tourism planning between the two cases proceeds along two very different paths. In the Kgalagadi, coordinating tourism approaches is the fourth most frequently mentioned disturbance and is especially common with Botswana respondents. In the GLTP, tourism also emerged as a top ten disturbance. As with animal control and border security, tourism planning between Botswana and South Africa is much more coordinated and exhibits a great deal more cooperation than between the GLTP countries. The closer relationship shows up in two places. In the first, the Kgalagadi has agreed upon a revenue sharing arrangement for park gate receipts. The Great Limpopo still struggles to find a collective resolution to this issue. Second, while both the GLTP

and the KTP have joint tourism plans, the KTP has progressed further toward implementation of these plans. In what follows, I will go into more detail about these two aspects of park tourism to examine the hypothesis on operational cooperation.

4.1.4.1. Revenue Sharing in the KTP

The literature on transboundary protected areas invariably lists economic development through ecotourism as one of the primary motivating factors for cross-border conservation. As a result, tourism plays a prominent role in TFCA management. In the KTP and GLTP one of the most important early discussions between the partnering countries concerned how to share tourism revenue. Tourism revenue comes from two primary sources – gate fees and hospitality which includes lodging and dining. The hospitality earnings currently stay within a park, as a return on a national park's investment in infrastructure. The difficulties arise over how to share the gate receipts. Part of the challenge stems from the intertwining of revenue sharing with two other frequently mentioned disturbances in both TFCAs – capacity constraints (#9 in the GLTP and #9 in the KTP) and coordinating between a parastatal and a governmental department (#7 in the KTP). Exploring capacity concerns and parastatal-department coordination, in turn, will lead back to the resolution of revenue sharing challenges.

Both transfrontier parks partner nations with vastly different levels of capacity together. As a result, collaboration on everyday functions often slows due to lack of funding, equipment, staff, or training on one side or the other. As the discussions on damage-causing animals indicate, South Africa must often support the Botswana ranger services in the Kgalagadi. Likewise, anti-poaching efforts in the GLTP are limited by capacity shortages. In 2003, the Limpopo National Park had only 27 rangers patrolling the 1 million hectares of the park (DeMotts, 2003). Even after focusing on capacity building, the park still had only 66 rangers for all park functions in 2007, as compared with 250 rangers for neighboring Kruger Park, roughly double the staff per area, not counting better infrastructure, resources, and training (DNAC staff, 3/12/2008; Kruger Park Staff, 3/25/2008). The situation in Zimbabwe further stresses the differences in capabilities, with staff depletion, infrastructure loss, and no financial support over the past decade due to general governmental challenges. Because of the major capacity differences, any discussion of tourism and tourist revenue immediately reverts to discussions on capacity building. Many believe that transfrontier conservation success ultimately requires an equalization of capacity. Until this point, South Africa agrees in the sharing of expert knowledge and providing human capital. However, when this means financial backing, South Africa shows reluctance for two main reasons. To begin, it is not clear how money earned by a government agency or collected from government budgets and national taxation can be readily shared across

international borders, and many question whether such financial arrangements should be undertaken. Additionally, building capacity in a transfrontier park links with another frequently mentioned disturbance – partnerships between parastatals (as in South Africa and Zimbabwe) and governmental departments (as in Botswana and Mozambique).

In South Africa and Zimbabwe, the park service is a revenue-generating, predominantly self-supporting parastatal. Although the individual national parks generally do not make a profit, as a whole they are expected to be largely financially independent. Currently, the South African government provides approximately 15% of the SANParks budget. The parks must generate the rest. Recently only two of the twenty national parks in South Africa have earned a profit – Table Mountain in Cape Town and Kruger Park. The profits of these two parks are used to subsidize other parks in ecologically important, but less financially sustainable areas, with Kruger providing 71% of SANParks operating budget in 2004 (Hecht, 2004). As a result, budgetary constraints have tightened for SANParks and governmental funding cuts are a constant worry. Likewise, Zimbabwe's current economic status with inflation rates approaching 1,000,000% annually and political situation reducing tourism to almost nothing has resulted in a nearly defunct park service with employees working for free and subsisting on consulting arrangements from international agencies (Zimbabwe park staff, 9/4/2006). As a result, no readily available source of internally-generated money can be spread around between partners to supplement transfrontier park undertakings. The difference between parastatals and governmental departments further complicates matters. In both Botswana and Mozambique the park service is within a governmental department. Park funding comes directly from Treasury allocations and the government budgetary cycle. Conversely, park-generated revenue flows directly to the central government for inclusion in the next budgetary plans. It is not necessarily earmarked for the parks. As a result, revenue sharing becomes increasingly contentious, with no one wanting to share earnings either as a cross-subsidy for other South African or Zimbabwean parks or for a Mozambican or Botswana budgetary shortage in another sector. Mozambique has started to change their structure by creating four autonomous park units that will be run more as self-supporting, financially independent entities. These park groups include the Limpopo National Park, Bazaruto Archipelago National Marine Park, the Selous-Niassa Transfrontier Corridor, and Gorongosa National Park (DNAC staff, 11/23/2006).

As a result of capacity inequalities, different governmental financial structures, and limited funding, revenue sharing plans attract attention. Just as with collaborative plans for the control of damage-causing animals or cooperative relations in border security, revenue-sharing in the Kgalagadi has proceeded much more smoothly than in the GLTP. In the Kgalagadi, gate

revenues are split evenly, regardless of where park patrons enter, exit, or stay within the park. The tourists are viewed as having visited a transfrontier park, not separate national parks. This arrangement has helped to subsidize and build capacity on the Botswana side of the park, and it has increased overall tourism numbers considerably (Botswana park staff, 3/29/2007). Overall, the transfrontier park has experienced further gains in levels of cooperation and in revenue generation as a result of their revenue-sharing decision and collective efforts. The same can not be said for revenue-sharing plans in the GLTP. Initial discussions ranged from South Africa's position that revenues should be collected based on where visitors entered and stayed. With over 1.3 million visitors annually to Kruger, roughly 40,000 in Mozambique, and 2,000 or less in Zimbabwe in 2006, this type of gate fee distribution is highly favorable to South Africa. Mozambique and Zimbabwe, by contrast, favor a plan where revenues would be split into equal thirds. While this might appear inequitable in terms of demands on infrastructure and costs to South Africa, it would allow the build-up of capacity – human capital, infrastructure, and tourism facilities. Amidst the squabbles over revenue-sharing, the Joint Management Board of the GLTP commissioned a study through DAI, a consultancy. The results highlighted five entry fee structures and four revenue allocation strategies (Hecht, 2004). The entry fee structures include:

- Wholly separate fees – each park charges and collects its own fee upon entrance, the GLTP arrangement at the time of the study;
- One GLTP fee – one entry fee goes to the transfrontier park, as in the Kgalagadi;
- Separate fees with free entrance to other parks where each park charges and collects its own fee, but entrance to additional parks is free;
- Discounted, separate fees in which each park collects a full fee from tourists at their first entrance, but additional entrances are discounted and collected upon entrance to the next park;
- A Dual Fee in which a visitor can purchase a single park entrance or a combined ticket which would be a discount to the total of each park fee. The revenue would be distributed proportionately to the individual park fee.

The revenue allocation plans then included "keep what you collect", sharing the funds equally, a formula based on agreed upon criteria (such as park area, kilometers of road, number of visitor days, etc.), or a reallocation based on need and ability to pay. The consultant recommended a dual fee structure, favorable to the South African position, but also proposed a reallocation based on need. As of 2007, wholly separate fees were in place with each park keeping what they collected. In contrast with the Kgalagadi revenue sharing plan, the GLTP does not yet operate like a collective body. Rather the park is still no more than the sum of the individual pieces.

Even on regular maps, the KTP now is shown as a single transfrontier park. Maps still represent the GLTP as three separate parks. No doubt, the distinction of the three parks of the GLTP persists due, in part, to the iconic status of the Kruger Park. Again, as with animal control and border security, it appears that revenue sharing arrangements have worked much smoother in the KTP than in the GLTP. In both cases, opportunities abound for difficult and sensitive negotiations over financial matters, and neither park has an easy solution. I argue that the close relationships developed over time in the Kgalagadi have helped to facilitate a solution favorable to the transfrontier park as a collective unit, rather than to the advantage of the individual pieces. The KTP simply functions as a unit, unlike the top-down imposed GLTP.

4.1.4.2. Joint Tourism Planning in the KTP versus the GLTP

In many ways both the Kgalagadi and the Great Limpopo suffer from the same problem with tourism planning. In each case South Africa has a large, well-established base for tourism. This brings both advantages and disadvantages to its neighbors that are struggling to build a tourism infrastructure. On the plus side, many tourists already journey to the two parks. As the South African parks get more crowded and congested, those in search of more open spaces and more rustic settings have the option of crossing the border. Both Botswana in the Kgalagadi and Mozambique in the Great Limpopo have experienced some of these positive effects. The negative side is threefold. First, the tourism industry is notoriously fickle. One of the many lessons that Zimbabwe has taught, political instability leads to the evaporation of tourism (Ferreira, 2004). Recent experiences in post-election 2007 Kenya have shown similar effects. Ecotourism sites compete on a global scale for a relatively limited set of international tourists (Duffy, 2007). As a regional tourism expert notes, "the upmarket game lodge industry in South Africa is highly volatile and risky, characterized by sensitivity to market fluctuations, a highly competitive market, high capital requirements, high fixed costs and a requirement for predictable and high quality game viewing" (Spenceley, 2006, p. 653). South Africa has built a reputation in this arena that its partners do not have. Second, it is not clear how much larger the ecotourism market will grow. Current estimates put the size of the South African market at 4.6 million visitors and $2.3 billion (Spenceley and Schoon, 2007). Some government estimates see the market increasing in size (DEAT, 2005). Other park experts see a strong, mature market that should remain stable into the future without huge gains in growth (SANParks staff, 5/18/2007). If the market does not grow, it is not clear that South Africa would be interested in sharing its wealth. Third in a limited tourism market, neighboring countries may end up competing for tourists, even in a transfrontier park (Büscher and Schoon, forthcoming). Experience elsewhere shows that others beyond southern Africa have witnessed this phenomenon as well (Duffy, 2005).

In a fickle, mature market South Africa's superior infrastructure and experience in tourism lead to distinct advantages vis-à-vis its partners in the TFCAs.

The two TFCAs have begun to tackle the unequal levels of tourism development and differences in infrastructure through joint tourism plans. Again, as with the revenue-sharing arrangements, the KTP's efforts are far more collaborative with holistic park views. The discussion on artificial water holes noted that the environment in the Kgalagadi makes tourist-friendly game viewing only along the two river beds. The Auob River is wholly within the South African park, and the Nossob forms the international border. Because of South Africa's head start in tourism infrastructure, many of the best lodge sites have already been developed. Current joint tourism plans have helped to locate sites for two additional lodges along the Nossob River in Botswana. At the same time, South Africa has agreed to not expand tourism facilities along the river bed, providing Botswana with the opportunity to improve its own situation. The process has been collaborative and transparent throughout the duration. By contrast, the GLTP joint tourism plans are not so productive. The first integrated tourism plan for the GLTP came out of a study by KPMG in 2002. The core message was that any collaborative efforts would be very challenging (KPMG, 2002). The report emphasized marketing the park as a single entity – a feature, as mentioned above, that has not yet happened. The report also encouraged viewing the park as a portfolio of different experiences, including a "bush and beach" all-encompassing vacation destination. While efforts are underway on these fronts, collaborative activities have not progressed as far as in the Kgalagadi.

4.1.5. Testing of H2 – Bottom-up origins have higher degrees of operational cooperation

In the previous pages I have drawn upon several of the most frequently mentioned disturbances in the Kgalagadi and the Great Limpopo to begin to explore the hypothesis that the grassroots formation of a transfrontier park instills trust and builds social capital in ways that top-down park planning does not. This, in turn, leads to higher degrees of operational level cooperation. In testing this hypothesis, I realize that context and confounding variables play a large role in any outcome and that attempting to trace cause-and-effect relationships becomes chaotic very quickly. The system under analysis is a complex, adaptive system. My point is not that the genesis of the parks explains outcomes, but that park originations create a propensity for the systems to respond in a particular way. In reviewing the evidence, I will highlight some of the key conflating effects. By drawing on the most frequently mentioned disturbances from hundreds of interviews, I have attempted to minimize bias in the selection of the disturbance responses that I assess for cooperation. In this way, I have tested the hypothesis by examining six

of the seven most frequently mentioned disturbances in the KTP (not including financial sustainability, discussed in the following section) and seven of the top ten disturbances in the GLTP (not discussing river health, financial sustainability, or veterinary disease, all discussed in the following section). Others were not included due to their discussion elsewhere, not a systematic bias against them in this context. Overall, it appears that there is a great deal of support for the case that more operational level cooperation takes place within the KTP than the GLTP. I attribute this in large part to the very beginnings of the transfrontier parks and the KTP's local-level support. Much of this support also comes from the pace of progress and the time required to figure out how and when to work together, to design effective institutional responses, and to spend the time getting to know cross-border partners. All of these further affect the formation of social capital and building trust between collaborators.

Both the local-level support for transboundary partnerships and the time for institutional evolution work in favor of building cooperation in the Kgalagadi. Time after time, the collective responses to disturbances and the collaboration between cross-border partners is stronger there than in the Great Limpopo. In handling the problem of damage-causing animals and human-wildlife conflict, both transfrontier parks have an unending challenge along every border. Only in the Kgalagadi do we find any levels of cooperation. In many cases a collaborative response could help to alleviate the problem, but this type of cross-border collaboration does not occur in the GLTP. With the problem of population control of elephants, again there is no partnership. This lack of partnership is due, in part, to the lack of clear solutions. However, with fences between South Africa and Mozambique now down in many places and elephants advancing into Limpopo National Park, Mozambique and South Africa need to work together as the physical parameters of this disturbance advance into Mozambique. As a potential elephant population "solution", with the Limpopo National Park acting as a short-term population sink, it solves one problem while it exacerbates human-wildlife conflict in Mozambique. Everyone is aware of the problem, but no one vocalizes the ramifications. As with the case of animal control, border security appears to have more collaboration for tourists and staff movement in the Kgalagadi than in the GLTP. There may be close partnerships in the combating of illegal migration in the GLTP, but it is difficult to assess due to national security concerns. All outward examinations of border security policy, both in its development and application, support the hypothesis that one should expect more cooperation in the Kgalagadi.

The discussion on tourism raises several interrelated issues. Revenue sharing links tourism development with attempts to balance unequal capacity, an issue that surfaces in every area and program of the transfrontier parks, and it impacts every attempt to cooperate across the

border. In addition to capacity imbalances, revenue sharing also brings up the challenge of how to work within different types of governmental structures, particularly between parastatals and governmental departments. Capacity issues and different governmental structures are important issues in both transfrontier parks. In addressing these issues through the equal sharing of revenue, the Kgalagadi has taken concrete steps toward rectifying the capacity issue. The GLTP has shown no similar levels of progress. Of course, the difficulties of sharing tourism revenue are much greater in Kruger National Park, with millions of tourists, financial profitability, and the necessity of using Kruger funds to finance much of the rest of SANParks activities. With respect to establishing partnerships between parastatals and governmental departments, the GLTP has one of its best examples of cross-border cooperation. As will be discussed in the following section, this partnership shows the power of close senior-level political relationships. The cooperation here comes at a higher policy level, not in the field, but the level of cooperation is commendable.

Following the policies of the national governments, neither protected area collaborates on the park's relationships with local neighbors. This evidence neither supports nor refutes the hypothesis, but it does add another confounding variable – national level edicts and the added aspects of managing within nested systems – that will be further examined in the exploration of Hypothesis 3. Beyond the official park-community policies, the Kgalagadi's recent cross-border environmental education program is the start of cross-border community outreach programs. Otherwise, local community relations provide little support for the hypothesis, as neither transfrontier park has any cross-border presence.

One area that provides evidence contrary to the hypothesis is in the joint tourism plans. While the Botswana-South Africa partnership has progressed further in tourism planning, the joint tourism plans between Mozambique and South Africa have also moved ahead. While collaboration with Zimbabwe lags due to the political scene there, the burgeoning tourism relationship in the GLTP provides some evidence against the hypothesis. A stronger refutation of the hypothesis comes from veterinary disease control, the biggest source of cooperation at an operational level in the GLTP. The details of veterinary disease control will be discussed in the next section, but it is one area where the GLTP has witnessed a great deal of cross-border collaboration with an active group of ground-level veterinarians.

In summary, the detailed analysis of several prominent disturbances in the KTP and the GLTP shows several examples pointing toward confirmation of the hypothesis that transfrontier parks that emerge from the bottom-up exhibit higher levels of operational cooperation. However, context matters a great deal, and the relative management simplicity of the Kgalagadi greatly aids

in local-level cooperation. The complexities of high population densities surrounding the park, high tourism levels, and heightened border security may serve to make cooperation more difficult in the GLTP. Finally, there are at least two instances with moderately high levels of cross-border cooperation at an operational level in the GLTP – veterinary disease control and joint tourism planning. The Kgalagadi also has high cooperation on tourism planning and has no problems with veterinary disease, so it's difficult to directly test the hypothesis. While not refuting the hypothesis, these disturbance responses do cloud the story somewhat. Overall, the evidence from a wide variety of responses to salient disturbances provides some support for the hypothesis that greater degrees of operational cooperation will emerge in cases of bottom-up transfrontier park development than in the top-down imposition of a transfrontier park, but, as in any complex system, multiple factors influence the outcomes.

4.2. Political Will, Path Dependency, and Institutional Evolution

While the Kgalagadi has achieved a great deal of transboundary cooperation on the ground in part due to the genesis of the transfrontier park as a grassroots endeavor, the Great Limpopo has had a quite different evolutionary path due to its own unique origins, from the very beginning receiving substantial amounts of political support from the national governments. The past discussions looked for evidence to test the hypothesis that operational-level cooperation in the Kgalagadi would be strong due to the grassroots beginning of the park. In this section, I explore the hypothesis that in cases of top-down transfrontier conservation, such as in the case of the Great Limpopo Transfrontier Park, higher degrees of political cooperation at the policy level will be found than in cases of bottom-up TFCA origin. As mentioned in the opening chapters, by policy-level cooperation, I refer to cooperation in programs or initiatives designed, promoted, and implemented by the central government and bureaucrats outside of the implementing agencies such as the parks. By top-down conservation, I mean that protected area developments are driven by national and international initiatives rather than transboundary efforts that emerged at the local-level and from within the parks themselves. The top-down nature of the GLTP is not disputed and is frequently commented on in the literature, often as being problematic (Braack, 2003; Swatuk, 2006; Demotts, 2005; Büscher and Dietz, 2005).

The ideas examined here are not that the top-down origination is problematic in itself, but that it leads to a very different institutional trajectory than one with a bottom-up genesis. The different trajectories may or may not prove problematic depending on the issue and the context. In fact, I argue that the transfrontier park often benefits from its top-down origination through higher levels of political support. The nature of the hypothesis to be tested is epitomized by the following quote by a South African government official on TFCAs, saying "the KTP may have

more simplicity and elegance than the GLTP, but where is the political will or the motivation? This will and political desire is with the GLTP." (DEAT staff, 4/3/2007).

In what follows, this section will examine four main themes. The first is cooperative interaction in the control of veterinary disease. On one level the spread of veterinary disease facing the GLTP is an operational disturbance with a great deal of cooperation, contrary to many other local-level disturbance responses in the park. On another level, this coordinated response shows the power of epistemic communities and the political importance of livestock in the region. The second theme pertinent to the role of politics in transfrontier conservation is the speed of political action in the transfrontier park. This manifests itself in a few ways – in the creation of the Limpopo National Park in Mozambique, in the early conflicts between operational progress and national politics, and in the struggle for financial viability. The third theme looks at interconnected issues, such as international river health, and how even senior levels of political cooperation have limits when the examination moves beyond the jurisdiction of transfrontier parks, even within other conservation programs. The fourth theme contrasts with these and looks at progress in the Kgalagadi and the associated political support found within a transfrontier park of bottom-up origination.

4.2.1. Why Veterinary Support Emerges in the GLTP

Veterinary disease control is a top-six disturbance in the GLTP, frequently mentioned by officials from all three countries. Veterinarians within the park services and the Departments of Agriculture in each country have the responsibility to control disease outbreaks in the wild animal population of the parks and to prevent the spread of disease from wild animals to domestic stock respectively. The State Veterinarians' role in the prevention of disease infection in domestic animals explains the responsibility of the Department of Agriculture for fence maintenance around Kruger National Park. Likewise, the veterinarians are very involved in minimizing human-wildlife conflict, particularly on disease transmission between wildlife, livestock, and people. From the very beginning of the transfrontier park, it has benefited from veterinary experts from within the park services, from the Departments of Agriculture, and from the research and NGO communities. Chapter Three discusses the role of these groups in creating an epistemic community which forms the basis for the JMB's veterinary sub-committee and the AHEAD (Animal Health for Environment and Development) program's Southern Africa unit. Through these two organizations, this study looks at two subjects in veterinary disease beyond the specific disease control measures featured in the previous discussion. The first topic views veterinary disease as a political issue, rather than as simply the building of operational collaboration, due to the importance of livestock in southern African society. The second focuses on a program where

the veterinary group plays a key role – animal translocations, viewed here as a political event. This second topic provides an example of operational-level cooperation that has emerged from national-level political collaboration.

4.2.1.1. Vet Disease Risk as a Political Issue

Veterinary disease, like the closely linked problem of human-wildlife conflict, creates many problems between protected areas and local communities, as diseased wildlife come into contact with domestic livestock. In much of rural Africa, communities not only use cattle for their livelihoods but more importantly as storehouses of wealth (Kuper, 1982). This immediately brings the issue to the political forefront with the threat to everyone's short and long-term worth, especially that of wealthy, influential members of the area. Although many of those most affected by their proximity to the park are subsistence farmers and ranchers, the risk to wealthy and powerful people also exists. As with other community members, they want to safeguard their individual livelihoods, but, unlike many of the rural poor, they have the political power and acumen to take the government to task for any failures. As a result, politicians at local, provincial, and national levels often become intimately involved in the debate at an early stage. While specific responses come from veterinarians at an operational level, rapid response is an imperative to governmental officials who readily support disease control efforts. What begins as an operational-level issue quickly shifts to a high-level, politically driven issue due to the importance of livestock in southern African society. Because these issues are common to each country in the transfrontier park and have high salience to each government, a platform exists for international cooperation. Also, unlike other disturbances in the transfrontier park, like capacity shortfalls, threats of illegal migration, or lack of tourism infrastructure, a leading source of veterinary disease as a disturbance comes from South Africa. The risk of bovine tuberculosis comes from its spreading from Kruger National Park's buffalo herds to Mozambique and Zimbabwe, not the other way around. As a result, South Africa has an obligation to intervene on behalf of its neighbors. For all of these reasons, the operational responses are guided and supported by political imperatives.

In addition to the duties of the park service, the overlapping responsibility between the park service, the Agriculture department, and the NGO community for veterinary disease control creates linkages outside the park which further serve to raise the political profile of veterinary disease within each country. Rather than working in isolated environments, wildlife veterinarians draw from their own epistemic community to coordinate local-level initiatives. In the opposite manner to many programs within the Kgalagadi, collaborative efforts have progressed from policy-level cooperation to operational-level initiatives. While it is difficult to make direct

comparisons between different disturbances and responses, it is worth noting that many programs in the KTP, such as responses to damage-causing animals or border security, began at an operational level and scaled up to the political agenda. Although veterinary disease does not constitute a disturbance in any significant way in the Kgalagadi and was not mentioned at all by KTP experts, the political importance in veterinary disease and the resultant effects on operational-level responses contrasts with responses to a wide variety of disturbance responses in the KTP. In the Kgalagadi the political will is not nearly as omnipresent as in the GLTP. In the GLTP, national-level political imperatives often drive transboundary collaboration.

4.2.1.2. Animal Translocations as a Political Event

As discussed in Chapter Three, veterinary officials also play an active role in the translocation of animals from Kruger National Park to Limpopo National Park. Veterinarians from both sides have cooperated to ensure the safe transport and acclimatization of relocated animals, which now number in the thousands, as shown in Table 3.5. These translocations, which have continued over the past seven years, show an active cooperation at an operational level. Instead of focusing on the operational cooperation necessary for successful translocations, here I focus on them as national-level political events. The most auspicious of the translocations occurred on October 12, 2001, celebrating the 80th birthday of the Peace Parks Foundation's founder, Anton Rupert (Wolmer, 2003; Ramutsindela, 2004). The birthday celebration began with the tearing down the first section of fence between South Africa and Mozambique and the translocation of a family of elephants from Kruger into the freshly christened Limpopo National Park. At this point in time, according to the Wits University Refugee Research Programme, very few Gaza Province residents knew that they lived within a newly proclaimed national park (RRP, 2002). Furthermore, no one notified the villages that officials released potentially hazardous animals into the area. Organizers set aside many practical considerations –communicating with villagers, training a ranger corp, and preparing the park for the merging with its neighbor. In the end, many of the concerns were ill-founded as the elephants returned to their old home in the following days. Operationally, the project's success was questionable. Politically, however, the event achieved its purpose. The new transfrontier park became a reality. Nelson Mandela gave a speech and passed on his blessing, joking that South Africa was paying his *lobola* in elephants, a traditional African wedding dowry, to Mozambique for his new wife, Graça Machel, the widow of the late president of Mozambique, Samora Machel. Anton Rupert, the largest supporter and drive behind southern African "Peace Parks", had an once-in-a-lifetime birthday celebration. And the press had an event for the year – politicians, high society, a new Peace Park, and all while on safari. Although the Peace Parks Foundation said that the decision to release the

elephants had nothing to do with the birthday celebration, the magnitude of the event goes beyond coincidence (Duffy, 2006).

The point is not to belabor this specific event or to attempt to explain away all operational progress. Rather, I hoped to show how operational decision-making gets easily entangled with senior level political calculations, similar to situations encountered in every type of policy. The high profile of the Great Limpopo and the grand claims of its advocates place a spotlight on every decision in the park and entangle operational-level officials in a political web running to the highest offices of the countries involved, one that is more imposing and pervasive than in more remote and lesser known parks like the Kgalagadi. This often works to the benefit of the Kgalagadi on day-to-day decision-making, but it can also work to the benefit of park officials in the Great Limpopo if it brings access to more resources, political support, or financial backing.

The two examples of veterinary services in the GLTP provide cases of operational progress in a top-down transfrontier park, contrary to the contentions of the hypothesis of the previous section that operational success is more apt to emerge from transfrontier parks that develop from the bottom up. The point raised here, however, is that the operational successes in these cases are due to political considerations and cooperation at a senior level of government. The high levels of political cooperation in a top-down directed transfrontier park enabled these examples of operational progress.

4.2.2 Speed of Policy Implementation

Just as the discussions regarding veterinary disease highlight the role of political agendas in decision-making in the Great Limpopo, the political drive for the development of the park has had a tremendous impact on the pace of implementation as well. In Mozambique, the speed of progress has emerged as a frequently mentioned disturbance, ranking in the top ten. This disturbance shows up less often in the other countries because many of the biggest changes have affected Mozambique – the creation of a new national park, the resettlement program for park residents, the reception of translocated animals, and the opening of new border posts. In what follows, I will focus on two areas where the pace of implementation in the GLTP has resulted in a particular institutional trajectory and current park outcomes. The first of these is the speed of creation of the Limpopo National Park and the challenges of moving from political decision-making and policy to implementation. Related to this, the second instance where the pace of progress has influenced operational results is in the conflict between bureaucrats and park staff over transfrontier park implementation in the Kruger National Park. Both of these examples seek to provide examples of how top-down creation of a transfrontier park has resulted in high levels of political will and an institutional trajectory quite distinct from the bottom-up maturation of the

Kgalagadi. Yet political will and operational cooperation do not always coincide, leading to fundamental challenges facing the GLTP going forward.

4.2.2.1 The Creation of the Limpopo National Park

In support of the policy goal of having the GLTP fully operational within five years of signing the Trilateral Agreement on 10 November 2000, as outlined by the tri-nation's ministerial committee (Ramutsindela, 2007), a tremendous amount of pressure rested on the shoulders of the Project Implementation Unit (PIU) of the Limpopo National Park (DNAC staff, 6/14/2007). The relative ease of bringing the treaties to political fruition contrasts with many of the operational challenges faced by the PIU. In the PIU's partnership with their transfrontier counterparts, relationships are amicable, by all accounts. But unlike in the KTP, park staff in the Limpopo National Park has not had much time to build social capital and trust with their cross-border counterparts, although relationships with South Africa were undoubtedly improved through the hiring of a South African park manager as one of the implementing agents for the LNP. Not only did the short timeframe between the idea conception for the TFCA and the signing of the treaty minimize the amount of engagement between ground level officials, it also created a host of operational issues for the LNP. Three of the most important include the limited capacity to implement policies, the difficulties in organizing a large-scale 'voluntary' resettlement, and the challenges of establishing a tourism base for the newly gazetted park.

As discussed in the tourism section above, capacity constraints plague the move from policy promotion to implementation. The Mozambican government and donor groups have directed as much financial resources as can be spared toward the park, but the costs of rapidly reshaping communal land into a national park that spans 10,000 km^2 in a short time period exceed the budgets of the government and its largest supporters. Beyond the financial limitations, few local people have the education or training required to work for, let alone run, a national park of this size. Nor do many have the experience of seeing how a successful national park is run from the inside. The job requires a special set of skills that are difficult to acquire without experienced mentors. So while under the pressure of rapid implementation, the PIU also must work to build capacity, fight for additional funds and resources, and train and educate its staff. Financial restrictions and staffing shortages look to challenge management into the foreseeable future. In the case of the Limpopo National Park, political agreement at a policy level happened quickly. The same speed cannot be said to have been reached for operational development and the implementation of park policies.

Many have commented on the resettlement process, the perceived inequities to local communities, and the problems with the park (Draper et al., 2004; Spierenburg et al., 2006;

Ramutsindela, 2007). For the park service, many of the staff are caught between warring parties of NGOs. One group of NGOs serves as community support organizations. The other group consists of donor organizations wanting rapid progress in the park. While the PIU faces an increasingly tight timeframe to transform the park into a free-standing, self-sustaining entity, at the same time, they face community members and their supporters who decry the resettlement process and demand better restitution. The resulting predicament has dragged on for several years. Initial resettlement plans were drawn up during the planning stages for the LNP prior to 1999. Park staff hired consultants to draw up plans in accordance with the most rigorous World Bank standards as early as 2003. These plans discussed the various options regarding people living in the protected area – doing nothing, fencing them in, or resettling them (DNAC official, 11/23/2006). For the past few years, news of imminent resettlement was frequent, and the reports were just as frequently incorrect. As I left the field at the end of 2007, rumors again surfaced that resettlement was at hand. Park officials had started a pilot program with housing for the first 40 people to move in August 2007 (DNAC official, 6/12/2007). The timing was such as to allow for a cropping season by October to help establish them in the new area. Although the houses were ready, the move did not happen. I have not yet heard any word on the reactivation of the pilot program or any impending moves. Beyond the pilot program, the larger resettlement options were further limited when a sugar cane plantation began operation on the land previously planned for the resettlement village – a case of requisition by higher governmental authorities, usurping the plans of the environmental ministries, in a country where all land is officially owned by the state (DNAC official, 6/11/2007 and 10/27/2007).

Tourism expansion also poses a problem for the Limpopo National Park. In addition to the collective challenges of tourism in the transfrontier park discussed earlier, such as revenue-sharing and joint planning, the Limpopo Park staff also faces operational level difficulties due, in part, to their lack of experience. At present only one concessionaire works in Mozambique. The luxury tented camp struggles with several transfrontier obstacles. First, the lack of infrastructure within Mozambique has resulted in the need to obtain supplies from South African markets. Upon bringing these goods across the border, the operator must pay excise taxes on the goods. This has increased expenses substantially and led to frustration for someone working in a "transfrontier" environment. Second, the tour operator currently picks up tourists in Kruger National Park interested in a transfrontier park experience. As was explained earlier, these tourists then have to pay for new park permits and visas upon entering the Mozambican park. Many tourists do not understand why they need to pay again if they remain within the one transfrontier park. This makes it harder for the concessionaire to justify why tourists should visit

the new park at all. As a result, the concessionaire has been under-capacity and had substantial cost overruns. It is not clear if others are willing to launch transfrontier tourism ventures or Mozambican tours given the current state of affairs.

Tourism expansion in the LNP also struggles due to a lack of capacity and infrastructure both within and around the park. An estimated 40,000 tourists entered the park in 2007 (DNAC official, 6/12/2007). Most of these tourists used the park as a transit route to the increasingly popular Mozambican coast. Most enjoyed the park as day visitors, and few have stayed overnight to experience more of the park. In part this is due to a lack of options. Beyond the tented concessionaire, there are a few primitive campgrounds and two rustic community lodges of limited capacity. The choices of lodging are the small five-star concession or one-star campgrounds, with little in between. As a result, the park fails to capitalize on its full tourism potential. In addition, the road network within the park is still under development with most areas requiring off-road capabilities. For food and supplies, few restaurants or stores cater to tourists in the vicinity of the park, and tourists must be largely self-sufficient. All of which create a tourism base without a large tourism income.

These three examples – the challenges of building capacity, planning a large-scale resettlement, and establishing a tourism enterprise – are problems for the Mozambican park officials. In part they are challenges that they must face on their own and not a case of building transboundary cooperation. The point I want to emphasize here is that the policy-level cooperation happened quickly and easily in a top-down directed transfrontier park, but the aftermath continues for park management at ground level. Ideally these operational issues will work themselves out, ground-level cooperation will eventually emerge over time, and the GLTP will resolve its larger dilemmas and become a long-enduring and well-run transfrontier park. In the meantime, the ease of policy-making in these circumstances masks the realities on the ground.

4.2.2.2 Conflict between Politics and Operations in South Africa

The rush from treaty signing to policy enactment was not only felt in Mozambique. Park staff in South Africa also experienced the pressure. Again there was a disparity between political time horizons and operational realities. The rush to cooperation resulted in two decisions that substantially impacted the pace of progress going forward. The first political decision to speed up the pace of progress was the previously mentioned switch from a transfrontier conservation area to a transfrontier park. It was felt that a park was more intuitively understandable to politicians, the donor community, and to tourists. With very well-defined goals, management of a park could take concrete, readily measureable steps toward desired conservation and development outcomes. A more loosely defined conservation area could not do the same. The second concerned the role

of the communities along the park's western border, particularly the Makuleke. As has been extensively documented elsewhere, the communities desired a governance position in the transfrontier entity (DeMotts, 2003; Spierenburg et al., 2006). As partners in a contractual park at the geographic center of the GLTP, the Makuleke felt that they warranted a position on the governing body of any group that could make decisions directly affecting the management of their land. The first GLTP international coordinator, Leo Braack, agreed and supported community involvement, believing that the transfrontier park would not move forward without the support and blessings of the local population as an important stakeholder (South African NGO staff, 11/10/2006).

The view on the ground was that broader local involvement might make the short-term planning more difficult, but it would help the park in the long-run by creating a base of support and provide benefits to a wider group of people. It would have direct implications for monitoring and enforcement of conservation policies. This perspective was not shared by others at higher levels in the government. Valli Moosa, the Minister of the Environment for South Africa at the time, repeatedly declared that community members would not have a "seat at the table" and that park management was the responsibility of the government, not the communities (DeMotts, 2006). The view was that government officials had the responsibility to care for the best interest of the country's citizens, therefore, the citizens' interests were already taken into account. One of the main concerns of the Department of Environmental Affairs and Tourism was that involving communities would slow the pace of implementation. At the time, many were concerned that the transfrontier conservation movement needed to show rapid success to sustain the high levels of public support and donor funding. Debating and incorporating the views of multiple stakeholders would slow the pace of progress.

Shifting from a conservation area to a park and minimizing community consultation in park governance epitomize the desire for quick implementation and progress in the transfrontier park. Paralleling the pace of park development in Mozambique, the South African transfrontier park group experienced a great deal of pressure for advancement toward transfrontier conservation. In discussions at the AHEAD-GLTFCA conference (March 8-9, 2007), participants openly talked of the ramifications of the speed of implementation. One prominent example covered the role of the fence along the international border of Mozambique and South Africa (Ferguson, 2007). Participants discussed how boundary fences were removed to show progress toward the transfrontier park. This decision, however, resulted in the movement of animals from South Africa to Mozambique, particularly along river ways. The communities still residing within the Limpopo National Park also live predominantly along the rivers. As a result,

the probability of human-wildlife conflict and the threat of veterinary disease transmission increased. Everyone understood the likely consequences of the decision to tear down the fence, but the longer-term challenges were drowned out by short-term imperatives. Ultimately the decisions to speed up the operational timelines, minimize the role of local communities, and other related choices spurred the resignation of the first GLTP international coordinator (DeMotts, 2005). The transfrontier park has sometimes benefited from the setting of stretch goals and pushing for tangible achievement, but often political desires have seemed to outpace the operational realities in the top-down building of a transfrontier park.

4.2.3 The Challenges of River Health

Another of the disturbances most frequently mentioned in the GLTP is concern with river health, the second most frequently mentioned in South Africa and a top five disturbance in Mozambique. Trepidation over river health in the GLTP encompasses several related issues – the drying up of rivers due to upstream withdrawals, declining water quality levels, variable water flow rates, and the back flooding of river channels due to downstream damming. Park officials in both countries have been frustrated because of their lack of control regarding the rivers and their reliance on the Department of Water Affairs and Forestry (DWAF) in South Africa and the National Water Directorate (DNA) and its implementing agency, ARA-Sul (the Southern Mozambique Water Authority), in Mozambique. As it relates to the nature of policy-level cooperation in a transfrontier park, the hypothesis would suggest that cooperation with outside agencies would also improve due to the high level of political support. The reality delivers a mixed message. In what follows, I will look at each of the areas of river health mentioned above and the political support for the transfrontier park across both departmental and international boundaries.

In exploring the problems with river health in the Great Limpopo, initial interviews responses caused a great deal of confusion. Seven major rivers systems flow from west to east across Kruger National Park into Limpopo National Park. From South to North, these rivers are: the Crocodile-Komati (which does not flow into LNP, but into rural land south of the park in Mozambique), the Sabie, the Olifants, the Letaba, the Shingwedzi, the Levuvhu, and the Limpopo. In discussions with river experts, several mentioned that the Olifants and Letaba had recently started to dry up due to upstream water withdrawals, as well as exacerbating low water levels in seasonally flowing rivers like the Shingwedzi. Others mentioned that the Olifants was problematic due to flooding. Initially, I thought that perhaps the flooding was due to upstream water appropriators redirecting water back to the system, which created floods during certain periods. In actuality, the two problems are not directly related. The flooding is due to the back

up of water from dam rehabilitation in Mozambique. The loss of water due to upstream usage has created tremendous problems for the park with changing riparian habitats, the loss of fish species, and decreasing water availability for more water-dependent land animals. The enactment of the South African Water Act of 1998 has helped to rectify some of the problem with abstractions and rivers going dry. Water experts view the updated Water Act as very progressive, but as one that has not been fully implemented (SA researcher, 10/3/2006). In addition to water quality targets, the act specifies minimum in-stream flow rates (IFRs) as a required ecological component of the river. Park officials, therefore, theoretically have a minimum quantity of water at all times that varies seasonally within historic ranges. Working with DWAF and user groups, extraction rates from industry, mining and agriculture have improved (SANParks staff, 11/30/2007). On this issue, cooperation between DWAF and SANParks appears solid, although implementation and enforcement of the Act remain challenging.

However, water usage in communal areas has also increased, particularly drawing on the Sabie and Olifants Rivers. These impoverished communities are growing rapidly and rely on the rivers for both household use and agriculture. Here, a second part of the Water Act comes into play. The act specifies that DWAF must devolve river management issues to catchment management associations (CMAs). Members of local communities and local interest groups, as well as officials from national and provincial agencies, participate in the CMAs. In this manner, all stakeholder groups theoretically have representation, and the rights of local users are represented. The act specifies that water priorities start with two concerns – the fulfillment of basic human needs and the assurance of minimal environmental flow standards (O'Keefe and Rogers). Two problems have emerged with the Water Act in practice. The first is that implementation of the act has been insufficient (DWAF official, 1/16/2007). In some cases, the scientific data do not exist to specify environmental requirements. In other cases, the data exist, but the IFRs are not kept and no sanctions are enforced. This has led to consternation on the part of SANParks and problematic relations with DWAF and some water users. The second problem that has arisen is that the collaboration of CMAs varies from active, fully-functional groups like in the Sabie catchment to less developed groups like in the Crocodile catchment to no groups on the Olifants or Levuvhu. In areas like Sand-Sabie river system, CMAs and NGOs like the "Save the Sand" organization cooperate closely with SANParks, often leading to improved river health and better outcomes for resource appropriators (Pollard et al., 2007). Often the lack of organization is due to lack of money, which appears to be one of the reasons for the dissolution of the Joint Management Commission for the Olifants. A similar situation emerges at the international level. The Komati Basin Water Authority, between South Africa, Swaziland, and

Mozambique works well and is well financed by water users, but the Limpopo Basin Authority, a management group composed of representatives from SANParks, DWAF, and their counterparts in Botswana, Zimbabwe, and Mozambique, struggles with lack of support and funding (SANParks staff, 4/18/2007). South African water quality and flow is also affected by the spread of alien invasive species and algal blooms, often due to nutrient enrichment from agricultural run-off, a problem discussed earlier in Chapter Three. The Working for Water program from DWAF has helped the agency to work with local communities on improving their water supply through invasive species eradication programs. However, cooperation across domestic and international boundaries on water flow and quality has been sporadic and contingent on factors far outside the reach of the transboundary park plans and park management authorities. Cooperation relies on sources of funding for catchment management groups and on the presence of political entrepreneurs and user groups willing to solve second-order collective action problems for encouraging organization and institution building in order to manage a common pool resource.

Many of the water quality issues and water shortages in the GLTP come from within South Africa and affect their downstream partner, Mozambique. The problem of flooding of the Olifants River gorge comes from dams in Mozambique. This issue is very contentious within Kruger National Park, which has protested and written position papers stating their views of the negative ecological impacts to both DWAF and their Mozambican counterparts (SANParks staff, 10/30/2006). Recently Mozambique began to refurbish the Massinger dam located on the Elefantes River, just beyond where the Olifants and Letaba Rivers merge near the South African border. In replacing the sluice gates, the reservoir level could be raised 2 to 3 meters, resulting in backflooding across the border into Kruger Park. The South African park staff believes that this will flood out a large crocodile population, pods of hippopotamus, and drown populations of several endangered plant species. However, DWAF did not attempt to prevent or delay their counterparts in Mozambique. According to DWAF officials:

> There is an agreement between the Portuguese [of Mozambique] and South Africa, set in 1973. While this agreement no longer fits international practice, the current agreement is in everyone's best interest. For South Africa, there are no requirements regarding water quality, which has historically been quite poor due to all of the upstream mining and agriculture. Mozambique gives up entitlement to water quality and to any say in what happens upstream, as long as they get their quantity of water. And in return, Mozambique can build the Massingir Dam. All they are doing now is repairing sluice gates that needed to be fixed to prevent further water leakage from under the dam. What they are doing is putting in taller gates that allow the reservoir level to rise. This is what the Kruger staff is concerned about. Meanwhile, the treaty is still in force because it is in both parties' short term interests not to renegotiate, even though the treaty violates modern principles of international river management. (DWAF official, 01/16/07)

SANParks officials disagree with these comments, believing that the actions are illegal, that the dam is ecologically damaging, and that it is ultimately ineffective and rapidly filling the reservoir with silt (SANParks official, 4/18/2007). Mozambican officials responded by saying:

> Mozambique is in a coastal flood plain. There are not too many locations to build dams for hydroelectric power generation, water storage and irrigation, or flood control. That's why we end up building reservoirs near the South African border. We created a bilateral commission for water and worked on the Massingir in stages. The Massingir Dam was already there, but we needed to rehab it – we needed water for agriculture and for further development. We developed an environmental plan that we have followed openly and transparently. (ARA-Sul official, 6/11/2007)

The resulting situation has created a great deal of animosity between SANParks and both DWAF and ARA-Sul. It is not clear what the ecological ramifications will be for Kruger, but there is little doubt that the reservoir level will eventually raise and backflood some of the Olifants gorge. Mozambican park officials have attempted to stay away from the issue, deferring to Mozambican water authorities. South African water authorities have sided with their Mozambican counterparts rather than with the South African park service. The battle lines were drawn, not along national boundaries, but along organizational boundaries.

The evidence regarding the levels of transboundary cooperation in the case of a top-down transfrontier park is quite mixed. Policy-level cooperation often extends beyond the conservation realm. Domestically, SANParks plays an active role in the CMAs and supports DWAF on the Working for Water program. The park also works with the South African governmental research institute – the Council of Scientific and Industrial Research, CSIR, on studies of river health. The recent national water legislation has helped improve the environmental conditions of rivers. However, in some cases cooperation between governmental departments has not had an impact on ground-level implementation and enforcement. Internationally, the situation is quite different and surprising. The South African water authority, DWAF, sided with the Mozambican water authorities, not with the South African park service. In sum, it is not clear that the top-down nature of the GLTP and the high levels of political support have had much influence beyond the park.

4.2.4 Policy-level Support in the KTP

In contrast to the Great Limpopo, political support and exposure in the Kgalagadi has not been as omnipresent, taking a backseat to the buzz over the "flagship" GLTP (Wolmer, 2003). National-level political interest in the KTP peaked in 1999 with the signing of the Bilateral Agreement between Botswana and South Africa, recognizing the transfrontier park. But even the political event was an afterthought in a transfrontier park that had been operational for several decades. The political event, orchestrated by the Peace Parks Foundation, seemed to function

more as a kickoff event for the transfrontier conservation movement throughout the region, using a past success to celebrate the start of a "new" movement in southern Africa. Perhaps because of its operational successes, the KTP has experienced lower levels of policy-level support than other transfrontier parks in the region, especially the Great Limpopo. Transfrontier aspects of the park work smoothly. Tourists travel back and forth without visas. No fences interfere with ecological functioning. Park management works closely together on a variety of subjects ranging from tourism to human-wildlife conflict. Most importantly, relationships between Botswana and South Africa are peaceful.

In one of the few instances of national-level political involvement in the KTP since the signing of the treaty, officials recently reopened a border crossing with Namibia within the park at Mata Mata on 12 October 2007. This crossing had last been operational in 1990 when it was closed with the independence of Namibia. The South African Department of Environmental Affairs and Tourism (DEAT) view this border post as an important point in regional tourism. It creates a link between Windhoek, the capital of Namibia and the Kgalagadi, providing entrance to both Botswana and South Africa from central Namibia. Now tourists can make a link between Etosha National Park, north of Windhoek, and the Kgalagadi. From there they can move on to other tourist destinations in Botswana and South Africa. The new border post cuts several hours of driving off such a trip. The park ensures that tourists benefit rather than transit companies by requiring a two night stay in the Kgalagadi as a precondition to the crossing. Yet even this event is only partially about the transfrontier park and more about DEAT's tourism strategy for the 2010 World Cup soccer event (Scott, 2007). Other than this announcement, there are few other references to the Kgalagadi in any other DEAT publication or national-level policy formation. At a national-level, the KTP is little more than an afterthought.

4.2.5 Testing of H3 – Top-down origins have Higher Degrees of Policy-level Cooperation

In exploring whether the top-down origins of the Great Limpopo lead to a higher degree of policy-level cooperation than in cases of bottom-up transfrontier conservation, several insights emerge. In the first section, on veterinary disease control, the main point is that the answer is not as clear as in the earlier testing of the hypothesis that bottom-up origins have higher degrees of operational cooperation. The top-down creation of a transfrontier park does lead to higher levels of cooperation at a policy level, but it seems to influence the operational level as well. This may be because of the specific context of the two cases in this study and the disturbances and responses that were analyzed. A likely possibility is that, in certain cases, policy-level cooperation drives or forces the operational work, and the results mix. So while operational

cooperation may eventually lead to higher-level political support, it does not appear to have the coercive or suggestive power that policy-level cooperation has on ground-level operations. The analysis of the ground-level work on the control of veterinary disease suggests that operational support may stem from the high levels of political support in some circumstances. While some may posit that the operational cooperation in the Kgalagadi enabled the policy-level collaborations that emerged in 1999, there is little evidence of a causal linkage there. Instead, circumstantial evidence suggests that the limited political support during the treaty stages of the Kgalagadi served instead to further political agendas in the Great Limpopo, not the Kgalagadi. Based on a review of collaboration on veterinary disease control, it appears that high-level policy support may emerge from top-down beginnings, and it also may sometimes foster operational cooperation, but the evidence linking operational support and policy-level cooperation in transfrontier conservation is far from definitive.

The clearest instance of top-down park beginnings influencing policy-level cooperation comes from the speed of implementation in the GLTP. Once the process started gaining momentum, the bureaucratic decisions happened quickly. Treaties were signed, parks were created, and management structures were designed. However the brisk pace of policy progress often hampered operational progress. In the rapid ramp-up of the transfrontier park, political leaders set very short timeframes. Two national-level political decisions epitomize the trumping of operational choices with political demands – the shift from a TFCA to a transfrontier park and the resolution to minimize community involvement. In both cases, some operational staff disagreed with the decisions. These choices ultimately resulted in the resignation of key managers and personnel. Problematic aspects continued to emerge as the mismatch of bureaucratic and operational timelines became more apparent. The mismatches became most apparent in the tearing down of fences and release of animals – an international political event showing unity of purpose in the transfrontier park. Fence removal happened without notifying communities that could be affected by increased wildlife encounters. As a result, already conflictual relationships deteriorated further.

Five years beyond the signing of the GLTP treaty, substantial ground-level progress has occurred, and the political pressure has eased somewhat (JMB member, 6/12/2007). Some of the pressures of early missteps and conflict zones of the past have dissipated as ground-level workers have had the time to resolve problems, work with outside stakeholders and community members, and look beyond the park to the larger conservation area. Mozambique has especially benefited from the somewhat eased pace and taken the time to work through some of their operational dilemmas. This has been especially important, as some of the strongest support for the

hypothesis came from the creation of the Limpopo National Park. High levels of political support, without grounded realities, resulted in a national park that struggles with building capacity at the same time as it established a massive conservation park, capacity that still requires augmentation. The policy impetus, without the on-the-ground time needed for implementation, also resulted in problematic relations with community members. In Mozambique, people often did not know if they were required to relocate or not. They often heard rumors of impending moves, making it difficult to make livelihood decisions due to their uncertain future (Mozambican researcher, 10/3/2006). This has exacerbated poor park-community relations. Likewise, the prohibition from adding local representatives to transfrontier management boards, the lack of community participation, and the decision to bypass community feedback on the South African side and in the TFCA as a whole has hindered operational level progress. This coordinated decision to minimize the role of communities in transfrontier park management at the policy-level has aggravated operational challenges.

Responses to river health indicate that, while top-down initiatives may hold an advantage in garnering policy-level cooperation, there are limits. These limits become apparent in bureaucratic decisions from outside the park services and environmental ministries. Governance responsibility for disturbances affecting river health in the transfrontier park resides in the national ministries of water. These ministries in Mozambique and South Africa have good working relationships, but they often diverge from the wishes of the park service. From international river management at one end of the spectrum to local catchment management associations at the other, the transfrontier park managers confront large swathes of the decision-making power on river issues that lie far outside the authority of the park officials. Thus, in spite of the magnitude of the disturbances surrounding rivers and water in the transfrontier park, the park service has little control of the system and must rely on collaboration with outside entities.

To summarize, some evidence exists supporting the hypothesis on policy-level cooperation, but a great deal of noise surrounds it. The speed of implementation and the policy-making decisions with respect to local communities highlight both the high degree of cross-border cooperation at a policy-level and how this cooperation does not always trickle down to the operational level. The noise comes from two sources. The first source of noise comes from how the influence that policy-level cooperation can interact with operational level concerns, as in the responses to veterinary perturbations. The second source of noise in analyzing this hypothesis comes from the limited sphere of influence of policy-level cooperation. As soon as a disturbance affecting the transfrontier park falls under the jurisdiction of other governmental bodies – as in the case with river health and the Departments of Water – the environmental ministries and park

departments lose some control of the response. In these cases, their superior degrees of policy-level cooperation do not directly influence their capacity to effectively respond to the disturbance. In addition to the data collected on the disturbance-response events from the top-down GLTP, evidence from the bottom-up Kgalagadi also supports the hypothesis. National support for the Kgalagadi has been limited throughout the history of the transfrontier park with the minor exception of the ribbon-cutting ceremony officially proclaiming the park, supporting the corollary of the hypothesis that bottom-up created parks have lower levels of policy-level cooperation.

4.3. Conclusion

This chapter has examined the detailed contextual evidence testing two hypotheses. In the first half of the chapter, the responses to several disturbance-response events and the amount of cross-border cooperation that resulted showed substantial support for Hypothesis 2 – bottom-up origins of a transfrontier park result in more operational cooperation than TFCAs of top-down origins. Again, the bottom-up origination allows for repeated opportunities to work together to resolve collective problems and respond to disturbances of importance to the collective entity. In turn, this results in a build-up of trust and social capital, which then lead in a virtuous circle to more operational cooperation. In a top-down origination, the transfrontier park is imposed on ground-level staffs in each partnering country. When faced with similar collective problems and disturbances, the operational staff that has to respond has no social capital to draw upon and much of the decision-making remains autonomous and within the separate systems. Evidence from animal control, border security, local community relations, and tourism planning all lend credence to the hypothesis.

At the same time, the two cases provide mixed support for H3 – that top-down origins result in more policy-level cooperation than cases bottom-up origins. While responses to disturbance suggest that the hypothesis holds in some places, it is not so clear-cut. Speed of implementation shows the clearest evidence of policy cooperation emerging in a top-down park well in advance of operational support. This rush to implement happens repeatedly – in the creation of the Limpopo Park, in the push for a transfrontier park instead of a conservation area, and in the reduced role for local communities and co-management positions in the transfrontier park. Veterinary disease control provides an example of operational cooperation growing out of policy-level cooperation. Even in this case of relatively high levels of grassroots support, political considerations drive the process. The disturbance of river health provides another problematic area for the hypothesis. Here, the explanatory power of the hypothesis is limited because the evidence suggests that policy-level cooperation often will not hold across

governmental silos. Finally, lack of policy-level support in the KTP supports the hypothesis that top-down parks will engender more broad-level cooperation than bottom-up parks.

In the final chapter, the discussion shifts back to the initial inquiries into institutional robustness. At this point, the examination of a diverse number of disturbance-response events provides insight into how different types of governance structures react differently to different types of disturbances. Cooperation occurs in some places and not in others. Different types of institutional arrangements are more (or less) robust to different types of disturbances, and no arrangement provides absolute protection or is better in all cases. Based on this knowledge regarding the most frequently mentioned disturbances and the type of cooperation that develops within different governance structures, the study concludes with a brief discussion on policy regarding possible roles going forward for a Joint Management Board.

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5. Chapter Five: Disturbance Dilemmas, Robust Responses, and Good Governance

"Conservation is a state of harmony between men and land."
- *(Leopold 1949)*

Globalization affects every aspect of conservation today. International organizations and international non-governmental organizations shape many conservation initiatives in every corner of the world. These projects often overrun pre-existing local efforts. However, more and more conservationists and development planners at multiple scales have begun to integrate their efforts. This integration has brought many challenges of cross-scale, cross-border governance – favoring conservation or development goals, balancing between global desires and local necessities, and pushing a rapid pace of progress. One of the foremost international conservation efforts brought about by these international actors and global processes is the development of transboundary conservation projects, often known as Peace Parks. These parks encapsulate many of the challenges facing conservation in the 21st Century due to the scale and scope of their efforts, the interactions of actors at local, national, and international levels, and struggles with all of the challenges of cross-border governance. These transboundary struggles form the heart of this research program.

In this study, I have focused on an analysis of the Great Limpopo Transfrontier Park and the Kgalagadi Transfrontier Park, two transboundary protected areas located in southern Africa. While similar in many respects – size, involvement of South Africa, land tenure arrangements, and duration of international treaties – certain critical aspects of their history set them apart from each other and form the backbone of this study of how different governance structures affect the institutional development of transboundary conservation. The research analyzed how park officials reacted and responded to disturbances, created cross-border institutions, and when and where they engendered cooperation. The most interesting findings show how the bottom-up development of the Kgalagadi case led to successful responses to particular types of disturbances while struggling to deal with other. Similarly, the top-down development of the Great Limpopo has thrived in its capacity to respond in some cases and toiled in others. The two cases often diverge in their areas of strength and strife.

The following sections highlight the main findings enlightened through research on how the governance structure of the two cases leads to different capabilities in response to disturbance. The first section of this chapter revisits the set of questions initially broached in the introduction. The second section then discusses some of the critical adaptations and transformations resulting from a wide range of disturbance-response events. The next section returns to the first theoretical

question of Chapter One, exploring how to manage within a polycentric system and when cooperation across a border makes sense and when a smaller-scale response is in order. The following section discusses the second theoretical question on the conditions facilitating institutional robustness. The fifth section shifts attention to issues of more applicable and practical relevance – what role should the Joint Management Board play vis-à-vis national organizations and how and when should cooperation occur. Finally, the chapter concludes by revisiting the original research question of how the institutional design of TBPAs change in response to various types of disturbances.

5.1. The Importance of Building

The study has focused on the conflux of several deep, complex and intertwined ideas. The first page of the thesis introduced several questions of interest:

- How do actors effectively coordinate their actions within a multi-level, polycentric governance system?
- How can actors design or modify institutions to improve cooperation in areas that would benefit from more collaborative efforts?
- In turn, how can people design institutions to be more robust to future challenges or disturbances?
- When and how do park managers and government officials work together in transboundary parks?
- Why do these actors foster or facilitate cooperation across borders in some areas and not others?
- Finally, with long-enduring institutions, how do people sustainably manage a social-ecological system?

In the pages and chapters that followed many more ideas, concepts, and hypotheses were introduced. Ultimately, these questions all revolve around four interlinked ideas of "building". They all relate to building trust and social capital, building appropriate levels of cooperation and collaboration, building institutional robustness and long-enduring institutions, and building effective cross-border governance structures. It is the aspect of building that unites the questions in this study. The reflexive behavior of human actors creates a social-ecological system where individuals and organizations attempt to shape their environment in beneficial ways. In particular, the study intends to provide insight into how humans can design governing institutions that improve their situation, that provide long-term solutions for collective action problems, and that enhance sustainability in social-ecological systems across scales.

5.2. Adaptations and Transformations

After exploring dozens of disturbance-response events in the two case studies, a new puzzle emerged. Why do some types of governance structures have better capacity and capabilities for dealing with some types of disturbances than others? Often, the Great Limpopo and the Kgalagadi faced similar disturbances but responded in different manners and with different levels of intensity. Responses to one type of disturbance succeeded at one park, while similar responses worked less well in the other park or even in the same park in response to a different disturbance. In choosing to categorize the two parks by their style of origination provides one perspective for how responses may differ between the two. At an intuitive level, the bottom-up nature of the Kgalagadi should lead to greater capacity to respond to operational disturbances, and many of the examples support this intuition. Likewise, the top-down beginnings of the GLTP suggest that it has an inherent advantage in responding to policy-level disturbances.

Yet, these insights go well beyond simple, intuitive notions. Theory also supports this intuition. From theories of resilience, the importance of slow and fast variables indicates that the operational collaboration in the Kgalagadi leads to greater levels of cross-border trust accompanied by high degrees of social capital as compared to the transboundary partnerships imposed on the ranger corps of the Great Limpopo. By contrast, the speed of policy response in the GLTP as compared to the Kgalagadi leads to more policy-level cooperation. Duit et al. (2008) note that centralized governance structures, like the environmental ministries' support for the GLTP, often respond effectively to disturbances where they can exploit their size and power. Conversely, responses to new and novel disturbances that require flexibility and on-the-ground learning emerge more readily in an environment similar to the governance structure in the KTP. Kingdon's (1984) "windows of opportunity" explains that the political entrepreneurs within the central governments and the powerful international conservation NGOs also helped create a situation where the GLTP could quickly respond to certain types of disturbance due to the senior-level support for transboundary conservation. Robustness theory does not indicate which type of governance structure will evolve to be more effective to a particular disturbance, but it does indicate that no structure can fix or optimize everything. Different response capacity will emerge depending on the type of disturbance designed for, whether intentionally designed in this manner or not. This suggests that operational officials generally would design institutions that result in more effective responses to the types of disturbances that confront them in their daily work. Similarly, policymakers will design institutions to respond to their needs at a policy level.

The international relations literature, particularly the work of international institutionalists, sees cooperation evolving in steps and starts and depends on the building of trust and social capital. Several of these paradigms suggest that cooperation will emerge through functional levels that work closely together – between operational staff in the KTP and between policymakers in the GLTP. Work in multi-level governance stresses the need to improve cross-scale linkages, take advantage of institutional diversity, and see the differences between policy and operational cooperation. Further development of these insights from the perspective of polycentricity and adaptive governance will resurface in following two sections. In summary, many of the theoretical insights support the intuition that the KTP and the GLTP will respond better than the other to different types of disturbances.

The insights also go beyond the basic intuitive ideas. Rather than presume that "small is good" or that "bigger is better", Chapters Three and Four review many of the leading disturbances and the institutional responses. They provide examples of how the Kgalagadi generally responds more effectively to operational level disturbances and the GLTP responds better to policy issues. However, both chapters also acknowledge some anomalies from this pattern. In revisiting a few of the most frequently mentioned disturbances, the analysis assesses the park managements' collective responses to see whether the park went through a transformative change, adapted to the disturbance without significantly altering the state of the system, or whether no major changes took place.

Partly as a consequence of the "New South Africa" in the post-apartheid world and the end of civil war in Mozambique, many of the transformations experienced in southern Africa in transfrontier conservation and in conservation in general tie to the relations between park management and local communities. In response to the struggles with local communities over land claims, co-management arrangements, resettlement, and land tenure disputes, policymakers in the GLTP are now revisiting the controversial decision to shift from a TFCA to a TFP. The initial decision to focus on a transfrontier park is occasionally referred to now as a "decision of political expediency" (DNAC official, 6/14/2007). Discussions have started again to expand thinking beyond the park borders to a giant multiple-use conservation area, a major policy transformation. No such policy changes are anticipated in the Kgalagadi.

With this decision, more discussions between park officials and communities along the Limpopo River focus on the creation of an unfenced buffer zone rather than a fenced boundary. Past philosophy in South Africa used fences as hard barriers to keep animals in and people out. With the removal of sections of fencing between South Africa and Mozambique in creating the GLTP and with further decisions not to fence the eastern boundary of the transfrontier park,

management reliance on this philosophy has weakened. Instead, park managers in South Africa have even started to discuss the possibility of creating buffer zones along the western border of Kruger and possible changes in resource use by community members (SANParks official, 10/30/2006). In response to the challenges along the interface of local communities and the park, policymakers have started to respond. It remains to be seen how these policy transformations will cascade down to the operational level and how rapidly changes will take effect.

While relations between local communities and the GLTP have often involved transformative change, the shifting from a fortress conservation mindset to more of an open partnership with park neighbors has been more of a gradual adaptation as needed. This is a response to persistent, continuous stress for local resource user rights rather than a one time response to a huge shock. Future research may provide a mean of testing the explanatory power that response to persistent stressors is more apt to be incremental adaptation than responses to large, infrequent disturbances. In other words, is there a correlation between amplitude and frequency of disturbance and the type of response? Other institutional responses to disturbances have also taken a more incremental, adaptive approach. Another of the major concerns in the GLTP has always been the control of veterinary disease. With parks as "conservation islands" with high concentrations of game surrounded by livestock, park veterinarians view their role as mitigating the outbreak of disease epidemics (SANParks staff, 01/09/07). Linked to the changing philosophies behind the use of fencing discussed above, as fences come down the spread of diseased animals across international boundaries, the spread from wildlife to domestic stock, and the risk to human populations increase. As a result, the veterinary sub-committee in the GLTP has worked closely together by sharing expertise, trying to minimize risk, and increasing adaptive capacity (DNAC official, 03/08/07). Working with the AHEAD (Animal Health for the Environment and Development) project, an international epistemic community has evolved out of national initiatives in the GLTP (Cumming et al., 2007(Cumming, Biggs et al. 2007)). Such high-level initiatives are precisely the type of policy responses anticipated by both intuition and theory to occur in the Great Limpopo as opposed to the Kgalagadi.

Another major concern in both the GLTP and the KTP concerns human-wildlife conflict. Whether this conflict takes the form of crop loss to elephants in the Limpopo, loss of livestock to predation in the KTP, or direct threats to human life; human-wildlife conflict has the potential to destroy lives and livelihoods and tear relations between park and community asunder. Compounding this, current policies in South Africa and Mozambique minimize compensation of loss by the state while still preventing civilian killing of wildlife in response to damage-causing animals. In the Kgalagadi, park rangers respond to the threat immediately, capturing lions and

leopards and returning them to the park (Funston 2001). Regardless of whether the animal escapes into Namibia, Botswana, or South Africa, South African rangers play the lead role in returning the animal to the confines of the park. In doing so, they work closely with park rangers across the border, border control officials, and local ranchers. Actions over the past few years to improve cooperation have resulted in joint training on animal recovery and improved communication networks with ranchers. Such tight cooperation does not yet occur in the GLTP.

One final disturbance of critical importance is border security. Early discussions in both parks viewed transfrontier parks as an opportunity for wildlife, staff, and tourists to have a completely borderless park experience. Tourists could enter the park and travel anywhere within the park without officially traversing a border post. Staff would interact seamlessly across the border. Animals would see a fenceless stretch of landscape. In the Kgalagadi, ground-level implementation of border security policy has evolved to bring this concept to fruition. Current travel within the park does not necessitate visiting a border post as long as entry and exit of the park occurs in the same country. However, a passport stamp is recommended in case of emergency and would be required upon exit in the other country (SANParks staff, 3/23/2007). Efforts are in progress to build a single border post and park entrance at Twee Rivieren directly on the border (in the riverbed) to allow for a one-stop entrance and border crossing. This level of cooperation on border security is no doubt due to the unique context of the Kgalagadi with its remote location and low human population density. Furthermore, the relationship between the equally high economic levels of Botswana and South Africa, the similar openness of governance, and general good relations between the two countries help support a more relaxed border environment than in many cases.

The situation in the GLTP, however, is quite different. In spite of the conceptual ideas of early advocates, border security concerns soon took precedence (Peddle, Braack et al. 2004). Border officials confined and minimized fence removal along the border. Border crossings between South Africa and Mozambique required the placement of a border post in the center of the park at Giriyondo, established in 2006, and another at Pafuri in the northern end of the park. Park visitors must have the necessary visas and paperwork to visit both sides of the park. Travel into the Zimbabwean section of the park still requires leaving the GLTP frontiers and crossing through a standard border post at Beitbridge, although efforts are underway to build a bridge across the Limpopo River connecting South Africa and Zimbabwe. The difficulties of border crossings affect park staff and researchers alike. While joint research projects and collective staff efforts continue, border crossings require the standard border post experience as well as requiring research approval from multiple governing bodies. For a variety of reasons – threat of illegal

migration and smuggling, population densities, historic relations, and unequal levels of economic development – border security in the GLTP has remained far stricter and less willing to adapt within a new transfrontier entity than in the KTP. It is doubtful whether this fact will change in the near future.

In attempting to understand and study several theoretical and practical puzzles regarding polycentric governance, institutional robustness and cooperation in transboundary conservation, a new puzzle emerged, one born from exploring the original puzzles introduced in Chapter One. The new puzzle asks why some types of governance structures have better capacity and capabilities for dealing with some types of disturbances than others. Intuition, theory, and real world all coalesce to provide answers to this question and provide some degree of support for Hypotheses 2 and 3, analyzed in Chapter 4. In short, systems of governance tend to respond better to the types of challenges that the designers often confront and have personal experience with addressing. In a transboundary protected area that originates from high-level policymakers, such as the Great Limpopo, park management has a bias towards response to policy challenges. Cross-border partners cooperate on these types of issues. Conversely, in the Kgalagadi Transfrontier Park which originated from a local initiative, park developers designed governance structures efficient in response to operational issues. They had control over these issues and the expertise to deal with them. The next several sections examine this statement in more detail, shifting back to look at the theoretical and practical puzzles outlined in the introduction.

5.3. Lessons in Polycentricity and Multi-Level Governance

The first chapter introduced the major theoretical puzzle of the study – how to manage within a multi-level, polycentric governance system. By looking at the responses of actors across a wide gamut of disturbances at multiple scales, the two case studies provide useful windows for examining multi-level governance systems. Because the levels of governance spanned challenges from very parochial and local to very broad and international, the cases create a view of polycentricity across a broader canvas than many studies of polycentricity. In addressing this puzzle through these cases, three key takeaway messages emerge. First, this study seeks to apply polycentric frameworks to levels of governance up to and including the international sphere. Often, systems of polycentric governance limit analysis to local systems or to national/federal systems at the broadest. The transfrontier parks enable a view of a "localized" international system, one that crosses national borders, yet still retains important notions of place. Second, effectiveness in polycentric systems requires matching responses to disturbances. This matching provision often is ignored in the political struggles for power and control, one of the most important findings from the decentralization literature. The matching of responses to the scale of

effects of a disturbance helps to guide when and where cooperation across a border makes sense and when response at a different scale is preferable. The third point expands on this matching provision, stating that in addition to matching responses to disturbances, governance structures can also be designed for certain sets of commonly encountered disturbances or disturbances of high concern. The different response capabilities of actors in the two case studies highlight how governance structures may respond to one set of disturbances better than another set and that other governance structures will have different capacities of response to other sets of disturbances.

5.3.1 Polycentricity at Broader Levels of Governance

The first important finding from the study pertains to the use of polycentric ideas in broader levels of governance than past research analyzed. Most studies of polycentricity have explored ideas of overlapping authority and multiple centers of power in smaller scale systems – the water districts of Los Angeles (Blomquist 1992), municipal public service provision (Parks and Oakerson 1989), and local-level irrigation associations (Lam 1996), among others. However, while some research has been directed toward the upper scale of federal systems (see especially (Ostrom 1994)), few studies have directly applied these principles to the international level. In studying transboundary protected areas, this research expands the scale of study to the international level. Few, if any, other studies explicitly use polycentric concepts at such a broad scale.

Of course, other bodies of literature draw upon similar ideas such as much of the decentralization literature, some collaborative governance work, and other studies of networked governance. All focus on governance at multiple levels and governance beyond government. To varying degrees, especially the decentralization work, each also tries to explore how to divide decision-making power between levels of governance. Polycentricity emphasizes two important points more than the others, however. First, not only do multiple centers hold governing power, but polycentricity also emphasizes aggregating decision-making in some cases and decentralizing it in others based on the nature of the issue. It is not a debate over the merits of centralization or decentralization. Different types of disturbances necessitate action at different levels of governance. In addition, multiple centers of power at similar levels provide "laboratories" for experimenting and offer the aggregate social-ecological system more institutional diversity. This diversity creates chances for some centers to succeed while others fail, allows learning to occur between centers, and enhances the probabilities for long-enduring institutions. At the same time, other levels of governance can serve as bridging organizations and help to share knowledge and successes between parallel programs at narrower levels. In the case of the transfrontier parks in

South Africa, programs within the parks can be replicated at other transfrontier parks through TFCA coordinators in the central park offices. An example of this emerged in modifying the organizing structure of the Kgalagadi after experimenting with different arrangements in the GLTP. Second, polycentricity more explicitly highlights the role of transaction costs in determining governance arrangements than some of the other literature does. In some cases, the aggregation of governance to a higher level increases the cost of decision-making through increases in communication costs, additional time for reaching consensus, and other expenses of spanning larger areas. In other cases, the larger size provides economies of scale and scope and reduces costs. Oftentimes, moving up a level reduces the number of organizational actors involved in decision-making, even if the decisions cover a larger population. This can be good or bad and controversial or not depending on the nature of the decisions. The Kgalagadi, for instance, gained economies of scale in having a joint response team for human-wildlife conflict. The costs of maintaining two separate groups, when combined with capacity shortfalls, made the choice an imperative. At the same time, the costs of coordinating scientific research programs in the Kgalagadi, at present, seems to outweigh the benefits of combining the research agendas.

At the same time, while most focus on transboundary parks looks at the international arrangements in the parks, many of the challenges on a day-to-day basis occur at a very local level – through interactions regarding relations with neighboring communities, human-wildlife conflict, and veterinary disease control. While each of these disturbances has regional, national, and international aspects, a large part of the challenge occurs locally with responses by field rangers and other operational officials. The overwhelming focus on the international aspects of TBPAs on the part of many researchers and donors seems a bit misguided. Polycentricity provides a means of accounting for multiple levels of governance, encompassing the international aspects of transboundary conservation while still enabling in-depth examination of very localized situations which are often coordinated by local actors. It is the contrast between efforts at the international and local levels that differentiates many of the successes and failures of the two case studies.

5.3.2 Matching Responses to Disturbances

The second take-away message on multi-level governance, true to the heart of polycentric governance ideals, is in some ways intuitively obvious. Effective responses to disturbance all depend on the nature of the problem. Some disturbances are best handled locally, other responses work better centrally, and others require a multiple level, coordinated approach. By studying a whole host of disturbances that affect transboundary protected areas across a range of ecological scales and governance levels, this research tries to grasp how overlapping jurisdictions and

multiple sources of governance can work in reality. As in many systems, the challenges come from coordinating myriad responses to disturbances in a highly politicized environment. The conflicting goals and political agendas of different sets of actors – economically, ecologically, and ideologically – eliminate any clear-cut solutions. Many transboundary conservation advocates continue to ignore the diverse goal prioritizations of various stakeholders in the process and continue to appeal to "win-win" solutions, avoiding conflict and keeping everyone happy. Not only is this often unrealistic, but it also results in messy governance arrangements and obfuscates a simpler exercise of matching the appropriate level of governance responses to the scale of disturbances.

Another challenge in matching response levels to disturbances is a practical one. Most of the current decision-making occurs without the luxury of time to examine response options and the appropriate level of governance. Instead, key actors, such as the national park officials, make the best decisions possible in short order. Joint Management Boards meet only periodically, and rather than shuttle decisions back and forth between levels, officials make quick decisions as problems emerge and move on to "fight the next fire" (SANParks official, 11/27/2006). One goal of this research is to clarify the disturbances facing transboundary protected areas and consciously assess the nature and scale of the challenge and potential responses. Eliminating artificial waterholes or operationalizing fire policy works best through local level officials. Coordinating ideal policies for drought and fire response, however, necessitates discussion and coordination at broader levels of governance. Likewise, national-level policies may dictate minimal involvement with community officials, but coordination of co-management arrangements between contractual parks and between TFCA management groups may require park authorities to work as go-betweens. Officials know the problems that they face, but they often have neither the time nor inclination to map out the multitude of issues and the scale and scope of each. They may also not know how to move up a governance level, who to talk to in the partner countries, or the authority to make these types of decisions. As the previous section discussed these types of decisions and choices come with higher transaction costs that also needed to be weighed against the gains from collaboration, if not in actual calculations then at least conceptually. In addition, many of the challenges interrelate, further obscuring the type and level of response. Instead responses to disturbance are often ad hoc or an incremental addition to pre-existing response systems. The simple, intuitive idea of matching responses to disturbances at the appropriate level of governance appears so easy and straightforward. The reality is quite different, as this study repeatedly emphasizes.

5.3.3 Matching Governance Structures to Disturbance Sets

The third comment on polycentric governance, and the main message of this study, is that different governance structures respond better to different types of disturbances than others. This idea relates to engineering research on Bode Integrals within linear control systems. The analogy is that in effectively responding to frequent, low amplitude events (disturbances), a system becomes vulnerable to low-frequency, high amplitude events. In effect, becoming robust to one type of disturbance may make the system vulnerable to other types. Examples of this in transboundary conservation will follow in the coming section. Maintaining a flexible approach to governance and being willing to relinquish authority in appropriate places will allow for better responses to disturbances. Relinquishing authority must occur both in centralizing some work and decentralizing other work. Understanding this idea and doing it are two different tasks and goes against much of bureaucratic theorizing speculating that the bureaucratic mindset is about gaining power (Niskanen 1994). This requires communication and trust between levels of governance and between governmental agencies within a country, just as required with cross-border collaboration. Current governance structures are contingent on the historical context in which they emerged and on institutional evolution since that point. As a result, wholesale changes are extremely difficult, but the structures do change incrementally over time partially guided by path dependence.

The two transfrontier parks of this study differ in substantive ways with respect to their governance structures. As emphasized throughout, the bottom-up nature of the Kgalagadi has led to a heightened ability to respond at a ground level when compared to the Great Limpopo, which has its own strengths in responses at a policy level. Although much of this is due to the nature of their individual inceptions and the institutional evolution since then, it alludes to ways of playing to the strengths of different institutional structures at times, relinquishing jurisdiction in other cases, and augmenting capacity in other places. In spite of its inherent strength at the policy level, the Great Limpopo has tremendous operational capacity in Kruger Park. GLTP officials have not yet figured out how to apply these talents to the transfrontier park. Mozambique has expressed a keen desire to learn from this knowledge base rather than relearn skills and abilities (DNAC official, 6/12/2007). Although the GLTP has emerged from a top-down process, the capabilities of SANParks provide tremendous opportunities to improve at an operational level. The Kgalagadi has great cooperation between park officials but has not yet translated this partnership at the policy level. One possibility here is that, due to the successes on the ground in the Kgalagadi, park officials will rise through the ranks of both the park services and ministries of environment. In turn, as operational officials surface in higher level policy roles, the potential exists that policy support for the Kgalagadi will improve. This has begun to happen, with former

Botswana officials moving into director-level positions in the park service and former South African wardens moving into SANParks regional director positions. By building on their respective strengths, acknowledging areas of undercapacity, and being fully cognizant of how different disturbance types affect the social-ecological system, the ability to respond to disturbance can continue to improve. While influenced by historical context and the effects of path dependency, ultimately institutions are designed and respond to human agency. Thinking about governance in a polycentric manner builds understanding of the strengths and weaknesses of different types of governance structures and their abilities to handle and respond to different sets of disturbances. In turn, this enables actors to shape and craft institutional arrangements in response to the most pressing needs. As the following discussion on robustness emphasizes, actors may craft institutions for robustness to some types of perturbation, but there are always trade-offs between robustness and performance and robustness to multiple disturbances (Janssen and Anderies 2007).

5.4. The Robustness of Governance Institutions

The preceding discussion on polycentricity leads directly to the study's second theoretical puzzle – how to improve the robustness of governance institutions and how to create long-enduring institutions. Concepts of polycentricity point to how the capabilities of different governance structures enable better responses to some types of disturbances than others. In designing and improving these governance structures, earlier conjectures on robustness noted that social-ecological systems are too complex to optimize and that design toward response to certain types of disturbances leads to a design that is robust, yet fragile (Carlson and Doyle 2002). By "robust, yet fragile", the authors refer to how system designers build robustness to one type of perturbation while trading off robustness to another type of perturbation. An example of this within the transfrontier parks lies at the heart of the Great Limpopo's creation. One of the ecological goals for park creation mentioned in Chapter One was to minimize habitat fragmentation and create a larger open space for conservation. In removing fences and establishing the larger protected area, the ecosystem became more robust to problems due to genetic inbreeding, local species extinctions, and many more of the issues addressed in section 1.3.1. At the same point, the removal of fencing has increased the risk of breakouts of veterinary epidemics. Given constant levels of capacity, the robustness to veterinary disease declined with the increase in robustness to problems due to habitat fragmentation.

With this conceptual background, the case analyses suggest four main points in improving the robustness of governance institutions. First, as the differences between the two case studies exhibit, institutional change is often a slow, guided evolution and may take a great

deal of time. Cases of punctuated equilibrium, the tipping points and thresholds of resilience theory, show that change, however, can sometimes be dramatic. In between tipping points, though, institutional change is often agonizingly slow for institutional reformers. Second, the robustness of institutions may improve from governance structures emphasizing aspects of polycentric design. Of course, many other techniques can be used to build or maintain robustness, ranging from autocratic regimes to fully decentralized cases. The point is not to exclude the other options but to emphasize a democratic and equitable means for improving upon the robustness of existing designs within the current governance structures. Third, philosophies of adaptive governance provide prospects for building robustness by hunting for and taking advantage of opportunities. To do this, an atmosphere and attitude of learning and experimentation is needed. Finally, governance structures that allow for institutional diversity create even more opportunities for experimentation, learning from the successes and failures of others, and provide the foundation for recovery from failed policies. Institutional diversity supports adaptive governance efforts which in turn help promote robust alternatives. These four points will be expanded upon in the following sections.

5.4.1 The Pace of Institutional Change

First, institutional change often takes time. Rules and norms can change extremely slowly. One of the keys to success for the Kgalagadi has been that it has had the time to evolve. Through much of its informal history as a transfrontier park, the Kgalagadi had little outside exposure. Park officials had a free rein to experiment and learn in a transboundary environment. They did not face a lot of pressure from higher authorities. Nor did the national agencies force specific approaches upon the parks. Local officials had the freedom to make decisions appropriate to local circumstances. As a consequence the governance structure could evolve slowly over time, guided by those most directly in touch with the environment. By contrast, like royalty, the GLTP has had a place in the public's eye since before its conception. The transfrontier park was created by edict, a punctuated event to the system. Following the clear shift at the policy level, many expected correspondingly quick results operationally, but the institutional framework has not had time to develop and change as needed. Nor have local officials always had the scope to innovate without the outside involvement of powerful non-governmental organizations or the national governments. It is not clear that time will resolve many of the problems in the GLTP, but it is unreasonable to think that failure is inevitable given the short time that has elapsed for operational-level development to date.

Just as institutions often change slowly, building social capital takes time. Cross-border cooperation and collaboration, as frequently mentioned, requires trust that emerges from social

capital. Many of the current frustrations in the GLTP and the mindset that progress in the transfrontier effort has stagnated may disappear as the slow variables of transfrontier conservation – social capital accumulation and trust-building – catch up with the dramatic shifts in policy of recent years. The close relationships and trust across borders in the Kgalagadi has taken years to develop and has benefitted from many long-tenured staff. As one official described, "It takes several years to become acquainted with the Kalahari, and it takes decades to understand it. But it takes a lifetime to become a part of it" (SANParks official, 3/23/2007). It may be that the GLTP still needs time to build operational relationships in parallel to the policy level ties.

5.4.2 Linking Polycentricity and Robustness

The second finding regarding how to build the robustness of governance institutions draws on the previous discussion on polycentricity. Much of the institutional design in transfrontier conservation in southern Africa over the past decade has taken a "smart guy" approach, where experienced practitioners made necessary decisions on the fly. In many cases capacity constraints and urgency of action dictated this course. This approach has a historical base in the history of the national parks movement in South Africa, led for many years by intelligent, driven, and caring leaders guided by hands-on experience and passion for conservation (Carruthers 1995). Only after 30 years of operation did scientific study and research begin to factor into park management. Similarly, in the transfrontier parks organizational decisions were based on previously limited experience with transboundary protected areas and educated guesses. While this is a good start, there has been little conscientious thought to improve upon this design, and it is not clear how robust current designs will be. As stated earlier, this is not due to poor judgment as much as it is due to the lack of time for reflection and analysis across the plethora of disturbances facing transboundary conservation efforts. One starting point to improve upon the current structures would be to think in terms of polycentric design about how to respond to the disturbances judged to be the most important anticipated or historically repeating and do this in a place-based manner. This means that decisions should focus on the context of a specific park much more than basing decisions solely on what has worked in other places. To reiterate parts of an earlier point, some responses will require close collaboration with cross-border partners and others will work better proceeding individually. Some should involve senior policymakers and others decentralized to park officials. Some disturbance responses should coordinate the actions of local officials, and others will work between national delegates. These decisions should be made explicit. Many of these suggestions may appear intuitively obvious after being spelled out, but one point of this research was to clearly define and delimit

institutional responses to disturbance and think about how to improve transboundary conservation decision-making, something that is not necessarily obvious.

In advocating for a polycentric approach, this research does not call for a pollyannish, polycentric panacea. The contextual differences between the two case studies and other transfrontier conservation initiatives may require radically different decisions to similar types of problems. In some cases decentralized decisions in one park may need to be made within the national governments or at a transboundary level in another case. For instance, it may make sense for Kgalagadi officials to work together with the Ae!Hai Heritage park in the co-management of both the contractual park and the transfrontier park. At the same time, the sensitivities of local communities in the Great Limpopo, with resettlement and land claims, may require a more nationally centralized approach. Second, in trying to understand the robustness of institutions, this research does not presume that polycentricity is the only means of improving robustness. As the governmental involvement of Zimbabwe in the GLTP has repeatedly shown, other forms of governance can prove extraordinarily robust, whether autocratic and autarkic, decentralized and local, or from a multitude of other varieties. Polycentricity does fit well with the democratic ideals of Botswana, the new South Africa, and the rapidly improving governance of Mozambique. A polycentric approach expands on the existing governance structures of many of the transfrontier conservation areas in southern Africa, splitting authority transparently between local officials, national governments and transboundary management boards and collaborating to different degrees depending on the issue. The belief that polycentricity can improve robustness only calls for making such decisions more explicit.

5.4.3 Learning and Experimentation

The third point for maintaining robustness in a complex and ever-evolving social-ecological system is to create an atmosphere for learning and experimentation, an approach that some identify as one aspect of adaptive governance (Folke, Hahn et al. 2005). Another way of phrasing this approach is to concentrate on building adaptive capacity. Earlier, adaptive capacity was defined as the physical, economic, social and institutional requirements for enabling adaptation (Tompkins and Adger 2004). In other words, taking an approach of learning and experimentation to decision-making enables a governing environment more capable of responding to uncertainty and change and an institutional structure capable of somewhat controlled or guided evolution in response to perturbation. One possible initiative to strengthen adaptive capacity in the future comes from the adaptive management programs of SANParks. Two challenges make this a difficult program to roll out in a transfrontier environment. First, developing thresholds of potential concern and other social-ecological targets in an environment

of uncertainty creates the risk of indecision. There is a fine balance between the need for more experimentation and learning on the one hand and timely decision-making on the other. This can be difficult enough within one organization, such as SANParks. It becomes even more difficult when external disturbances, beyond the auspices of the park service, perturb the system. In this case, adaptive decision-making must include other organizations ranging from community groups to other governmental departments at multiple levels of governance to NGOs. This leads to the second challenge for adaptive management within a transfrontier conservation area – the recurring difficulties of managing across a border. The levels of uncertainty can wreak havoc on fragile international institutions with unclear and often mixed agendas. Perhaps more importantly, the need for opportune decisions becomes more evasive as the time and cost of decision-making rises due to the requirements of collaboration in such an international arrangement. This does not make the adaptive management program a forgettable idea, only an increasingly challenging concept to implement, particularly with transboundary partners of limited capacity and multiple levels of governance involved and affected.

As discussed in Chapter Three, experimentation and change can be reactive (an adaptation) or forward-looking (a mitigation). In addition to modifying institutions for robustness in response to perturbation, institutional change can also be directed toward achieving social goals, such as improved efficiency, equity, and others. In Chapter Three such institutional modifications were labeled as innovations. Another way to understand these changes is by looking at two aspects of robustness. Institutional change can be directed at building the robustness to a particular disturbance or set of disturbances. Similarly, institutions can change, not simply to improve robustness, but rather to improve performance. This is another way of comparing adaptations and innovations, with adaptations in response to present or future disturbances and innovations to improve performance. In choosing to expend scarce resources and make institutional changes, it is important to remember that trade-offs exist between improving robustness to different sets of disturbances or between improving robustness and improving performance.

5.4.4 Taking Advantage of Institutional Diversity

The final point on creating long-enduring institutions is that robustness can improve by allowing for institutional diversity. While institutional diversity will inevitably result in the failure of some institutional arrangements, it can provide more opportunities for the overall governance structure to maintain robustness. Building on the previous section, having multiple parallel centers of authority provides an environment for fostering learning and experimentation. If some efforts fail, other parallel efforts provide the seeds for reorganization. Success stories can

propagate and diverse options can be tried in new settings. In short, institutional diversity supports adaptive governance efforts. As mentioned earlier, one source of institutional diversity at one level and bridging organizations that can foster learning at a broader level comes from the multiple TFCAs under development in the area and the national parks services, regional NGOs, and SADC facilitators involved in several transfrontier parks. SANParks and DEAT in South Africa are working with six TFCAs and have a coordinator involved in the overall TFCA movement (see Figure 1.2). Similarly, Mozambique has a coordinator over the six TFCAs that they are a part. Zimbabwe also has five TFCA projects and Botswana has three. The SADC directorate has a TFCA coordinator working throughout the region. The World Bank has involvement in several of the projects. The Peace Parks Foundation, African Wildlife Foundation, Conservation International, and other NGOs also have involvement in several of these initiatives, providing other opportunities to spread learning between sites.

Furthermore, the benefits of institutional diversity reinforce the message of linking polycentricity and robustness. The most important lesson is to avoid using blueprints or panaceas in social-ecological systems that may differ in multiple important, yet unnoticed, ways (Ostrom, Janssen et al. 2007). With many of the same individual and organizational actors designing many of the TFCAs in southern Africa, the challenge is to avoid applying the same design to TFCAs that face different social-ecological environments while at the same time drawing on the expertise acquired through hard-earned experience. While this may slow progress initially, superior long-term outcomes should result. Positive examples of this include the less hierarchical organizational structure of the Kgalagadi as compared to the multiple expert sub-committees in the GLTP, as required by some of the more complex issues. Other areas where TFCAs in southern Africa could diverge include varying levels of local community involvement. For instance, the Kgalagadi and the Ai-Ais Richtersveld Transfrontier Parks already have close, albeit sometimes contentious, relationships with local communities through contractual parks. The management groups for the contractual parks could work with the transfrontier management groups much easier than the more complex situation with dozens of interest groups and millions of community members in the Great Limpopo. These opportunities provide examples of how encouraging institutional diversity can lead to improved robustness. In the next section, these and other examples will begin to shift theoretical discussions towards pragmatic actions that transboundary conservationists can use.

5.5. Possible Actions for Transfrontier Conservationists

While avoiding prescribing panacea solutions and not being privy to senior-level policy discussions, the goals of this research include providing pragmatic, actionable advice to

policymakers in transfrontier conservation. The originally stated policy puzzle was "what roles should the joint management board of a transboundary protected area play vis-à-vis the national park staffs". As the preceding discussions make clear, the research results all advocate for a rational and logical approach to problem-solving. In doing so, the goal is not simply to find a role for the joint management boards of the two parks, but to highlight methods to discern the appropriate level of governance across a wide range of issues. The research aims to help guide actors' decision-making regardless of the level of governance. To do this, the section first will review panarchical and polycentric concepts for parsing responses and jurisdiction between different levels of governance. Next, transaction costs are used as a means to start operationalizing these theories in practice. Third, this study applies these ideas to many of the disturbances faced by officials in the two case studies. Responses to several of these disturbances already work well. At the same time, other areas may benefit from reexamining the situation. Ultimately, differences between the two case studies exemplify the dangers of blindly designing transfrontier conservation governance systems from blueprint thinking.

5.5.1 Utilizing Panarchy and Polycentricity

With this in mind, one of the first places to start is to return to the principles of polycentricity. The discussion above on polycentricity indicated that attempting to match levels of governance with scales of problems results in more effective responses and solutions. However, just as ecological events cascade down from broader scales to narrower ones and back up again, designers of polycentric systems need to think through how to coordinate management between levels. Discussions of panarchy, mentioned earlier in Chapter 2, talk about small and fast scales revolting, creating innovation and surprise, while larger and slower scales tend to provide memory and stability (Gunderson and Holling, 2002). In governance terms, revolt may often be too strong of a word, but narrower levels of governance can often respond more quickly to problems than broader, bulkier levels of governance, less intimately connected to the local circumstances. They can also apply diverse solutions when compared with others governance units at a similar level, and learn quickly due to short feedback loops. In short, polycentric systems enable governance units to complement each other. In the case of the transfrontier parks, narrower levels of governance could be the separate national parks, sections of the national parks, areas under co-management with communities, or other smaller scale arrangements. Novelty and diversity in institutional responses at a narrower governance level form the cornerstone of long-enduring institutions. Robustness comes from building adaptive capacity through learning, experimenting, and responding at an appropriate level. In addition, the disturbance events at lower levels often have higher frequency and more variance than those of higher levels. This

provides a further source of diversity and opportunity for experimentation. Levin (1999) notes that "[a]s problems become broader in scale, however, the feedback loops become looser, the motivation becomes less, and the challenges for environmental action become greater" (p. 196). This alludes to the increased difficulties at managing at broader scales. The point is not that decentralization is the cure-all but that pushing authority to higher levels of governance should be a deliberate and intentional decision contingent on context and need.

Although narrower levels of governance provide multiple benefits for creating robust institutional arrangements, broader levels of governance, under which the others nest, also play an important role in the effective governance of social-ecological systems. First, they maintain system memory and smooth out the successes and failures of responses to disturbance nested within their jurisdiction. In panarchy terms, the higher levels remember as the lower levels revolt. They provide the seeds for recovery in cases of failure. The broader levels build adaptive capacity in two ways. First, broader levels can serve as clearinghouses for sharing learning and successes between locations at comparable levels, taking advantage of the benefits of lower level diversity. Second, broader levels also enable response with the appropriate scope to disturbances covering a larger spatial and temporal scale. Examples of this from polycentricity studies include nested policing structures where neighborhood level police patrol neighborhoods and respond to calls while aggregated police services coordinate city-wide or regionally for dispatching services or forensic investigations (Ostrom, Parks et al. 1974). Similarly, many studies of social-ecological systems show comparable cross-scale institutional coordination (Berkes, Colding et al. 2003). In particular, Alcorn et al., (2003) provide an example of how responses to external disturbances faced by indigenous communities move up through governance levels. In this example, the authors show the cross-scale linkages of Dayak communities in Borneo between individual local communities and a group of associations coupled together through an indigenous NGO that helps to organize the communities in response to challenges at a higher scale. These examples show how a polycentric approach to governance can provide more effective responses by managing to the scale of the disturbance, coordinating across nested levels of governance, and benefitting from multiple centers of jurisdiction. They also show how the coordination across levels can happen in practice.

5.5.2 Transaction Costs as Guides

In more practical terms, the analysis of transaction costs can be used to help discern the appropriate level of cooperation at various levels of governance. As mentioned in Chapter Four, decision-making across borders amplifies many of the costs of governance. Decisions in transboundary conservation may ultimately take on many aspects of international governance

regimes. Decision-making of large-scale actors often requires unanimity. This limits the specificity of many arrangements because choices may be limited to a politically acceptable set of options rather than a broader range of choices. While self-organized governance arrangements can emerge at sub-national levels, most international arrangements require complex negotiations. This has direct implications for both top-down and bottom-up parks, but the difficult negotiations hit them at different points in their development path – early on for the former and at a later stage for the latter. The multiple-level negotiations often require approval at national levels before international talks can proceed. The increases in communication, the additional time needed to come to agreement, the expense of multiple rounds of meeting, and the inability to optimize in some cases all lead to an increase of costs in international governance. Likewise, monitoring and enforcement costs often increase, both because of the larger spatial scale and because of the difficulties in coordinating groups from each country or creating an enforcement unit with enforcement authority in multiple jurisdictions. Additionally, as Levin noted, the feedback loops often loosen at broader scales and have more variables leading to ambiguity in cause-effect relationships. In sum, the costs of coordination of more actors in a more complex and heterogeneous environment all result in an increase in transaction costs when going transboundary.

The additional costs and difficulties emerge in virtually every aspect of transboundary conservation. A quick scan of the joint management board minutes for either the KTP or the GLTP provides examples of ongoing discussions with very slow progress on the creation of border posts, the development of tourism plans, the building of bridges to connect the parks, and many more. Additionally, the GLTP has several sub-committees on topics ranging from veterinary disease to border security to conservation. Interviews with many sub-committee members often gave examples of the additional transaction costs of working across the border and through the joint management board. One instance comes from the comments from a member of the veterinary disease sub-committee, one of the most active and progressive groups. Even in this group, the member noted that "there is a lot of talk but no action. We have no money to pursue some of our initiatives, so every meeting we just discuss what we would like to do. We don't actually do anything." (GLTP veterinary sub-committee, 06/19/2007). This is not an indictment of the joint management board or any of the sub-committees. Rather it acknowledges the costs and complexity of managing across borders.

Noting that transaction costs generally increase as governance moves to broader scales is not meant to dissuade such a move. Instead, it points to the urgency of comparing the costs and benefits of the move. Polycentricity and panarchy both demonstrate the importance of moving to

broader governance levels as needed. They also demonstrate the importance of only moving up a level when advantageous. Even if transaction costs increase when moving up a level, it may still be a worthwhile decision if the benefits of aggregation grow faster than the costs. In comparing the benefits and costs of moving up a level, the wide range of transaction costs faced by several groups of actors needs consideration. Typical discussions of transaction costs look at the cost of doing business between government officials. Changing levels of governance, however, changes the cost-benefit calculus for many others as well. In the case of a transfrontier park, the decisions may at first seem to affect the costs of decision-making through collaboration for the transnational representatives. However, the decisions made by a joint management board, for instance, also impact other officials. These officials may be at lower levels within the parks or officials in other governmental agencies such as international water groups, customs and border control, and so on. For instance, TFCA decisions can ripple through the decisions made in co-management groups for the contractual parks. In the past it has changed the budgetary decisions of provincial park authorities by changing land use plans and modifying tourism plans (South African provincial park staff, 06/23/05). The decisions may also change the cost equations for tourists and researchers, for better or for worse, by making cross-border movement more difficult or by increasing the length of time of the research permit process. During the course of this study, the research application process required approval from the park service and environmental ministries of each of the countries. Officials have discussed a joint permission process, but it has not yet happened. The use of transaction costs to guide decisions is not meant as a call for detailed cost-benefit analyses for every decision, but rather to serve as a conceptual guide for how to operationalize decisions and how to discern the appropriate level of governance for a wide range of challenges.

5.5.3 Examples of Converting Theory to Practice

In testing hypotheses in this study, several examples emerged where furthering international cooperation has helped to minimize problems. One prominent example is the epistemic community on veterinary issues. Through the collaborative efforts of NGOs, the Veterinary sub-committee of the GLTP management group, and state veterinarians, progress has been made to move certain issues to the international level such as disease control. Veterinary issues remain under the jurisdiction of national authorities, but close communication and collaborative efforts on vaccinations, disease testing, and animal capture allow responses to international threats like epidemics to scale up to the appropriate level. Another case of appropriate international cooperation is in tourism planning. In spite of naysayers that see tourism as a zero-sum game in which each country competes with its neighbors, tourism officials

have instead taken an approach that sees transfrontier conservation as a means of increasing the size of the market. As a result, officials now coordinate marketing efforts, particularly in the Kgalagadi. Officials also create joint tourism planning documents that coordinate future expansions and investments. The decision-making now seeks to optimize the international park rather than any of the national parks. In effect, officials have communicated and resolved the Prisoner's Dilemma that they were previously playing, and, in the process, converting the situation to a coordination game. These successes do not indicate that everything works perfectly in these cases. Rather, both provide positive examples of moving in the right direction.

In facing other disturbances, however, the partner countries have not yet found the best levels of international cooperation. For instance, to achieve the goals of simplifying the movement of people across the border within a transfrontier park more international collaboration is needed on border security. This includes the movement of tourists, officials, and scientists. One specific source of consternation has been the struggle in the GLTP to agree on specifics to build a bridge for direct border crossings between South Africa and Zimbabwe. The discussions have continued for several years with only preliminary advances. For such collaboration to work closer collaboration requires partnerships between departments within countries as well as across borders. A second example again comes from transfrontier research. If cross-border work and travel is simplified within the TFCAs, officials can begin to address the need more cross-border research. Just as there is a move toward more ecosystem-wide studies and less single species studies, research in the parks also needs to move toward more cross-border studies rather than isolated single country studies. As the calls for transboundary conservation makes clear, the political borders are artificial constructs in the ecosystem, and large-scale ecosystem research will benefit from "borderless" analyses.

Other areas that could benefit from more open cross-border discussions include changes in animal populations. The elephant population in Kruger is a massive, persistent problem in Kruger National Park that could benefit from more open discussions with TFCA partners. While there are no easy solutions, if Mozambique is thought to be a sink to draw down South Africa's elephant populations, this should be openly acknowledged. If not, the three partners in the GLTP will confront a common problem in the near future as population numbers expand over the entire range. Similarly, the continuing decline of springbok and hartebeest populations in the Kgalagadi requires a large-scale research project to identify root causes, accompanied by collaborative efforts to maintain populations. This project, and other similar research endeavors, needs greater levels of cross-border communication, collaboration, and cooperation. Likewise, officials in South Africa openly acknowledge threats from invasive species in the GLTP, but preventative

measures are not yet coordinated between then neighbors in spite of shared threats and difficult eradications. These examples and others could benefit from greater collaborative efforts.

Meanwhile, other threat responses could be devolved to more local levels. For instance, some damage-causing animal responses could be controlled locally when the issue is isolated and on the border most interior to a country. Other DCA events near shared borders could fall under joint jurisdiction and a coordinated response. Autonomous control is currently universal the GLTP, and coordinated responses are the norm in the KTP for Botswana. A better solution may be to make pre-determined decisions based on the location of problem and the specific threat, depending on capabilities and capacity. Similarly, river health issues often lack coordinated responses. Some issues that affect upstream/downstream relations, such as dam repairs at Massingir, upstream water withdrawals and effluent emissions, require park officials and water officials from each country. The current situation, as explained in Chapter 4, indicates that cooperation levels and expectations between governmental departments within South Africa are not aligned. Given the progressivity of South Africa's Water Act of 1998, a closer collaboration between park officials in Mozambique and South Africa could improve conservation outcomes by working to uphold minimum flow levels and water quality.

5.5.4 Suggestions for TFCA Management

To summarize, no panacea approach exists. Transfrontier conservation officials and NGO advocates must walk a fine line between generalizing from past experience elsewhere and taking contextual clues into account. Designing and implementing institutional arrangements is difficult and takes scientific and place-based knowledge, experience, and time. It also requires an adaptive governance approach of viewing decisions as experiments and in need of continual refinement. The diversity of situations in southern Africa's transfrontier conservation initiatives provides multiple laboratories for experiment and can facilitate region-wide learning. With respect to the specific question of what level of cross-border cooperation to achieve, the approach above is not meant to be simplistic or naïve, and it acknowledges that politics constantly buffets decision-making. Where possible, the intuitively obvious question to always ask is "Do the benefits of collaborative efforts outweigh the costs?" Unfortunately it does not always get asked. This question helps to reexamine the calculus in polycentric terms and eliminates much of the push for greater cooperation for no better reason than to cooperate. Instead, the lessons of polycentricity and robust institutional design encourage this more nuanced approach. In response to some disturbances, cooperate fully. In other cases, communication only with cross-border counterparts is the more appropriate level of interaction. Sometimes, working autonomously will generate the best solutions, either because local specifics require different responses or because a

variety of potential solutions may work. Response diversity enables learning and better responses to future disturbances. Within a country, as well, some actions will work best from the national level and others at a provincial level, some at a policy level and others at a bureaucratic level, some from within the parks and others from outside. The effectiveness of a particular level of cooperation in response to a disturbance and the type of governance structure best suited to respond all depends on the nature of the disturbance.

5.6. Revisiting the Research Question

The previous three sections have entertained the theoretical and practical puzzles first introduced in the introduction that helped guide this study. In searching for knowledge to address these puzzles, the study began with one driving research question – "how do the institutional designs of transboundary protected areas change in response to various types of disturbance?" Through the course of the research, however, the question has morphed into a new one – "why do some types of governance structure have better capabilities for dealing with some types of disturbances than others?" This question came out of seeing how actors in the two case studies often responded differently to similar perturbations, for example the frequently described human-wildlife conflict scenario or the differences in border security. Some of the differences seemed to come from environmental context, but others emerged from the unique institutional evolution and governance structure of each case. This insight opened a new path of inquiry into how to design long-enduring governance structures that would be sustainable in the face of a wide set of perturbation. As Janssen and Anderies (2007) have clearly articulated, no design can be made robust to everything. In short, institutions are often crafted with the intention to improve outcomes, but they are impossible to optimize.

With that stated, great strides have occurred over the past decade in southern African transfrontier conservation. The outcomes are not perfect, of course. The need to avoid panaceas needs repeating with greater urgency as more and more TFCAs roll out at an ever-faster pace. Not only does development continue to accelerate, but the ecological circumstances, governmental situations, and goals of establishment are all quite distinct. This danger has surfaced with several newer TFCAs in southern Africa. Three, in particular, deserve further comment – the Limpopo-Shashe, the Kavango-Zambezi, and the Maloti-Drakensberg TFCAs. The Limpopo-Shashe TFCA of Botswana, South Africa, and Zimbabwe attempts to create a TFCA from a broad set of land tenure arrangements. This includes land owned by private landholders, Mapungubwe National Park created in South Africa in 2004, the Venetia Limpopo Nature Reserve, owned by De Beers Conslidated Mines Ltd, and communal land. This TFCA has a mixed set of goals when compared to other protected areas. The national park in South Africa

is the first to be created for cultural reasons and is a World Heritage Site due to its archaeological excavations from the Great Zimbabwe civilization (Tiley 2005). Progress has slowed recently, and it is not clear what form the governance structure will take. Initial plans drew many parallels with the Great Limpopo, a case that does not appear widely applicable (SANParks official, 6/8/2005). In spite of the cultural richness, recent plans indicate a shift toward becoming yet another "Big Five" animal park, rather than strictly focusing on its unique historical significance. The concern is that blueprint planning may change the park from its original focus to a lesser version of the Great Limpopo.

KAZA, also known as the Kavango-Zambezi or the Four Corners TFCA, has the most ambitious plans of any park yet created. On 11 December, 2006 the ministers of environment and/or tourism from Angola, Botswana, Namibia, Zambia, and Zimbabwe signed a Memorandum of Understanding for a transfrontier conservation area that spans the borders of five countries and roughly 300,000 km^2. The conservation area encompasses ten national parks, dozens of game reserves and even more communal areas and would be the equivalent area of nearly ten parks the size of the Great Limpopo Transfrontier Park. Several NGOs have played prominent roles including Conservation International, the Peace Parks Foundation, and the World Wide Fund for Nature. Current plans are for the TFCA to be fully operational by 2010 (Braack 2007). Similar to the goals of other TFCAs, plans call for sustainable economic development through conservation and ecotourism. The monumental size, incredible diversity of land tenure regimes, and large number of state and non-state actors involved in the conservation area dwarf any previous conservation project. Any attempts to blindly apply previous TFCA plans seem fruitless.

The Maloti-Drakensberg Transfrontier Conservation and Development Area Project (MDTP) is the only southern African TFCA to explicitly call out the goals of economic development in its name. Formed in 2001 out of previous conservation-development projects – the Drakensberg-Maloti Mountain Conservation Programme (started in the 1980s) and the Lesotho Highlands Water Project (discussed in the 1950s and begun in the 1980s) – the goals of the TFCA are much more explicitly tilted toward livelihood improvement. This important difference has led to problematic institutional development (Buscher 2008). Efforts to draw on the successes of concurrent projects have not had much success, and it is unclear that the park services in Lesotho and South Africa agree on what the purpose of the project is with some emphasizing conservation and others development.

The crucial point to draw from the evolution of the MDTP is that institutional design must match the types of challenges that the conservation (and development) project is likely to

face. The governance structure needed in the MDTP is quite different from that of the KTP or the GLTP. While they can draw on past experiences in the Kgalagadi, the Great Limpopo and other transboundary conservation project, as KAZA and the Limpopo-Shashe progress, the institutional designs will need to diverge from other more established TFCAs. Other ongoing projects in the region provide further examples highlighting the similarities and differences between TFCAs, further emphasizing the point of avoiding blueprint approaches in conservation planning. Again, the point is not that no generalizable findings can come from case studies of transfrontier conservation projects. In fact, this study hopes to contribute to a better understanding of the robustness of institutions across a gamut of transboundary settings and help to provide guidance to such projects. The challenge lies in balancing learning from experience with avoiding the blind application of blueprint solutions.

The goal of this study is to use the case studies to explore some basic hypotheses and use the findings to create simple models of complex systems. The intention is to then be able to use the simple models across a diverse body of cases (Ostrom 2007). Model application to individual cases then requires accommodating the specifics of each case (Lejano and Ingram 2007). The need to move back and forth between generalizable conceptual models and context-specific case studies led to the shift from the original question of how institutional designs change in response to perturbations to one about how governance structures respond to various types of disturbances differently. In other words, what makes governance structures robust and vulnerable to different sets of disturbances? Through this new framing, models can be developed, hypotheses examined, and generalized findings distilled. These findings can then be tailored to specific cases. The study begins to answer this question by noting the different successes and challenges when comparing a transboundary protected area that evolved from the bottom-up with one that emerged from the top-down.

5.7. Areas for Future Study

The current study has focused on two case studies and a delineation of many of the disturbances that conservationists face not only in these two locations, but in transfrontier conservation throughout southern Africa. The conclusion has attempted to summarize the findings in the exploration of several theoretical puzzles about cross-border cooperation, robustness and institutional longevity, and polycentric governance as well as practical puzzles about co-management arrangements in protected areas and transboundary conservation. In addressing these questions, an equal number of new questions have been raised.

Future studies will be directed at a few broad categories. First, research will continue to focus on transboundary governance in transboundary conservation projects and in other human-

environment systems such as international rivers and transboundary pollution. Additional work will also strive for better understanding of long-enduring institutions and the robustness of institutional arrangements. In particular, the way that different types of governance structures respond to different types of disturbances may elicit findings important for the design of institutions in a wide variety of situations reaching far beyond conservation. Other questions emerge about cross-border and cross-scale cooperation. Ongoing projects regarding cross-border cooperation with respect to environmental dilemmas will draw on game theory and experimental designs to better understand governance in non-hierarchical, collaborative environments.

Five projects, in particular, deserve further mention. In pursuit of the first broad topic of transboundary conservation, an opportunity exists to work with the United Nations Environment Programme's Protected Areas group on a large sample, quantitative study on governance in transboundary protected areas around the world. The goal is to compare types of governance arrangements, cooperation levels, and performance on a variety of conservation metrics across TBPAs from around the world. Juxtaposing this statistical study, an extension of the dissertation is possible through the development of an in-depth case study which looks at the Kavango-Zambezi TFCA mentioned earlier. The additional complexity of this case provides numerous puzzles and conundrums to explore, including dozens of co-management and cross-border collaborative governance arrangements, several public-private governance partnerships, and both bottom-up and top-down conservation/development initiatives.

In examining the robustness of institutions, South African conservation efforts provide an interesting opportunity to study four unique types of co-managed contractual parks. Working with officials within South Africa's national parks organization, SANParks, four main types of contractual park arrangement have been identified: 1) parks wholly owned by a communal group and managed by a public entity, 2) parks partially owned by a communal group and managed by a public entity, 3) parks wholly owned by a communal group and managed by a private entity, and 4) parks partially owned by a communal group and managed by a private entity. The resulting four arrangements fit well within a simple matrix. Figure 5.1, on the following page, provides a graphical description of the co-management arrangements with prominent examples of each type. It is unclear if all of these relationships will work, if some will perform superior to others, if some will handle certain types of disturbances better and others worse, and if these institutional arrangements will all prove to be equally long-lasting. In each of these cases, we have a cross-border situation, with a boundary between ownership and management institutions and a cross-scale situation between local, provincial, and national land tenure, land use goals, and conservation objectives.

"Building Robustness to Disturbance: Governance in Southern African Peace Parks"

While the above three research paths all address cross-border and multi-level governance structures, two other research projects, one theoretical and one case-based, examine this in more detail. The theoretical project starts with the notion that cross-border institutions at multiple scales often face similar challenges. The goal is to begin a long-term project on cross-border, cross-scale institutions with the intention of responding to Oran Young's (2002) call for a generalizable theory on the governance of multi-scalar institutions. Young's research program has identified three primary groups of problems in multi-scalar institutions – those of fit, interplay, and scale. By using game theoretic insights, unique insights on the extant literature based on case studies, and basic modeling, the goal is to identify some of the critical components of long-enduring, robust institutions in cross-border, cross-scale relationships similar to Ostrom's classic study of common-pool resource governance (1990). In isolating these institutional aspects, the first objective is to create a database of collaborative cross-border, cross-scale institutional partnerships. The database will focus solely on conservation entities ranging from local-state arrangements to national-international alliances. From a preliminary theoretical study of these institutional arrangements, colleagues and I have begun to develop several testable propositions regarding the potential design principles of robust cross-border, cross-scale partnerships. The next goal of the database is to populate it with a large number of cases to enable a meta-analysis and test these propositions. I envision this taking several years, but in the meantime, the theoretical advancement and the case studies will continue to provide fresh perspectives in the short and medium term. Through this study, the robustness of institutional arrangements of the case studies may be improved which, in turn, will lead to the improved responsiveness to disturbances which threaten the sustainability of biodiversity conservation.

		Management	
		Public	**Private**
Ownership	**Communal**	**Itala Provincial Game Reserve**	**Phinda Private Game Reserve**
	Partnership	**Makuleke Contractual Park**	**Lapalala Wilderness Reserve**

Figure 5.1: Contractual Park Management-Ownership Arrangements

"Building Robustness to Disturbance: Governance in Southern African Peace Parks"

The case-based study on cross-border, multi-level governance ties this research agenda back to the original work in transboundary conservation. In the southwestern United States several national parks border Native American land. In some of these arrangements, sections of reservation land have been managed for eco-tourism and conservation, similar to the neighboring park. Two examples of this style of arrangement include the Havasupai Indian Reservation and Grand Canyon National Park in Arizona and Mesa Verde National Park and the Ute Mountain Indian Reservation and the Southern Ute Indian Reservation of southwestern Colorado. Several other such arrangements exist throughout the western United States. These provide examples within the United States of multiple levels of jurisdiction, interesting cases of sovereignty, and interplay of a variety of institutional arrangements. Each of these studies provides exciting opportunities to build on the foundation established in the current thesis.

Appendix A.1: Interview Introduction – Transboundary Protected Area Research Project:

“Building Robustness to Disturbance: Governance in Southern African Peace Parks”

Dear XXXXX,

I recently spoke with YYYYY, and she recommended that I speak with you soon. My name is Michael Schoon, and I am a doctoral student at Indiana University's Workshop in Political Theory and Policy Analysis and the School of Public and Environmental Affairs. I have been researching transboundary protected areas in southern Africa with TPARI now for the past three years from abroad, sprinkling in a few short trips to southern Africa. I am also a member of the WCPA, working on issues of governance. I have recently moved to Pretoria to begin a yearlong stint of field research.

The latest summary of what I am working on is that I’m attempting to understand international cooperation on environmental issues by looking at 2 transboundary parks involving South Africa – the Kgalagadi (partnering with Botswana) and the Great Limpopo (with Mozambique and Zimbabwe). Specifically, I will be looking at official responses to both significant social and ecological disturbances and how these responses are coordinated (or not). A few important features that I will focus on are rules, institutions and governance in general. One aspect that I hope to draw out is the difference between top-down and bottom-up conservation efforts. My work is primarily at the macro level, but over the course of the next 12-18 months, I hope to expand that focus to a more multi-level analysis.

I hope that we can meet at some point. I’d love to bounce some ideas off you, talk about any other contacts that you think might be beneficial to my research, and just chat with you either officially or over a coffee. I will be based at the University of Pretoria and at Wits, but I will be traveling to Gaborone, Maputo, and the 2 parks often.

Best regards,

Mike

Michael L. Schoon

Current:
University of Pretoria
HSB Office 14-24
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Appendix A.2: Interview guide for Transboundary Protected Area Research Project:

"Building Robustness to Disturbance: Governance in Southern African Peace Parks"

This guide contains *representative* questions for interviews with government and park officials, NGO staff, and academic researchers. All interviews will be conducted in English and all interviewees are fluent in English.

Questions regarding Disturbances

- What significant natural disturbances have you encountered in your work with the park service and park (including fire, flood, invasive species, veterinary disease, etc)?
- What are some of the more significant ones over the last 20 years?
- What social disturbance have you encountered in your work with the park service and park (including governmental change, disease epidemics, social upheaval, etc)?
- Have some of these disturbances (social or ecological) been more disruptive than others? Why?
- Which disturbances (social and ecological) have required changes in the management and operations of the park?
- How has the transboundary park affected your ability to respond to these disturbances, or has it had any effect?

Questions regarding park creation and evolution

- What are some of the biggest changes with respect to the park in the last 20 years?
- How has park management changed over this time frame?
- How has the creation of a transboundary park influenced park management as a whole?
- Has the transboundary park caused changes in other park rules, policies, strategies, or management procedures?

Questions regarding transboundary park creation and evolution

- What were some of the big motivators for the creation of the transboundary park?
- What is the current organizational layout of the TBPA?
- Has this changed over time?
- How do you differentiate between the Transfrontier Park and the Greater TFCA?
- How have relationships between countries changed over time?
- Who are/were the influential actors in the creation of the park?
- Are these actors still the key players in the park?
- How do these actors interact with the implementing agencies?

Questions regarding levels of transboundary cooperation

- How has transboundary cooperation changed since the creation of the park? (Regarding the park and beyond the park)?
- What areas of park governance are fully coordinated?

- What areas of park governance are in the process of being coordinated?
- What areas are not coordinated at present time?
- At what level are local communities involved in the TFCA and its governance?
- At what level are regional/provincial governments involved in the TFCA and its governance?
- At what level are NGOs involved in the TFCA and its governance?
- At what level is the private sector involved in the TFCA and its governance?

Questions regarding national laws, policies, and strategies in response to disturbance

- Have there been changes at the national level regarding the disturbances mentioned earlier?

Questions regarding international laws, policies, and strategies in response to disturbance

- Have there been efforts at the international level to coordinate policy and rule changes?

Questions regarding ecological conditions and changes over time

- Have the TFCAs caused any changes (positive or negative) in ecological conditions?

Questions regarding institutional conditions and changes over time

- What institutional changes has your organization made to correspond with TBPA and TFCA?
- Who has your organization partnered with (other governmental agencies, NGOs, private sector actors) in its role in the transboundary parks?

- Do you have any documentation that might be of interest to my study – regarding rules and policies, org structures, plans for the future, budgets and staffing figures, etc?
- Is there anyone else that you would recommend that I speak with regarding this project?
- How can this work be more helpful to you in your job?

Study # 06- 11121_

Appendix A.3: INDIANA UNIVERSITY - BLOOMINGTON
STUDY INFORMATION SHEET

"Building Robustness to Disturbance: Governance in Southern African Peace Parks"

You are invited to participate in a research study. The purpose of this study is to understand how to better coordinate multiple levels of governance, using policy responses to disturbances in transboundary protected areas as a medium for analysis.

INFORMATION
The study will require interviewing government officials, including park management staff, NGO workers, and academic researchers knowledgeable about park policies and institutions. Interviews will focus on policy changes in response to disturbances. Interview findings will be bolstered by archival research. Interviews will be conducted between July 2006 and June 2007 and will take between 45 minutes and 1 hour. Over the course of the project, roughly 100 interviews will be administered. Archival research will primarily consist of reading published reports on park creation and policy development, gray papers publicly available from government offices, and formal laws, policies, treaties, and other government proclamations available upon request at government offices and on government websites.

BENEFITS
In addition to the benefits to the body of knowledge in general, a summary of results may be provided to all interview subjects with the hope that the findings of this research can provide tangible improvements to managerial decision-making with respect to the parks and protected areas and enable improved coordination between governance levels.

CONFIDENTIALITY
All interview notes will be recorded using a coding system which will be used in all future references, keeping interview results completely confidential. Interview notes will be recorded exclusively under an interview number, which will be recorded in a separate file with no other identifying notes. The identifier numbers will be kept for the duration of the project. The disposal date will be December 2008. All responses will be confidential and any individual responses used will be non-attributable. No subjects will be identified in reports.

CONTACT
If you have questions at any time about the study or the procedures, you may contact me, Michael Schoon, at 513 N Park St., Bloomington, Indiana, 47408, USA, (812) 855-0441 (mlschoon@indiana.edu). Local contact information will be available at the time of the interview.

If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have not been honored during the course of this project, you may contact the office for the Indiana University Bloomington Human Subjects Committee, Carmichael Center L03, 530 E. Kirkwood Ave., Bloomington, IN 47408, 812/855-3067, or by e-mail at iub_hsc@indiana.edu.

PARTICIPATION

"Building Robustness to Disturbance: Governance in Southern African Peace Parks"

Your participation in this study is voluntary; you may refuse to participate without penalty. If you decide to participate, you may withdraw from the study at anytime without penalty and without loss of benefits to which you are otherwise entitled. If you withdraw from the study before data collection is completed your data will be returned to you or destroyed.
Information Sheet date: June 11, 2006

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Whyte, Ian J., Rudi J. van Aarde, and Stuart L. Pimm. "Kruger's Elephant Population: Its Size and Consequences for Ecosystem Heterogeneity." In *The Kruger Experience: Ecology and Management of Savanna Heterogeneity*, edited by

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Young, Oran, Frans Berkhout, Gilberto C. Gallopin, Marco A. Janssen, Elinor Ostrom, and Sander E. van der Leeuw. "The Globalization of Socio-Ecological Systems: An Agenda for Scientific Research." *Global Environmental Change* 16, no. 3 (2006): 304-16.

Young, Truman P. "Declining Rural Populations and the Future of Biodiversity: Missing the Forest for the Trees?" *Journal of International Wildlife Law and Policy* 9 (2006): 319-34.

Zbicz, Dorothy. "Transboundary Cooperation in Conservation: A Global Survey of Factors Influencing Cooperation between Internationally Adjoining Protected Areas." Dissertation, Duke University, 1999.

———. "Transfrontier Ecosystems and Internationally Adjoining Protected Areas." Durham, NC, 1999.

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———."Imposing Transboundary Conservation: Cooperation between Internationally Adjoining Protected Areas." *Journal of Sustainable Forestry* 17, no. 1/2 (2003): 21-37.

Zbicz, Dorothy, and Michael Green. "Status of the World's Transfrontier Protected Areas." Paper presented at the Parks for Peace, Somerset West, South Africa 1998.

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I. ACADEMIC BACKGROUND

Joint Ph.D. in Public Policy – School of Public and Environmental Affairs and Department of Political Science, Indiana University. Bloomington, Indiana 47405. Awarded: August, 2008. Advisor – Dr. Elinor Ostrom.

Concentrations: Environmental Policy, International Relations, and Public Policy
Dissertation Title: "Building Robustness to Disturbance: Governance in Southern African Peace Parks"

Masters of Business Administration – Kelley School of Business, Indiana University. Bloomington, IN 47405. Awarded: May 1999, 3.95 GPA.

Major: Strategy and Operations
Minors: International Business and Entrepreneurship

BS in Mechanical Engineering and BS in Aerospace Engineering, University of Arizona. Tucson, AZ 85721. Awarded: May 1993, 3.2 GPA.

II. RESEARCH ACTIVITIES

PUBLICATIONS

Janssen, Marco A., Michael L. Schoon, Katy Borner, and Weimao Ke. "Scholarly Networks on Resilience, Vulnerability, and Adaptation." *Global Environmental Change* 16, no. 3 (2006): 240-52.

Manuscripts Under Review

"Competition over Conservation: Governance, the State and Negotiating Transfrontier Conservation" with Bram Büscher Submitted to *Journal of Wildlife Law and Policy*.

"Linking conservation and social science: towards a platform for interdisciplinary engagement", with Graeme Cumming, University of Cape Town, Department of Ecology. Under review with *Conservation Biology*.

"Trust in Private and Common Property Experiments" James Cox, Elinor Ostrom, James Walker, Jamie Castillo, Eric Coleman, Robert Holahan, Michael Schoon, and Brian Steed. Under review with *Southern Economics Journal*.

Manuscripts in Preparation

"Cross-Border Multi-Stage Negotiation Games: The Importance of Game Shifting ", with Abigail York, Arizona State University, School of Human Evolution and Social Change.

"Ecology of Cross-Border Institutions: Towards a Generalizable Theory", 2008, with Abigail York, Arizona State University, School of Human Evolution and Social Change.

"Institutional Disturbances in Transfrontier Conservation", 2008.

"Wicked Problems in Transfrontier Conservation", 2008.

Working Papers

"A Short Historical Overview of the Concepts of Resilience, Vulnerability, and Adaptation", Working Paper W05-4, Workshop in Political Theory and Policy Analysis, 2005.

Book Chapters

Spenceley, Anna, and Michael L. Schoon. "Peace Parks as Social Ecological Systems: Testing Environmental Resilience in Southern Africa." In *Peace Parks: Conservation and Conflict Resolution*, edited by Saleem Ali. Cambridge, MA: MIT Press, 2007.

Schoon, Michael L. "Governance in Southern African Transboundary Protected Areas." In *Parks, Peace, and Partnerships*, edited by Michael Quinn, Len Broberg and Wayne Freimund. Calgary: University of Calgary Press, forthcoming.

Reports, Conference Proceedings and Other Publications

"Institutional Disturbances in Transfrontier Conservation" for the Proceedings of the Parks, Peace and Partnerships Conference, 2007.

"The Song Remains the Same: Cooperation and Coordination in Cross-Border Governance from Local to International Scales" for the Proceedings with Abigail York, from the Lineae Terrarum International Border Conference, 2006.

"Do Parks Harm More Than They Help? The Role of Peace Parks in Improving Robustness in Southern Africa", published as a chapter in USGS Scientific Investigations Report, 2005.

CONFERENCE PAPERS AND MAJOR PRESENTATIONS

"Governance in Transfrontier Parks: The Influences of Scale, Path Dependency and Institutional Evolution" presented at the Society for Conservation Biology Annual Conference (July 14-18, 2008 in Chattanooga, TN).

"Adaptive Governance in Transboundary Conservation: Influences of Institutional Evolution" presented at the Resilience 2008 Conference (April 14-17, 2008 in Stockholm, Sweden).

"Institutional Disturbances in Transfrontier Conservation" presented at the Parks, Peace and Partnerships Conference (September 10-13, 2007 in Waterton Lakes, Canada).

"Institutional Disturbances in Transfrontier Conservation" presented at the Workshop in Political Theory and Policy Analysis Colloquium Series at Indiana University (September 6, 2007 in Bloomington, IN).

"Transfrontier Conservation Challenges: A Game Theoretic Perspective" presented at University of South Africa's Economics Faculty Colloquium (August 22, 2007 in Pretoria, South Africa).

"Competition over Conservation: Governance, the State, and Negotiating Transfrontier Conservation" presented at the Society for Conservation Biology Annual Conference (July 1-5, 2007 in Port Elizabeth, South Africa).

"Building Robustness to Disturbance: Governance in Southern African Peace Parks" presented at the Kruger National Park Annual Science Conference (April 20, 2007 in Skukuza, South Africa).

"How to Improve Governance in Southern African Peace Parks" presented at the University of the Witwatersrand Environmental Forum (March 16, 2007 in Johannesburg, South Africa).

"Crossing Borders: Responding to Disturbance in Transboundary Protected Areas" presented at University of Pretoria Political Science Colloquium (October 13, 2006 in Pretoria, South Africa).

"The Song Remains the Same: Managing Across Borders at the Municipal and International Level" presented with Abigail York at the Lineae Terrarum International Border Conference (March 28, 2006 in Las Cruces, NM).

"Neo-Imperial Conservation: The Relationship between South Africa and Its Neighbors in Transboundary Protected Areas" presented at the International Studies Association Annual Conference (March 22, 2006 in San Diego, CA).

Chaired panel on "Biodiversity, Conservation, and Agriculture" at the International Studies Association Annual Conference (March 22, 2006 in San Diego, CA).

"Understanding Institutional Design in the Transboundary Protected Areas of Southern Africa" presented at University of South Africa's Economics Faculty Colloquium (May 25, 2005 in Pretoria, South Africa).

"Institutional Design and Robustness of Peace Parks in Southern Africa" presented at University of Witwatersrand Graduate Student Colloquium (May 24, 2005 in Johannesburg, South Africa).
"Looking Beyond Traditional International Relations Paradigms in the Study of Transboundary Protected Areas", presented at the Midwest Political Science Annual Conference (April 7-10, 2005 in Chicago, IL).

"Do Parks Harm More Than They Help? The Role of Peace Parks in Improving Robustness in Southern Africa" presented at the Institutional Analysis for Environmental Decision-making Workshop (January 28-29, 2005 in Fort Collins, CO).

HONORS/AWARDS

Indiana University DeVault Graduate Fellowship, 2008
Indiana University Workshop in Political Theory and Policy Analysis Dissertation Writing Grant, 2007.
National Science Foundation Doctoral Dissertation Improvement Grant through the Decision, Risk and Management Sciences and the Ethics and Values of Science and Society Programs, 2006.
Transboundary Protected Area Research Initiative Pre-Dissertation Grant, 2005.
Indiana University Pre-Dissertation International Travel Grant, 2005.
Indiana University Chancellor's Fellowship Recipient, 2003-2005.
Dean's Merit Scholar – Awarded to top 5 students in MBA graduating class, Indiana University, 1999.
Member of National Business Honorary – Beta Gamma Sigma, 1999 – present.
Patent awarded for printing refeeder machine, 1996.
First place awarded in Senior Aircraft Conceptual Design Competition, University of Arizona, 1993.
Certified Engineer-in-Training, 1993.

POPULAR PRESS CITATIONS

Interviewed for Chicago Tribune article on transfrontier conservation and global warming, released November 2, 2007.
Kruger Park Times article on my research, released March 26, 2008.
Interviewed for Indiana Business Review on sustainability, released May 5, 2008.

Reviewer for Conservation and Society
Reviewer for Development Southern Africa

Reviewer for Ecology and Society
Reviewer for Geojournal
Reviewer for Global Environmental Change
Reviewer for the International Journal of the Commons
Reviewer for Policy Sciences
Reviewer for Society and Natural Resources
Reviewer for MIT Press
Referee for Animal Health for the Environment and Development-Great Limpopo Transfrontier Conservation Area (AHEAD-GLTFA) Seed Grants Program, 2008

RESEARCH EXPERIENCE

Post-Doctoral Researcher, Arizona State University, Center for the Study of Institutional Diversity, School of Human Evolution and Social Change, 09/2008 – present.
Continuing doctoral research on transboundary conservation, robustness of institutions, and cross-border, multi-level governance coordination.

Research Associate for Transboundary Protected Area Research Initiative (TPARI), an IUCN-South Africa and University of Witwatersrand affiliated research group, 05/2005 – 07/2007.
Applying social ecological concepts of resilience, robustness, vulnerability, and adaptability to communities surrounding transboundary protected areas in an effort to understand the impacts of protected areas on the surrounding communities and ecosystems.
Analyzing the institutional design of the Great Limpopo Transfrontier Protected Area in comparison with the institutional design of the Kgalagadi Transfrontier Protected Area.

Research Associate for International Human Dimensions Programme, Bonn, Germany 04/2004 – 02/2006.
Studying social ecological concepts of resilience, robustness, vulnerability, and adaptability.
Co-authored paper on historical mapping of resilience, vulnerability, and adaptability.
Created annotated bibliography and database of literature on resilience, vulnerability, and adaptability.

Research Associate for Indiana University's Workshop in Political Theory and Policy Analysis, 04/2004 – 08/2008.
Training undergraduate honors student interns on the concepts of resilience, vulnerability, and adaptability.
Conducting double-blind experiments on trust and reciprocity in the Interdisciplinary Experimental Laboratory.
Conducting computer experiments on common pool resource usage in the Interdisciplinary Experimental Laboratory.

Research Associate for Business Management and Strategy Department at Kelley School of Business at Indiana University, 1998 – 1999.

Research Associate for Center for International Business and Education Research (CIBER) at Indiana University,
1997 – 1998.

III. TEACHING

Taught MSc. level "Society and Natural Resources" section of a "Conservation Biology" course at the University of Cape Town, August, 2008.

Taught 100-level "People and the Environment" course at the School of Public and Environmental Affairs at Indiana University, Spring, 2008.

Taught sessions on protected areas for 500-level "Conservation Biology" course at the School of Public and Environmental Affairs at Indiana University, Spring, 2008.

Taught 200-level public management course at the School of Public and Environmental Affairs at Indiana University, Spring, 2006.

Organized and led a for-credit, student-run doctoral seminar on international environmental policy for first, second, and third year Ph.D. students, 03/2004 – 2006.

IV. PROFESSIONAL PRACTICE

EMPLOYMENT

Strategy Consultant, Kurt Salmon Associates, Atlanta, GA 8/99 – 6/2003

International Development

Instructed the government of El Salvador on how to focus business incentives for apparel exports to the US under new free trade policies.

Analyzed the offshore garment production environment for a Honduran joint venture and presented findings to the JV partners and to the Latin American division of the World Bank, resulting in a loan of $25 million.

Strategy Development

Built a go-to-market strategy for a manufacturing division of a large Japanese firm, guiding senior management to re-align company directives in sales, manufacturing, inventory, and IT, returning the division to profitability.

Assessed and outlined retail strategy options for a French manufacturer with the goal of improving the retail experience – conducting focus groups and a market assessment to identify new retail formats and working with ad agencies to build message for consumers.

Quantitative Research and Analysis

Created a new corporate vision and strategy through detailed economic analysis and market research for a major home textile firm leading to a new positioning of brands, in product categories and channels, as well the development of as a new organizational structure. Stock prices have increased 300% and the company is no longer on the verge of bankruptcy.

Generated a launch strategy for a newly developed product with a multinational chemical company, estimating market share gains and competitive responses. Product launch is currently proceeding as scheduled.

Formulated supply chain strategies for an international apparel organization, using B2B technology to increase efficiencies organization-wide and with key supply chain partners.

R&D Engineer, Gämmerler (US) Corp, Hanover Park, IL 1/94 - 7/97

Innovation

Invented and patented printing industry refeeder machine with $1.5 million market, taking design from concept through sale.

Implemented all design-engineering processes for $18 million US division, growing from one person to a division of nine.

Created all engineering standards for refeeder and flat conveying production lines, resulting in over 100 easy-to-use designs.

Communication Skills

Established engineering communications with German parent firm, linking projects and design concepts, through frequent trips and business sessions in European office.

Initiated and managed first US-division new product development team, providing contact between customers and engineering.

Studied German formally to the intermediate level to facilitate international work.

PROFESSIONAL ORGANIZATIONS

American Society of Mechanical Engineers member, 1990 – present.
American Institute of Aeronautics and Astronautics member, 1990 – present.
Beta Gamma Sigma, National Business Honorary, 1999 – present.
American Political Science Association member, 2003 – present.
International Studies Association member, 2003 – present.
International Association for the Study of the Common, 2003 – present.
Midwest Political Science Association member, 2003 – present.
Transboundary Protected Area Research Initiative, 2003 – present.
Society of Conservation Biology, 2005 – present.
IUCN World Commission on Protected Areas member, 2005 – present.
George Wright Society member, 2006 – present.
Association for Public Policy Analysis and Management, 2006 – present.
African Studies Association, 2006 – present.

Transboundary Protected Area Research Initiative – co-director, 2007 – present.
Resilience Alliance Young Scholars group, 2007 – present.

V. PUBLIC SERVICE

UNIVERSITY ACTIVITIES

Elected to Executive Council of Association for SPEA PhD Students at Indiana University, 2003-2004 and 2004-2005.
Member of Organizing Committee for Indiana University Young Researchers Conference, 2004 and 2005.
Elected by student body as Vice President of MBA class, 1998-1999.
Selected as member of the Board of Directors for the Indiana University Entrepreneurship Academy, 1998 – 1999.
Selected for Leadership Development Institute of Indiana University, 1997-1999 – Inaugural class and mentor group for leadership skill-building.

PUBLIC ACTIVITIES

Nominated to IUCN World Commission on Protected Areas Transfrontier Conservation Area Task Force, 2005 – present.

Presented "Visions of Peace Parks" to the Pretoria Central, South Africa Rotary Club, July 19, 2007.

Taught class on Sustainability to Danville High School advanced Economics courses, April 24, 2008.

Volunteer, Fundacion Mensajeros de La Paz, Cuenca, Ecuador 3/02 – 7/02
Multiculturalism
Obtained advanced proficiency in oral and written Spanish through 16-week intensive in-country coursework.
Taught life skills and music to 30 street children and orphans over 4 months in Ecuador.

Center Director, Appalachia Service Project, Johnson City, TN 5/90 – 8/93
Leadership
Coordinated and directed Buchanan County Summer Center for low-income housing construction and rehabilitation.
Supervised over 500 workers per summer at 15 construction work sites.
Led staff of four in coordination of construction supervision, budget management, and volunteer activity planning.

Chapter President, Habitat for Humanity, Tucson, Arizona, 8/91 – 5/93
Founded and chaired Habitat for Humanity chapter at the University of Arizona.

Volunteerism

Member of Sierra Club, 1/02 – present.

Member of Audubon Society, 1/02 – present.

Certified Emergency Medical Technician – volunteered in emergency room. Chicago, IL, 08/96 – 01/97.

Volunteer, Big Brothers of America. Tucson, AZ, 08/89 – 05/93.