Evaluating Ecological Integrity and Social Equity in National Parks: Case Studies from Canada and South Africa

by

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ABSTRACT

There are concerns that many national parks worldwide are ineffective at conserving biological diversity and ecosystem processes, are socially unjust in their relations with Indigenous communities, or both. This dissertation asks: can national parks protect ecological integrity and concurrently address social equity issues? It presents empirical results of a systematic evaluation of six case study national parks in Canada and South Africa. Purposive sampling was used to select the six case study national parks. Data sources included State of the Park Reports; park ecological monitoring data; archival data; and semi-structured interviews with park biologists, managers, and Indigenous members of park co-management boards.

Status and trend assessments and effectiveness evaluations of park ecological monitoring data were used to evaluate how effectively the parks addressed three ecological integrity criteria. Results show that all six parks effectively addressed the priority indicators for which they had monitoring data. However, the effectiveness ratings of each park decreased when all indicators, including those identified as priorities but lacking monitoring data, were analysed. This indicates that the parks had generally identified more priority indicators than they were actually able to address (for reasons including lack of budget or trained staff, managerial challenges). Thematic coding of semi-structured interview and archival data, and the assignation of numerical ratings to these data, were used to evaluate how effectively the parks addressed three equity criteria. Results show that all but one of the case study parks were equitable, parks with more comprehensive co-management and support from neighbouring Indigenous groups were more equitable than parks with lower levels of co-management, the parks with settled land claims were not necessarily more equitable overall, and a few parks were found to be co-managed in name only. The overall results of this evaluation demonstrate that parks effective at protecting ecological integrity can also successfully address social equity, but that further efforts to integrate these two realms are both possible and necessary. A logical starting point would be to build upon those existing integrative processes already institutionalised in many parks and protected areas: the co-management and integrated conservation and development efforts.

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1 INTRODUCTORY CHAPTER

1.1 Introduction

National parks and other protected areas remain central to biodiversity conservation across landscapes. Yet, there is growing concern that many national parks worldwide are ineffective at conserving biodiversity and ecosystem processes, and their long-term sustainability is increasingly being questioned (Bruner et al. 2001). Critics have claimed that national parks cannot be expected to carry the burden of maintaining biodiversity (Eagles 1993), that they do not necessarily protect biotic integrity within their borders (Terborgh 2004; Bruner et al. 2001; Salafsky et al. 2002), or that they have been poorly located from the standpoint of biodiversity conservation (Scott et al. 2001; Rodrigues et al. 2004).

Many of these same parks are also operating under difficult social and political conditions, including unnecessarily poor relations with Indigenous communities. In the past, many national parks were established with little consideration for social equity – fairness in the distribution of benefits (Berkes 2004) – which includes prior informed consent, property and human rights, and the relationship between rights holders (Indigenous people) and duty bearers (park managers) (Blaustein 2007). The establishment and management of many national parks are often reflective of *fortress conservation*, a top-down protectionist approach to park management (Bruner et al. 2001; Wilshusen et al. 2002). Such parks are envisaged as places where rural livelihoods do not belong (Brockington et al 2006), human habitation is often excluded through the forced removal of local and Indigenous people (Magome and Murombedzi 2003), and nature is seen to be preserved as “wilderness” (Colchester 2004). There are differing opinions over the appropriate role for Indigenous people in parks management and conservation strategies. Some argue that a focus on human needs have compromised conservation efforts (Sanderson and Redford 2003; Terborgh 2004), while others see human issues as inalienable from discussions on conservation in general and on parks in particular (Brosius 2004; Faizi 2006). Regardless of the diverse challenges facing them, the global network of national parks and protected areas is a key option for maintaining and enhancing biodiversity conservation; ways need to be found to strengthen those that are

failing (Terborgh and van Schaik 2002) and understand and learn from those that are succeeding.

Efforts have been made to improve the sustainability of national parks. However, these often reflect professional and disciplinary lines, with ecologists and conservation biologists emphasising something different from social scientists and human rights advocates (Blaustein 2007). For example, many park managers focus primarily on protecting ecological integrity. Ecological integrity means that the dominant ecological characteristics (such as composition, structure, function, and ecological processes) of a system occur within their natural ranges of variation and can withstand and recover from perturbations caused by natural environmental or human factors (Parrish et al. 2003).

Yet national parks do not operate in a vacuum; they are compromised by other land uses and socio-political processes, and often compromise in turn those who live on the periphery. As such, social scientists have argued that improvements need to be made to mitigate the impact of national parks and conservation strategies on local and Indigenous communities (Brechin et al. 2002; West et al. 2006). Tense relations between Indigenous people[1] and park managers has raised issues of restitution which in the past have been ignored (Blaustein 2007), and Indigenous people around the world are seeking compensation for lost rights and pursuing land claims in and around national parks. *The Durban Accord*, developed during the fifth World Parks Congress, urged a commitment to involving Indigenous peoples in establishing and managing protected areas, and participating in decision-making on a fair and equitable basis (Colchester 2004). An increasing emphasis on the involvement of Indigenous people by park agencies and international organizations has resulted in the pursuit of co-management initiatives, understood to mean the substantial sharing of (protected-area)

[1] In this study, self-identification as Indigenous or tribal was regarded as fundamental to ensure the broadest inclusion of affected peoples were included in the study. Indigenous in this paper refers to "tribal peoples in independent countries whose social, cultural and economic conditions distinguish them from other sections of the national community, and whose status is regulated wholly or partially by their own customs or traditions or by special laws or regulations" and "peoples in independent countries who are regarded as indigenous on account of their descent from populations which inhabited the country, or a geographical region to which the country belongs, at the time of conquest or colonisation…and who, irrespective of their legal status, retain some or all of their own social, economic, cultural, and political institutions" (ILO 1989).

management responsibilities and authority between local- and state-level systems (Berkes 1994; Brechin et al. 2001). The provision of access to park resources and employment opportunities has also been seen as a means to mitigate the impact of parks on the lives and livelihoods of neighbouring Indigenous people.

The World Conservation Union (IUCN) (1994) has emphasised that national parks should both protect ecological integrity and take into account the needs of Indigenous people. Amidst progress made to improve the ecological and social sustainability of national parks, we must remember that success for nature does not necessarily mean success for people, and vice versa (Brockington et al. 2006). Global society expects governments to conserve their country's biological diversity, while upholding values of human rights and social justice, among other things. National parks are political entities managed (generally) by national governments. These same governments are often signatories to global, multi-lateral agreements, such as the *Convention on Biological Diversity* which contains several provisions for equitable access and customary use of natural resources by Indigenous groups (UNEP 2007). Expectations towards national park managers, as members of parastatal park agencies, should be no different. They should be expected to define, manage for, and evaluate the success with which their parks both protect ecological integrity and address concerns over social equity.

1.2 Research Purpose

This dissertation presents empirical results from a systematic evaluation of six case study national parks in Canada and South Africa. The fundamental question that guides this work is:

> Can national parks effectively protect ecological integrity and concurrently address social equity issues?

A primary goal has been the comparison of several case study national parks that are actively co-managed by government and Indigenous groups to parks characterized by minimal co-management and involvement of Indigenous groups. Additionally, this work compares parks that exhibit many of the successes and challenges associated with designing and

implementing ecological monitoring programs. In this study, a national park was considered to be successful at protecting ecological integrity if it achieved park management objectives in a manner that sustained biodiversity and ecosystem processes while abating threats (*sensu* Ervin 2003). A park was considered to be equitable if it successfully addressed land tenure and access rights into the park (including unresolved historical loss of rights and those transgressed in the genesis of new parks), eased tensions and addressed concerns over participation and decision-making authority in park governance, and resolved conflicts stemming from loss or change in local livelihoods.

The specific objectives of this research were to:

1) characterize ecological integrity in regard to national parks and evaluate how effectively the case study national parks protected ecological integrity;
2) characterize social equity in regard to national parks and evaluate how effectively the case study national parks addressed equity from an Indigenous perspective; and
3) assess how effectively the case study national parks concurrently protected ecological integrity and addressed social equity.

1.3 Logic of the Case Study Selection

This study was ultimately restricted to Canada and South Africa because of the distinct similarities and differences presented by the historical, cultural, and biological characteristics of the case study regions, as well as for logistical reasons. Specifically, the national parks and national park reserves included in this study were: Kluane, Gwaii Haanas and Pacific Rim National Park Reserves and Waterton Lakes National Park in Canada, and the Kruger and Kgalagadi National Parks in South Africa.

The national governments in Canada and South Africa both maintain extensive and well-established national parks that are under claim (in part or in whole) by neighbouring Indigenous or tribal groups. These Commonwealth countries are signatories to the Convention on Biological Diversity, which contains several provisions for equitable access and customary use of natural resources by Indigenous groups (UNEP 2007). Ideally, the broadest-based representation of peoples impacted by national parks would have been

included in this study however due to constraints, parks with neighbours meeting the ILO (1989) definition of Indigenous were selected. This definition accounts for both Indigenous and tribal groups in the African context, and includes self-identification as Indigenous and a history of self-government. This is in no way meant to indicate that the concerns of other non-Indigenous communities are illegitimate.

Canada and South Africa share a common legacy of land dispossession followed by the subsequent pursuit of land claims by Indigenous people seeking compensation for lost land and rights. National park agencies in these two countries have attempted to deal with claims on national park lands in a similar manner. In Canada, Indigenous peoples' experiences of much of the twentieth century could be characterized as a continuing process of encroachment on (and sometimes transformation of) their traditional territories, and of restriction of their customary livelihood including government restrictions on hunting and fishing and population relocation and sedentarisation (Usher 2003). National parks have further exacerbated these hardships. In response, Parks Canada has pursued a proactive national park reserve designation which specifically acknowledges that First Nations (the term given to Indigenous people in Canada) claim outstanding rights or interest to some national park lands. Pending the settlement of any such rights or interests through treaty or other negotiations, the park reserve status allows the area to be managed with the protection afforded all national parks under the Canada Parks Act (Parks Canada 2003).

In South Africa, land dispossession was based on an apartheid policy which forced 'black' and 'coloured' people onto black homelands or coloured reserves, respectively (Reid et al. 2004).2 National parks established during apartheid meant that the majority of people who had been alienated from much needed natural resources remained so after the end of apartheid. Since majority rule in 1994, the South African government has instituted a process of land reform. As such, contract national parks have arisen from the settlement of several land claims, are managed by the national conservation authority as part of a larger national

[2] We recognize that 'race' is (and should be) a contested term in the social sciences as efforts to distinguish biophysical features of racial groups have failed both genetically and phenotypically. The construct 'race' expressed as 'visible minorities' is nonetheless the defining feature of formal apartheid systems and their post-apartheid derivatives.

park according to the terms of a joint management agreement, and are emerging as a mechanism for meeting the country's conservation and development objectives (Reid et al. 2004).

National Parks in Canada and South Africa differ in the extent of Indigenous involvement in park management, employment, and decision-making processes. For instance, the Haida Nation (Canada) has recognised that the natural and cultural elements of their home island of Haida Gwaii are inseparably intertwined. Consequently they initiated the designation of Gwaii Haanas as a Heritage Site in 1985 in response to logging on Lyell Island (AMB 2002). In 1988, the Government of Canada protected Gwaii Haanas as a national park reserve, and together with the Council of the Haida Nation, cooperatively manages the park under an Archipelago Management Board (AMB) (AMB 2002). While all national park reserves in Canada pursue co-management initiatives with the local First Nations, many of the country's other national parks also have varying levels of co-management. There are indications that all future national parks will be negotiated via some form of co-management agreement, reflecting a Parks Canada policy shift towards these initiatives (Weitzner and Manseau 2001).

Comparatively, a strong commitment to co-management in South Africa's national parks is not as yet evident. South African National Parks (SANParks) sees commercialization and employment of 'black' and 'coloured' South Africans as more effective routes to empowerment than co-management (Reid et al. 2004). SANParks has in the past been accused by both park observers and tribal groups of using participation to improve public relations rather than to devolve any genuine decision-making powers (Gibson and Marks 1995). The two South African parks included in this study have both settled land claims and established contract parks. Kruger National Park settled a formal land claim with the Makuleke tribe at the park's northern end, turning that region into a contract park, while also establishing a comprehensive park forum structure to aid communication between the park and the approximately 187 villages situated near its border. The Kgalagadi National Park settled a formal land claim with the ǂKhomani San and Mier communities in 1999, turning a portion of the national park into a contract park. The ǂKhomani San people of the Kalahari

are part of the San, some of the 'first people' of Southern Africa and believed to have been living in the region for more than 20 000 years; they cannot maintain their lifestyle fully anywhere else than in and around the Park, where their ancestors lived and migrated as hunter-gatherers (Bosch and Hirschfeld 2002). The Mier, are an Afrikaans-speaking, marginalized minority who came to live in the Northern Cape in 1865, possessed their own form of self-government, and had lived on and farmed land in the Kgalagadi National Parks and now occupy a former 'coloured' reserve (Bosch 2003). The Mier community has also experienced a history of dispossession, and their settlements have poor water supplies and no electricity, education and job opportunities are limited, literacy is estimated to be 10 per cent, and most rely on farming for their income (see Reid et al. 2004: 388). The Mier and the ǂKhomani San have been living in close proximity for a very long time and many are now linked through familial lines.

While the logic of the case study selection is explored in greater detail in Chapters 3 and 4, I present here a brief rationale for the selection of each case study. Overall, the case study parks were selected because of their level of co-management with Indigenous neighbours, and because of the explicitness of the park's management plan and depth and availability of monitoring data.

Gwaii Haanas National Park Reserve is located on the southern half of Moresby Island, on the archipelago of Haida Gwaii off the northwest coast of British Columbia, Canada. This park protects the Pacific Coast Mountains natural region, and was established in 1993 at the initiation of the Haida Nation, the island's Indigenous people. It was selected for inclusion in the study because it is a co-managed park with full devolution of authority making to the Archipelago Management Board, the park's co-management board. It is also the most-recently established park in this study. While the park management plan has less explicit management objectives than other parks in this study, the managers have developed a long-term monitoring program focused on a set of ecological indicators and completed the park's first State of the Park Report in 2007. The park's ecological integrity is threatened by a number of alien flora and fauna.

Waterton Lakes National Park is the oldest park in the study, having been established in 1895. It is a small park (525 kms2) protecting a portion of the Crown of the Continent ecosystem in the Rocky Mountains of southwestern Alberta, Canada. It protects important habitat for a large number of terrestrial species including several species of carnivores, ungulates, and for an endemic plant. This park is bordered to the south by the much larger Glacier National Park in Montana, USA, and was selected partly because of its ecological importance and the explicitness of its management objectives in the park's management plan. This park has no formal co-management arrangement with the neighbouring Indigenous groups, the Kainai and the Piikani Nations, however the park director works closely with the land manager from the Kainai Nation on several initiatives.

Kluane National Park & Reserve, established in 1976, is located in the southwest corner of the Yukon Territory, Canada, and protects the Northern Coast Mountains natural region. This large wilderness park has very explicit management objectives identified in its management plan; threats to the park's ecological integrity include climate change and forest pests. The Kluane Park Management Board (KPMB), comprised of members of the Kluane and Champagne-Aishihik First Nations and Parks Canada, has a restricted level of authority over decision-making about the park.

Pacific Rim National Park Reserve was established in 1970 on the west coast of Vancouver Island, Canada to protect the lowland Pacific Coast Mountains natural region. Pacific Rim has the least explicit management statement of all the parks in this study, though in practice there is a fair amount of ecological monitoring being conducted by the park's ecologists. The park is situated in a culturally rich region with as many as nine Indigenous groups having used the park's land historically. Though no formal park co-management board existed as of early 2008, the park has continued to operate in a 'post treaty environment' for years, the Maanulth treaty with several of the regions Indigenous groups was settled in November 2007, and some co-operative initiatives are underway.

The South African portion of the Kgalagadi Transfrontier Park (with Botswana) was originally established in 1931 as the Kalahari Gemsbok National Park to protect the

dwindling populations of Gemsbok (*Oryx gazella*) and the Southern Kalahari ecoregion. This park's management plan does not have very explicit management objectives, and much of the ecological monitoring activities within the park (and hence, monitoring data) is conducted by researchers external to South African National Parks (SANParks). The park does have good long-term monitoring data for antelope populations due to annual helicopter surveys of the park's river valleys. The southern portion of the park was established as a contract park when the final land claim with the Mier and ǂKhomani San was settled in 2002. As mentioned above, these two groups suffer from high levels of poverty and have a low level of access to resources within the park. Members of these two groups also sit on a co-management board, however it has only a restricted level of authority over decision-making about the park. The park has made some effort to provide adequate employment, training, and alternative livelihoods for the Mier and ǂKhomani San neighbours.

The world famous Kruger National Park is located in eastern South Africa, bordering Mozambique and protecting the South African lowveld ecoregion. This park was established in 1898, and protects a wealth of biological and ecosystem diversity, including a very large population of elephants. The Kruger was selected partly because of the explicitness of its management objectives and because it uses the unique Thresholds of Potential Concern (TPC) approach. TPCs, essentially the upper and lower limits along a continuum of change in selected environmental indicators, are a set of operational goals that together define the spatiotemporal heterogeneity conditions for which the Kruger ecosystem is managed (Biggs and Rogers 2003). The northern portion of the park near Pafuri gate was established as the Makuleke contract park in 1998, and three other land claims have been filed which would result in more than half of this almost 20, 000 kms2 park being managed as contract parks. As mentioned above, conservation in the Kruger is challenged by a large population (approximately 187 villages) of poor people situated near its western border. The park's People and Conservation program has made great efforts and met with some success in providing employment, training, and alternative livelihoods for many of these neighbours.

1.4 Format of the Dissertation

This dissertation is separated into six discrete chapters.[3] This introductory chapter presents background information and a rationale for the study, and introduces the research purpose and study objectives. Chapter 2 presents a review of the key literature that was used to develop the criteria and indicators that were then used to evaluate both ecological integrity and social equity in the case study terrestrial national parks. This stage of work included an examination of principles and evaluative criteria (both qualitative and quantitative) that were explicit within, or could be inferred or derived from, the literatures addressing common property resources and co-management, sustainable livelihoods and social impact assessments, critiques of parks, and conservation biology in relation to protected areas.

Chapter 3 presents the methods and results of an evaluation of how effectively the case study national parks protected ecological integrity. All six parks effectively addressed the priority indicators for which they had monitoring data; however the effectiveness ratings of all but one of the parks decreased when all indicators, including those identified as priorities but lacking monitoring data, were analysed. This indicates that the parks had generally identified more priority indicators than they were actually able to address (for whatever reason, including lack of budget or trained staff, or managerial challenges).

Chapter 4 presents the methods and results of a study that evaluated how effectively the case study national parks addressed equity issues. It argues that national parks need to effectively address issues of equity, including property and human rights, and the relationship of rights holders and duty bearers. All but one of the case study parks were equitable, parks with more involved and intricate co-management and support from neighbouring Indigenous groups were more equitable than parks with lower levels of co-management, the parks with settled land claims were not necessarily more equitable overall, and a few parks were co-managed in name only.

[3] Apart from the introduction and conclusion, the four main chapters are written as *de facto* separate manuscripts.

Chapter 5 presents a synthesis of the results presented in Chapters 3 and 4. The results demonstrate that parks effective at protecting ecological integrity can also successfully address equity issues, such as Indigenous co-management. These results are discussed in reference to the study's main research question and broader parks management best practices in general.

Chapter 6 presents a conclusion to the dissertation. It discusses the significance of the results by relating the individual manuscripts to each other and to the field of study, presents the anticipated and actual outcomes of the research, discusses the strengths and weaknesses of the research and the overall significance of the research to the field of study, and identifies the potential applications of the research findings.

1.5 Conclusion

National parks and protected areas are amongst our best current options for maintaining and enhancing biodiversity if we manage them within the 'matrix' of uses across a landscape and with consideration for shifting climatic conditions and atmospheric pollution (Noss 2001; Lindenmayer and Franklin 2002). Yet managers of national parks will be challenged to conserve the biological diversity within park borders if these areas continue to operate under difficult social and political conditions and are faced with unnecessarily poor relations with neighbouring Indigenous communities. The need for genuine involvement of Indigenous and local people in the governance of parks is evident when considering that many national parks face a diversity of threats, including inadequate management of resources, human encroachment, the collection of non-timber forest products, logging (mainly illegal), illegal harvesting (poaching), and adjacent land development (Hockings 2003; Lacerda 2004).

The comparative case study presented in this dissertation provides strong evidence that national park managers can effectively address both the social and ecological realms simultaneously. In the past, in all but the most strictly community-controlled protected areas, Indigenous people had very little equity in decision-making, and the relationship of park

agencies with Indigenous and local communities was generally paternalistic and unidirectional (Stankey 1989). More recently, the co-management of parks has become more common; productive and effective working relationships between governments, park personnel and Indigenous people are needed to ensure that local livelihood needs are met and critical biodiversity and ecosystem processes are maintained.

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2 CRITERIA AND INDICATORS FOR EVALUATING SOCIAL EQUITY AND ECOLOGICAL INTEGRITY IN NATIONAL PARKS AND PROTECTED AREAS[4]

2.1 Overview

There are concerns that many national parks and protected areas worldwide are ineffective at protecting biological diversity and ecosystem processes, are socially unjust in their relations with Indigenous communities, or both. This paper outlines what we believe are the key criteria and indicators for evaluating socio equity and ecological integrity in terrestrial national parks and protected areas. These criteria and indicators were developed through a detailed review of relevant literature; a pilot analysis of the management plans and management direction statements from 14 national and provincial parks in Canada, Australia and South Africa (countries with robust and extensive national parks systems and which share a common legacy of land dispossession followed by the subsequent pursuit of land claims by disadvantaged groups); and in-depth case study examination of six national parks.

2.2 Introduction

National parks and protected areas worldwide remain the cornerstone of efforts to protect biological diversity (herein biodiversity). Yet there is growing concern that many parks are not working and their effectiveness and sustainability is now in question. Critics have claimed that national parks (and other types of protected areas) cannot be expected to carry the burden of maintaining biodiversity (Eagles 1993), cannot necessarily protect the biotic integrity within their borders (Terborgh 2004; Bruner et al. 2001; Salafsky et al. 2002), and/or have been poorly situated (Scott et al. 2001; Rodrigues et al. 2004). Many national parks and protected areas are also operating under difficult social and political conditions, including unnecessarily poor relations with Indigenous and local communities. The hundreds of parks currently foundering are nonetheless a key current option for enhancing biodiversity conservation; thus, ways of strengthening parks both socially and biologically must be found (Terborgh and van Schaik 2002).

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In response to calls for improved management, evaluating the status and effectiveness of parks has been advocated (Dudley et al. 1999; Salafsky et al. 2002; Parrish et al. 2003; Hockings et al. 2004; Hockings et al. 2006). Status assessments enable an understanding of conservation status and threats by answering the question "How is the biodiversity we care about doing?" (Salzer and Salafsky 2006). Effectiveness evaluations focus on outcomes and ask 'what did we achieve'? In a systematic manner, effectiveness evaluations can encourage adaptive and responsive management by reviewing results of actions taken, assessing whether these actions produced desired results, and promoting accountability and transparency (Hawthorn et al. 2002; Hockings et al. 2006). Effectiveness evaluations provide a more direct measure of achievement than those that only target inputs or processes of management because they measure the real impact of management action (Salafsky et al. 2002; Saterson et al. 2004). Unfortunately, many national parks do not currently have adequate monitoring and evaluation programs to enable an effectiveness evaluation. For whatever reason (e.g., lack of budget, lack of trained staff; managerial reluctance) park managers may be unable to carry out management actions and to determine if those actions have resulted in desired outcomes. Status and trend assessments to determine the health of an ecological system can be an easier first step in priming a national park for an effectiveness evaluation at a later date.

The World Conservation Union (IUCN) (1994) specifies that common goals for the management of national parks include protecting ecological integrity, eliminating exploitation or occupation inimical to their purpose, and taking into account the needs of Indigenous people, including subsistence resource use, in a manner that does not adversely affect the other objectives of management. A park can be considered to have ecological integrity if it achieves park management objectives in a manner that sustains biodiversity and ecosystem processes while abating threats (Ervin 2003). Yet, given the multifaceted goals of national parks, evaluations must encompass both ecological and social measures (Kleiman et al. 2000). Most evaluations to date have been anecdotal rather than empirical, and few have been comprehensive enough to assess effects on biological resources, on ecosystem function, and on social welfare and equity (Saterson et al. 2004). In his review of twenty-seven

assessment methodologies, Hockings (2003) found that none of those focused on effectiveness combined both monitoring (e.g., ecological) and interview (e.g., social) data.

The criteria and indicators (C&I) developed in this paper work to address this vacancy. Most of the C&I presented here have been used in an experiment to test whether a set of case study national parks in Canada and South Africa were simultaneously effective at addressing social equity and protecting ecological integrity. Criteria are defined herein as the essential elements that must be present to achieve a defined goal (Sherry et al. 2005), and indicators are the quantitative or qualitative signs and signals that can be used to measure how closely management actions are achieving each criterion.

2.2.1 Study Approach

The C&I in this paper were developed in three stages. Initially a broad list of criteria and indicators were developed through a comprehensive review of the literature on communities and natural resources, critiques of parks, and conservation biology in relation to protected areas. Next, an analysis of the management plans and management direction statements from a purposive sample of 14 national and provincial parks in Canada, Australia and South Africa (countries with robust and extensive national parks systems and which share a common legacy of land dispossession followed by the subsequent pursuit of land claims by disadvantaged groups seeking compensation for lost land rights) were analysed to provide other indicators of import to protected areas not mentioned in the literature (Table 2.1). Finally, in-depth case study investigation of six of the national parks from Canada and South Africa was completed. This included: detailed analysis of park management plans and priority monitoring statements, document analysis, semi-structured interviews with Indigenous members of park co-management boards, park outreach staff and ecologists, and as appropriate, an analysis of park ecological monitoring data using either a status or effectiveness scale (Table 2.1).

Table 2.1. National and provincial park management plans, management direction statements, and master plans used to identify criteria and indicators for evaluations of ecological integrity and social equity.

Country	National Park
Canada	Gwaii Haanas National Park Reserve[1] & Haida Heritage Site (Parks Canada 2002) Kluane National Park of Canada[1] Management Plan (Parks Canada2004) Waterton Lakes National Park of Canada[1] Management Plan (Parks Canada 2000a) Pacific Rim National Park Reserve[1] Management Guidelines (Parks Canada 1994) Tatshenshini-Alsek Park Management Direction Statement (BC Parks 2001) Ts'il?os Provincial Park Master Plan (BC Parks 1997) Mount Robson Provincial Park Master Plan (BC Parks 1992); Mount Robson Provincial Park Ecosystem Management Plan (B.A. Blackwell and Associates Ltd., et al. 2001) Kootenay National Park of Canada Management Plan (Parks Canada 2000b)
South Africa	Kgalagadi Transfrontier Park[1,2] Management Plan (SANParks & DWNP 2003) Kruger National Park[1] Biodiversity Objectives (SANParks 2005) and Ecosystem Objectives (SANParks 2006) Hluluwe-Umfolozi Park Management Plan (Conway et al. 2001) Great Limpopo Transfrontier Park Joint Management Plan (Joint Management Plan Working Group 2001)
Australia	Kakadu National Park Plan of Management (Parks Australia 1999) Mungo National Park Draft Plan of Management (Department of Environment and Conservation 2004)

1 National parks included in detailed case study examination
2 This park used to be known as the Kalahari-Gemsbok National Park. This park is the South African portion of the Kgalagadi Transfrontier Park shared with Botswana.

While a few of the national parks involved in the case study research do monitor most of the indicators proposed below, none currently monitor all of them while some parks only monitor heavily in the ecological or social realm. We stress the 'pilot' nature of our effort and expect that many of the suggested indicators will require further calibration. We also recognize that the national parks used in the sample vary greatly in size, primary ecosystem type, budget, management strategy, and type and degree of threats, and believe this has added depth and breadth to the list of indicators we propose. While some of the individual C&I discussed in this paper may not be new, we believe this is the first attempt to develop a list of both social and ecological indicators in the context of national parks.

This paper aims to: (1) outline what we believe are the key criteria and indicators for evaluating social equity and ecological integrity in terrestrial national parks and protected areas (we refer interchangeably to parks, national parks and protected areas in this paper); and (2) present examples of the proposed C&I in a small set of case study parks. We consider and below defend a park to be equitable if it successfully addresses land tenure and access rights into the park (including unresolved historical loss of rights and those transgressed in the genesis of new parks), eases tensions and addresses concerns over Indigenous and local participation and decision-making authority in park governance, and resolves conflicts stemming from loss or change in local livelihoods. Below we identify the most pressing social and ecological concerns facing national parks, and propose criteria and associated indicators meant to address these concerns.

2.3 From Concerns and Critiques to Criteria and Indicators

2.3.1 Social Equity Concerns

While there may be little empirical evidence substantiating claims that parks have social impacts on Indigenous and local people (Brockington et al. 2006; Wilkie et al. 2006), there is qualitative evidence that national parks have exacerbated hardship in many communities. Further investigation into equity concerns surrounding these areas continues to be advocated (Harper 2002; Blaustein 2007). Potential negative impacts are varied and can include the "foreclosure of future land use options" (Adams et al. 2004), lost opportunity costs for Indigenous and local people, loss of local identity (Jones 2005), and the eviction of former inhabitants. Despite their obligation to account for the needs of Indigenous people, the establishment of many national parks has tended to reflect the 'Yellowstone model', generally excluding human habitation often through the forced removal of local populations (Magome and Murombedzi 2003). Many Indigenous communities have been forcibly displaced or relocated from newly designated protected areas, and have often been poorly informed as to why their access to resources has been curtailed (Harper 2002, McLean and Straede 2003). This has resulted in tense relations between Indigenous and local people and park officials. For example, in the Kruger National Park in South Africa, Skukuza (the name of the most famous rest camp and now the park's administrative centre) was the title given to

the park's first ranger by Tsonga tribesman evicted from their homesteads during the park's establishment. It means: "He who sweeps clean" (Barrow and Fabricius 2002).

Many have encouraged the involvement of Indigenous and local people in park management and governance as a means to mitigate some of these negative impacts. Although the applicability of local knowledge to park management has been recognized by some as crucial to the sustainability of parks (Agrawal 2003), there is still significant controversy over the appropriate role for Indigenous and local people in park governance. Some argue that a focus on human needs have co-opted conservation efforts (Sanderson and Redford 2003; Terborgh 2004), while others see human issues as inalienable from discussions on conservation in general and on parks in particular (Brosius 2004; Faizi 2006). Given the existing case study material and critiques of parks, we propose the following equity criteria: (1) the resolution of land tenure and ownership (in order provide compensation for lost land rights); (2) the maintenance of livelihood opportunities (in order to mitigate further impacts on livelihoods, to guarantee Indigenous people access to resources, and to provide local employment); and (3) Indigenous participation in park governance and decision-making (in order to enable local people to influence decisions that will affect them). These are explored in detail below.

2.3.2 Criteria and Indicators of Social Equity

In response to the social critiques of parks and protected areas, this section (accompanied by park specific examples in Table 2.2) describes the three equity criteria and associated sub-criteria and indicators that can be used to identify success or failure of effectively achieving equity in parks. Indicators are listed in such a way as to indicate the optimum outcome where 'more of each' is the preferred condition. (And while we acknowledge that an effectiveness evaluation requires a scale for judging progress made to address these C&I, given the breadth of issues covered in this chapter we do not discuss the ordinal scale used in our evaluations.)

Table 2.2. Criteria and indicators used to test whether a set of case study national parks in Canada and South Africa have been simultaneously effective at addressing social equity *and* ecological integrity. (Legend: AMB=Archipelago Management Board; CA-FN=Champagne-Aishihik First Nation; DCAs=damage causing animals (e.g., lions, elephants); Gwaii Haanas=Gwaii Haanas National Park Reserve; Kgalagadi= Kgalagadi National Park; Kruger=Kruger National Park; Kluane=Kluane National Park & Reserve; KPMB=Kluane Park Management Board; N/A-not applicable or not examined within the case study parks; Pacific Rim=Pacific Rim National Park Reserve; SANParks=South African National Parks; TPCs=Thresholds of Potential Concern; Waterton Lakes=Waterton Lakes National Park).

Criterion	Sub-Criterion	Potential Indicator(s)	Park-Specific Examples
Social Equity			
	Land Tenure and Ownership	The legal framework of the park clarifies property rights and provides for appropriate land tenure arrangements	The Makuleke, and Mier and ǂKhomani San have a final land claim agreement and co-manage contract parks with SANParks in Kruger and Kgalagadi (respectively)
Resolution of Land Tenure and Ownership	Relocation	Relocation was negotiated versus forced; compensation was offered for relocation	The ǂKhomani San and Mier people living inside Kgalagadi were forcibly relocated outside of the park when it was established in 1931; the new contract park is partial compensation for relocation
	Park Establishment	The process of establishing the protected area involved full consultation and negotiation directly between government and the local Indigenous groups	Stemming from their protests against logging on Lyell Island, the Haida Nation approached Parks Canada and initiated the establishment of Gwaii Haanas
Maintenance of Livelihood Opportunities	Livelihoods	There is a distribution of financial benefits from the park to local Indigenous communities; damages caused by wildlife are compensated in a manner deemed to be fair by local people	For the Makuleke in Kruger, money from trophy hunting is used to benefit the community (e.g., through building schools, water pumps, etc); DCAs and a lack of compensation are major unresolved issues with communities surrounding Kruger and Kgalagadi

	Access to Resources	Essential versus negotiable uses are determined by local Indigenous people	Haida and Makuleke members of the park co-management boards in Gwaii Haanas and Kruger respectively are satisfied with their access rights as they were negotiated directly with the relevant park authorities
	Employment Attributes	Employment opportunities include a training/capacity-building focus	Pacific Rim assists each First Nations employee to develop a long-term career plan with a mentor within the park to help them achieve their goals, and to identify funding sources and how they can gain skills (e.g., diploma courses, workshops); Kruger provides learnerships to local employees who wish to pursue further education
	Employment Statistics	The park has and uses an employment policy reflecting equity for minority groups	Gwaii Haanas has an HR plan with a goal of a minimum 50% of all positions staffed by Haida
Participation in Park Governance	Participation in a Management Board	Members are satisfied with their experience on the management board	The AMB (co-management board) at Gwaii Haanas has a strong, common message: the board "just works, it really does"
	Decision-Making Authority of the Management Board	The management board has authority over decision-making (versus being solely consultative)	Gwaii Haanas' AMB receives decision recommendations from the park staff and makes decisions on all aspects of park management based upon the best available information; the KPMB at Kluane is a consultative board that makes recommendations to the Minister

	Management Board origins	There are no conflicts over how the management board is determined (e.g., whether it is elected by the local community or appointed by local government)	N/A
	Indigenous People in Senior-Level Park Management	Local Indigenous and tribal people are employed in senior-level management positions (versus only in 'junior' staff positions)	Kluane has one CA-FN person training for the Superintendent position; Gwaii Haanas' goal is for 50% at all levels of the organization and in 2007 the Superintendent is Haida and there are Haida on the management team and in supervisory positions; Kgalagadi has no San or Mier working in senior management
	Other Opportunities for Participation	The institutional framework of the park provides for Indigenous involvement, education, and awareness and extension programs	Kruger and Kgalagadi both have a community forum, comprised of local community representatives and park personnel. The intent is for the forum results to feed back into management via the monthly Executive Committee meetings
Ecological Integrity			
Conservation of Biological Diversity	Native Species	Extent of change in the composition, abundance and distribution of native species assemblages and/or keystone or sensitive species	Kluane has long-term monitoring data for the Snowshoe hare cycle, a keystone prey species; Kgalagadi has long-term aerial surveys of key ungulate prey species
	Species At Risk	Extent of change in status, composition, abundance and distribution of species at risk	Kruger is monitoring two globally endangered mammal species; Waterton Lakes monitors a threatened plant species which is endemic to the park

	Landscape Diversity	Extent of change in the dominant woody vegetation or herbaceous species composition	Kruger is the only case study park that seeks to detect an undesirable change in vegetation heterogeneity including any loss of combinations of species and structural components in the park's landscapes
	Herbivory and Predation	Effects of herbivores on heterogeneity and biodiversity at different spatial and temporal scales	Kruger has vegetation TPCs to monitor changes in the most and least dominant vegetation species
Conservation of Ecosystem Processes	Disturbance Processes	Change in the extent of area and percent of park land affected by disturbance processes or agents beyond the range of historic variation	Waterton Lakes and Kruger both have targets for prescribed burning regimens
	Productivity	Extent of change to primary production	Kluane monitors productivity of several species as a possible indicator of climate change in the boreal region
Adaptation to and Mitigation of Threats and Stressors	Insularisation and Fragmentation	Extent of change in habitat connectivity and migration corridors	Pacific Rim conducted a study to assess connectivity in the park
	Climate Change	Changes in species distribution; changes in 'ice-on' and 'ice-off' events	Kluane monitors changes in species which could be indicators of climate change
	Illegal Hunting	Extent of change in the number and species of illegally harvested wildlife	Kruger maintains a database on illegal hunting activities

Disease and Pest Epidemics	Extent of change in the area or percent of park land affected by insect and/or disease processes beyond the range of historic variation	Waterton Lakes monitors white pine blister rust; Kruger monitors bovine TB in lions and buffalo; Kluane monitors spruce bark beetle
Atmospheric Contamination	Area and/or percent of park land subjected to levels of specific air pollutants that may cause negative impacts on the park ecosystems	N/A
Alien Biota	Extent of change in the abundance and distribution of alien biota; extent of change in potential pathways of invasion by alien biota	Gwaii Haanas monitors impacts of alien biota including deer, raccoons, and rats; Kruger has a hierarchical approach to evaluating new pathways of invasion for alien biota
Pressures and incursions from external sources	Extent of change in regional human populations, livestock trespass into park, and/or unregulated scenic air tours	Waterton Lakes has identified several external pressures on the park including haphazard development of surrounding landscapes, livestock trespass, increasing road densities, and an increasing regional population
Aquatic System Contamination	Water bodies in the park with significant variation from the historic range of variability in pH, dissolved oxygen, levels of chemicals, etc.	Pacific Rim has a comprehensive water quality monitoring program focused on priority sites, 32 trace metals and five groups of nutrients

2.3.2.1 Resolution of land tenure and ownership

The resolution of land tenure can make it more explicit who are and are not legitimate users of a particular resource. We acknowledge that the settlement of land claims are generally outside the realm of a park organization (e.g., responsibility lies with another government

department), but they must often be realized or compensated in part by the park agencies. Hence, it often becomes the park's responsibility to fulfil the requirements settled through a land claim, such as the legacy effects of relocation and current access or use rights. We also realize that the establishment of a park is for the benefit of constituents within a larger region (and indeed, often provides a global benefit), however much of the costs associated with individual protected areas are borne locally (Adams et al. 2004; Blaustein 2007).

A set of sub-criteria and potential indicators concerning land tenure or ownership in parks could include:

- Land Tenure and Ownership: the legal framework of the park clarifies property rights, provides for appropriate land tenure arrangements, recognizes customary and traditional rights of Indigenous people, and provides means of resolving property disputes by due process; local ownership of land with possible lease-back arrangement to the State (versus State ownership);
- Relocation: local Indigenous communities have been allowed to remain within the park versus being relocated outside of the park; relocation was negotiated (versus forced); compensation was offered for relocation; compensation was in a form acceptable to Indigenous groups;
- Park establishment: the process of establishing the protected area involved full consultation and negotiation directly between government and the local Indigenous groups; local people involved in park negotiations feel their concerns were adequately addressed.

2.3.2.2 Maintenance of livelihood opportunities

This criterion focuses on the critical aspects of livelihoods--the capabilities, assets and activities required for a means of living (Chambers and Conway 1991). Livelihoods can be considered sustainable when the people affected by change can cope with and recover from the stress and shocks of change, can maintain or enhance their capabilities or assets, and can provide sustainable livelihood opportunities for the next generation (Chambers and Conway 1991). The relocation of individuals and families, disruptions in daily living patterns, cultural and community changes, and increased poverty are directly linked (Burdge 1994). We acknowledge that park agencies should not be the foremost agency responsible for ensuring

that all local human health and livelihood needs are met. However, “there is an ethical obligation to attempt to improve the quality of life” within a protected area framework (Oltremari and Jackson 2006: 215). While the context of each park varies, we advocate that poverty reduction should not be compromised by conservation efforts (*sensu* Adams et al. 2004) and that parks can and should generate positive economic benefits for locals through non-extractive use such as ecotourism, safari hunting, and medicinal plant use, as appropriate. We also advise that, as Indigenous populations negotiate for or return to traditional uses heretofore banned in protected areas, it may at some point become necessary to examine the effects of traditional use on ecosystem health.

We believe a comprehensive yet versatile approach to economic generation is required because the complexity associated with many rural communities living outside a wage system renders employment levels a necessary but insufficient indicator on its own. The sustainable livelihoods and social impact literature pays particular attention to employment opportunities for minority groups and changes in livelihoods (especially due to relocation, *sensu* Burge 1994), while the cultural and environmental justice literature emphasizes the need for equity in access to resources within or associated with parks as issues of access highlight asymmetrical relations of power and governance around the granting of access rights (Zerner 2003). Thus, employment opportunities for local Indigenous groups, access to resources, and subsequent impacts on local livelihoods are listed as sub-criteria below. Sub-criteria and indicators for evaluating how effectively a park has addressed livelihood needs, resource access, and employment include:

- Livelihoods: local people have maintained their daily living patterns or livelihood opportunities; given relocation, the maintenance of existing livelihoods or a reasonable facsimile is possible; there is a distribution of financial benefits from the park to the local Indigenous communities and the distribution of benefits is seen by local people to be fair (Prabhu et al. 1999); damages (e.g., caused by wildlife) are compensated in a manner deemed to be fair by local people; nutritional and health status within surrounding communities is maintained or improved (Prabhu et al. 1999); funds from commercial tourism ventures such as trophy hunting are used for the common good of the community (e.g., building schools, water pumps, etc.);

- Access to resources: clear membership rules clarify who is (and is not) allowed to access a resource and why; essential versus negotiable uses are determined by local Indigenous people (versus by park administrators); local people have secured rights and access to natural resources; conditions of access can be easily met by local people; conditions of access are perceived locally to be fair (Prabhu et al. 1999); access fees for livelihood uses are waived or partially compensated by the park;
- Employment Attributes: employment opportunities are long-term, permanent positions (versus short-term, seasonal positions); employment opportunities include a training/capacity-building focus (versus little skills training or knowledge transfer); Indigenous people are employed in positions providing reliable alternatives economically and/or allow for the kinds of hybrid economies that characterize many rural populations; commercial opportunities are turned over to the community after a negotiated timeframe (e.g., Build, Operate, and Transfer agreements (BOTs) for commercial tourism lodges);
- Employment Statistics: an increase in occupational opportunities in the region can be attributed to the park; the beneficiaries of this employment are those who were most affected by the park in the first place; the park has and uses an employment policy reflecting equity for minority groups; the number and proportion of Indigenous people employed in the park is consistent with use and access rights forgone;
- Regional Impacts of Employment: a reduction in local poverty levels in the region surrounding the park is evident; the region surrounding the park has maintained a stable population as opposed to experiencing a dramatic influx/outflux of temporary workers; any influx of people to the region surrounding the park has not introduced additional social impacts (Prabhu et al. 1999).

2.3.2.3 Participation in park governance

National parks and protected areas need governance at a scale which allows these global interests to be protected. However, local Indigenous and tribal people in particular should have a proportional representation in park governance because they often bear the burden of conservation, whether through direct loss of access to traditional areas or wildlife damage to property. Decision control is widely recognized as a key attribute of social support at the local level of emerging and ongoing parks and protected areas. Common property scholars

argue that the devolution of authority to the lowest level possible is important so as to achieve significant local participation in decision-making (Brechin et al. 2001; McKean 2000). Common property theory provides insight into participation in decision-making. Several key attributes of a successful common-property regime include users having the right to make decisions, modify the rules of use over time, organize such that authority resides in the hands of local users and so provides for both flexibility in decision-making as well as incentives for local users to control their own fate, distribute decision-making rights, and that use rights are deemed "fair" and acceptable by users (McKean 2000; Agrawal 2003).

The devolution of authority is often referred to as co-management and was first defined in regard to protected areas by Brechin et al. (2001: 25) as "the substantial sharing of protected-areas management and responsibilities and authority among government officials and local people." In all but the most strictly community-controlled protected areas, Indigenous people have had very little equity in decision-making, and the relationship of park agencies with local communities in the past has generally been paternalistic and unidirectional (Stankey 1989). A cultural justice perspective emphasizes the importance of focusing on power and governance, and is primarily concerned with what authority is devolved to whom (Zerner 2003). Participation in park management often fails due to clear limits placed on the form and degree of participation that park authorities will tolerate. A genuine delegation of authority and power over decision-making to local people requires a shift from the practice of informing or consulting local people to participation at levels where there is real co-operation and community control (*sensu* Arnstein 1969; Berkes 1994).

Sub-criteria and indicators to evaluate how effectively a park has provided for local participation in park governance could include:

- Participation in a Management Board: the legal framework of the park provides opportunities for Indigenous participation in decision-making; the composition of the management board is reflective of the population in the region surrounding the park; any conflicts over membership or management board composition have been resolved equitably; there is an Indigenous majority on the management board where appropriate given the assignation of rights and titles in the region in question; there is

a level of satisfaction with any co-management arrangement; members are satisfied with their experience on the management board; recommendations to improve the management board are incorporated into practice; co-management agreements are revisited within a negotiated timeframe;

- Decision-Making Authority of the Management Board: the management board has authority over decision-making (versus being solely consultative); the management board makes decisions by consensus wherever possible (versus majority rule);
- Management Board origins: there are no conflicts over how the management board is determined (e.g., whether it is elected by the local community or appointed by local government);
- Indigenous People in Senior-Level Park Management: local Indigenous and tribal people are employed in senior-level management positions (versus only in 'junior' staff positions such as housekeeping or general labour);
- Other Opportunities for Participation: the institutional framework of the park provides for Indigenous participation in decision-making opportunities, outreach and education, and extension programs.

2.3.3 Ecological Concerns

Uncertainty over the ecological health and resilience of terrestrial parks persists due to several key threats. Davis et al. (2003) posit the major threats to protected areas are the "Four Horsemen of the Apocalypse":

- insularisation and fragmentation: the process whereby a large, contiguous area is either reduced in total area and/or divided into two or more isolated patches resulting in the redistribution of biological communities or populations (Primack 2000; Fahrig 2003);
- loss of native fire regimes whereby the frequency, intensity, and extent of native fire regimes in many parks have been significantly altered by deliberate fire suppression, changing land use, loss of customary Indigenous ignitions, and introduction of exotic plants (Davis et al. 2003);

- climate change which “looms large on the horizon of anthropogenic impacts that are likely to cause massive future extinctions” (Kerr and Packer 1998: 263), and is likely to be the greatest threat in many if not most regions (Lemieux and Scott 2005); and
- atmospheric contamination (pollution) from, among others, ozone, nitrates, and sulphates, has been shown to “significantly alter the competitive balance within an ecosystem, frequently affecting system productivity and often favouring “weedy” species” (Davis et al. 2003: 134).

The spread of exotic species (particularly plants) is a necessary addition to this list because once they become established, they can have devastating population and community-level impacts, are uncontrollable, and become “permanent in ecological time” (Coblentz 1990: 262). These and other threats and stressors are discussed below and are accompanied by park specific examples in Table 2.2.

2.3.4 Criteria and Indicators of Ecological Integrity

Assessments of ecological effectiveness generally focus on one of three areas: design, management processes, and ecological integrity (Ervin 2003). The ecological criteria and indicators in this paper are structured according to the concept of ecological integrity. Parrish et al. (2003: 852) note that a system or species has integrity when “its dominant ecological characteristics (e.g., elements of composition, structure, and function) occur within their natural ranges of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human disruptions.” An evaluation based on ecological integrity is holistic as it includes such concerns as intactness, species viability, ecological processes and functioning, and the threats and stressors facing a protected area (Ervin 2003). Our evaluation followed the three criteria for assessing the ecological integrity of a national park identified by the Panel on Ecological Integrity (Canadian Heritage 1998): (1) conservation of biological diversity (in order to account for species viability); (2) conservation of ecosystem processes (in order to assess the functionality of an ecosystem); and (3) adaptation to and mitigation of stressors and threats (in order to monitor and reduce negative impacts on each case study national park).

Effectiveness evaluations lend themselves quite easily to empirical investigation (Bingham and Felbinger 2002), although the availability of data is a major constraint in assessing

management effectiveness (Hawthorn et al. 2002). Hence, our decision to select national parks with well developed monitoring programs for our assessment was deliberate. All of the parks involved in the case study research had ecological data suitable for a status assessment of the above criteria; only a few of these parks had indicators that were also useful for effectiveness evaluations. We used long-term monitoring data to evaluate the status of park-specific ecological indicators, and suggest that if a park has consistently maintained its suite of ecological indicators in a healthy status against a sound baseline over time, the park can be considered effective at maintaining ecological integrity.

To a certain extent, one indicator could be used to measure progress on more than one criterion, thus there could be overlap between indicators in the following lists. Due to space limitations and given the breadth of factors that can be included in an evaluation of ecological integrity, we have provided here only the briefest introduction to the myriad indicators possible. (And while we acknowledge that an effectiveness evaluation requires a scale for judging progress made to address these C&I, given the breadth of issues covered in this chapter we do not discuss the status assessment and the ordinal scale used in our effectiveness evaluations.)

2.3.4.1 Conservation of biological diversity

Coarse-filter approaches to conservation, such as the establishment of large parks and protected areas, focus on the management of ecosystems and their natural processes. The main idea behind a coarse-filter approach is that the representation of ecosystems throughout a region will conserve most species and processes; the assumption is that the vast majority of species do not need individual attention but can be conserved by protecting examples of natural communities (Noss 1996). To evaluate if a coarse filter approach has been effective, it is often necessary to identify and evaluate the status of specific indicators, such as at risk or focal species. An evaluation of success for species-specific approaches is relatively straightforward as targets tend to be identifiable. Persistence of a species (ideally at historical levels or above an identified minimum viable population) is success and extirpation or extinction is a failure (subspecies, subpopulations and hybrids do present challenges to this approach) (Schwartz 1999).

Sub-criteria and indicators for evaluating key species conservation could include:

- Native Species: extent of change in the composition, abundance and distribution of native species assemblages and/or keystone or sensitive species including (but not limited to) insects, amphibians, landbirds, carnivores, or migratory species; changes in the extent and structure of focal plant communities (particularly those deemed critical wildlife habitat);
- Species At Risk (including those that appear on formal 'species at risk' lists and those not yet listed but suspected by biologists to be at risk): extent of change in status, composition, abundance and distribution of species at risk;
- Landscape Diversity (SANParks 2005): extent of change in the dominant woody vegetation species composition; extent of change in the dominant herbaceous species composition; maintenance of the horizontal variation or patchiness of the landscape; extent of change in canopy cover, volume or height of dominant woody species.

2.3.4.2 Conservation of ecosystem processes

Along with conserving patterns (e.g., richness), the ecological and evolutionary processes that generate genetic diversity and the mechanisms critical for speciation must also be preserved in order to maintain ecological integrity of a given park. The conservation of ecosystem processes can pre-emptively protect resources before they become endangered by preserving not just target species, but also important ecosystem linkages and habitat condition (Schwartz 1999).

Sub-criteria and indicators for evaluating ecosystem processes could include:

- Herbivory, Parasitism and Predation: effects of herbivores on heterogeneity and biodiversity at different spatial and temporal scales; factors determining prey selection by predators;
- Disturbance Processes: changes in the extent of area and percent of park land affected by disturbance processes or agents (e.g., fire, storm, permanent flooding) beyond the range of historic variation;
- Productivity (carbon assimilation by plants through photosynthesis; SANParks 2005): maintenance of historic determinants (such as extremes in rainfall and soil properties)

and processes of primary production at different scales (both terrestrial and aquatic); extent of change to primary production (possibly indicating an increase in nutrient inputs from outside an ecosystem);

- Degradation (SANParks 2006): extent of loss of landscape function including nutrient cycling, soil stability, infiltration and runoff (e.g., due to industrial forestry on park boundaries, see Cameron (2006)).

2.3.4.3 Adaptation to and mitigation of stressors and threats

Protected areas are subject to the same ecosystem-level processes and anthropogenic forces as the landscape surrounding them, and should strive to adapt to or mitigate stressors that reduce biological diversity or impair ecosystem health. Sub-criteria and indicators for evaluating stressors in national parks and protected areas could include:

- Alien Biota: extent of change in the abundance and distribution of alien biota (including flora and fauna); extent of change in potential pathways of invasion by alien biota;
- Insularisation and Fragmentation: extent of land cover change within and bordering park boundaries; changes in road densities within or on the perimeter of the park; extent of change in the perimeter to edge ratio of habitat patches;
- Climate Change: extent of change in the frequency of extreme events in the park region; implementation of adaptation strategies to natural disturbance events;
- Illegal hunting: extent of knowledge about illegal wildlife trade; changes in the number of park guards focused on preventing illegal harvesting; extent of change in the number and species of illegally harvested wildlife;
- Disease and Pest Epidemics: extent of change in the area and/or percent of park land affected by insect and/or disease processes beyond the range of historic variation;
- Atmospheric Contamination: extent of change in area and/or percent of park land subjected to levels of specific air pollutants (e.g., sulphates, nitrate, ozone) that may cause negative impacts on the park ecosystems;
- Pressures and incursions from external sources: extent of change in regional human populations, livestock trespass into park, unregulated scenic air tours, etc.;

Aquatic System Contamination: percent of stream kilometres in which stream flow and timing has significantly deviated from the historic range of variation; water bodies in the park with significant variation from the historic range of variability in pH, dissolved oxygen, levels of chemicals (electrical conductivity); identification and involvement of park managers in the mitigation of point source and non-point source pollution.

2.4 Conclusion

National parks and protected areas are amongst our best current options for maintaining and restoring biodiversity if we manage them within the 'matrix' of uses across a landscape and with consideration for shifting climatic conditions and atmospheric pollution (Noss 2001; Lindenmayer and Franklin 2002). However, parks and protected areas are confronted by a number of ecological threats and stressors, many of which originate outside park boundaries and jurisdictions, that present challenges to their long-term management. At the same time, many protected areas are also challenged by poor relations with Indigenous communities, often having exacerbated hardship through forced relocation and impacts on subsistence harvesting practices.

Effectiveness evaluations in parks must encompass social measures in addition to ecological measures given impacts on local communities, and the necessity of community support to ensuring park success in the first place. The integration of social and ecological variables has yet to be carried out in a meaningful way (Hockings 2003). This paper has attempted to address the lack of a holistic approach by outlining the criteria and indicators for evaluating both social equity and ecological integrity in national parks. Effectiveness evaluations are imperative in order to determine if management actions are achieving their intended outcomes, such as the conservation of target species, mitigation of threats, local participation in park governance, and maintenance of livelihood opportunities for local people. If a national park is not currently monitoring the effectiveness of their management actions, an ecological status assessment is a logical first step in priming the park for an effectiveness evaluation at a later date. Given the multitude of stressors facing national parks and protected areas, it seems short-sighted and neglectful if we do not attempt to ensure these areas are effective in achieving their social and ecological objectives.

2.5 References

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3 EVALUATING ECOLOGICAL INTEGRITY IN NATIONAL PARKS: CASE STUDIES FROM CANADA AND SOUTH AFRICA[5]

3.1 Overview

Many existing parks are currently experiencing difficulties in achieving their conservation aims, yet they remain an important option for maintaining and enhancing the conservation of biological diversity. Critics have claimed that many national parks cannot continue to protect the biological resources within their borders, and the sustainability of these areas over the long term is in question. Ways need to be found to strengthen those that are failing, and to understand and replicate those that are succeeding. This paper presents the empirical results from a systematic evaluation of how effectively six case study national parks and national park reserves in Canada and South Africa have been protecting ecological integrity. All six parks have effectively addressed the priority indicators for which they have monitoring data. However, the effectiveness rating of each park decreased when all indicators, including those identified as priorities but lacking monitoring data, were analysed. This indicates that the parks had generally identified more priority indicators than they were actually able to address.

3.2 Introduction

National parks are considered fundamental to efforts to protect biodiversity around the world. Yet, many existing parks are currently experiencing difficulties in achieving their conservation aims, and their long-term sustainability has been questioned (Bruner et al. 2001). Critics have claimed that national parks cannot be expected to carry the burden of maintaining biodiversity (Eagles 1993), that they do not necessarily protect biotic integrity within their borders (Terborgh 2004; Bruner et al. 2001; Salafsky et al. 2002), or they have been poorly located from the standpoint of biodiversity conservation (Scott et al. 2001; Rodrigues et al. 2004). Nonetheless, the global network of parks is currently a key option for maintaining and enhancing biodiversity conservation; ways need to be found to strengthen

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those that are failing (Terborgh and van Schaik 2002), and to understand and replicate those that are succeeding.

Efforts have been made to improve the sustainability of national parks by evaluating the effectiveness of management actions, and incorporating the findings back into management strategies (Dudley et al. 1999; Salafsky et al. 2002; Parrish et al. 2003; Hockings et al. 2004; Hockings et al. 2006). Effectiveness evaluations focus on outcomes, provide a more direct measure of the impact of management than those that only target inputs or processes, and assess if management actions resulted in the intended outcomes (Salafsky et al. 2002; Salzer and Salafsky 2006; Saterson et al. 2004). If undertaken in a systematic manner, such evaluations can encourage adaptive management by reviewing actions taken and assessing whether they produced the desired results (Hawthorn et al 2002; Hockings et al. 2006). However, many evaluations have been anecdotal rather than empirical (Saterson et al. 2004), and a systematic approach has not always been used. And although effectiveness evaluations lend themselves quite easily to empirical investigation (Bingham and Felbinger 2002), the availability of data is a major constraint (Hawthorn et al. 2002).

For whatever reason (e.g., lack of budget or trained staff, managerial challenges), many national parks do not yet possess adequate monitoring and evaluation programs that would enable a full evaluation of the effectiveness of their management. Managers are thus unable to accurately assess if management actions have directly resulted in desired outcomes. In lieu of sufficient monitoring data, status and trend assessments can be used to evaluate the status of ecological integrity. Status assessments focus on the question “how is the biodiversity we care about doing?” (Salzer and Salafsky 2006: 311), and are an ideal way to prime a national park for a full effectiveness evaluation at a later date.

This paper presents the results from a systematic evaluation of how effectively six national parks and national park reserves in Canada and South Africa have been protecting ecological integrity. An ecosystem has integrity when its dominant ecological characteristics (e.g., elements of composition, structure, function, and ecological processes) occur within their natural ranges of variation and can withstand and recover from most perturbations caused by

natural environmental or human factors (Parrish et al. 2003). Evaluations based on ecological integrity are holistic as they include such concerns as intactness, species viability, ecological processes and functioning, and the threats and stressors facing a protected area (Ervin 2003). In this study, a national park was considered ecologically effective if it achieved park management objectives in a manner that sustained biodiversity and ecosystem processes while abating threats (*sensu* Ervin 2003).

3.3 Methods

The goal of this study was to systematically evaluate how effectively national parks were protecting ecological integrity. To do this, we selected six case study parks in Canada and South Africa and evaluated each case study using various data sources against a set of criteria and indicators and using the analytic procedures described below.

3.3.1 Selection of National Parks for the Study

The study was restricted to Canada and South Africa for logistical reasons and because both countries possess functioning predator-prey cycles and maintain extensive and well-established national parks that are under claim (in part or in whole) by neighbouring Indigenous or tribal groups. Based on expert opinion and our knowledge of national parks in these countries, purposive sampling (Babbie and Benaquisto 2002) was used to select the IUCN (1994) Category II national parks. The sampling logic was a theoretical replication wherein the case studies were selected because they would provide contrasting results but for predictable reasons (Yin 2003). Because of the broader aims of the project (a study of Indigenous co-management and access to national parks), parks were selected on the basis of the presence of a co-management board involving local Indigenous or tribal groups, as well as being restricted to those having a management plan and monitoring data.

Specifically, the national parks and national park reserves included in this study were: Kluane, Gwaii Haanas and Pacific Rim National Park Reserves and Waterton Lakes National Park in Canada, and the Kruger and Kgalagadi National Parks in South Africa. Kluane and Waterton Lakes were selected because they had very explicit management objectives identified in park management plans. Gwaii Haanas and the Kgalagadi were selected as they had less explicit management objectives in their management plans than Kluane and

Waterton Lakes, though there was ecological monitoring within the parks. Pacific Rim had the least explicit management statement of all the parks. The Kruger is unique in this study and was selected because it uses the Thresholds of Potential Concern (TPC) approach. TPCs, essentially the upper and lower limits along a continuum of change in selected environmental indicators, are a set of operational goals that together define the spatiotemporal heterogeneity conditions for which the Kruger ecosystem is managed (Biggs and Rogers 2003). The case studies varied in size, regional ecosystem type, co-management strategy, and their main management and conservation issues (Table 3.1).

3.3.2 Selection of Criteria and Indicators of Ecological Integrity

Woodley (1993) proposed a framework for monitoring ecological integrity in national parks that included three general components – biodiversity, ecosystem processes, and stressors. Parks Canada uses this framework as a set of criteria for evaluating the ecological integrity of national parks: conservation of biological diversity (in order to account for species viability); conservation of ecosystem processes (in order to assess the functionality of an ecosystem); and adaptation to and mitigation of stressors and threats (in order to monitor and reduce negative impacts) (Canadian Heritage 1998; Parks Canada Agency 2005). Using these as the criteria in our evaluation, we outlined a preliminary list of indicators through an analysis of management plans and management direction statements from a purposive sample of 14 national and provincial parks in Canada, Australia and South Africa (see Timko and Satterfield, in press). Investigation of six of these national parks allowed the list of indicators generated inductively from case examination to complement those generated deductively from the assessment of management plans (Boyatzis 1998).

3.3.3 Data Collection

The monitoring data and information used to evaluate the ecological integrity of each park were collected during site visits between October 2005 and February 2007, and through subsequent correspondence as necessary. All data used in the evaluations were obtained directly from the park staff or private researchers working in the parks. If a State of the Park Report (SoPR) was available for a park, its list of identified indicators and status and trend results were used as that park's evaluation. For all other parks, a staff biologist from the relevant park was asked to review and comment on the list of indicators to ensure their

Table 3.1. Distinguishing characteristics of six case study national parks in Canada and South Africa involved in the evaluation of ecological effectiveness.

National Park	Country and Location	Latitude, Longitude (decimal degrees)	Year Established	Size (sq km)	Regional Description	Main Management/ Conservation Issues
Waterton Lakes National Park	Canada, SW corner of Alberta, northern part of the Waterton-Glacier International Peace Park with Glacier National Park, Montana, USA	49 01 24 N, 113 55 42 W	1895	525	Crown of the Continent ecosystem, Rocky Mountains	Small size of park relative to large migratory wildlife using the park; external influences from increasing human populations; climate change
Kluane National Park & Reserve	Canada, SW corner of Yukon Territory	61 00 49 N, 138 31 31 W	1976	21 980	Northern Coast Mountains Natural Region	Climate change, predator/prey interactions; forest pests
Gwaii Haanas National Park Reserve and Haida Heritage Site	Canada, 130km off northwest coast of British Columbia	52 18 20 N, 131 24 18 W	1993	1470	Pacific Coast Mountains Natural Region	Spread of invasive and alien biota; seabird conservation
Pacific Rim National Park Reserve	Canada, West side of Vancouver Island	49 03 05 N, 125 42 46 W	1970	499	Pacific Coast Mountains Natural Region	Narrowness of the Long Beach Unit, anthropogenic impacts on water quality, shoreline protection, large numbers of tourists
Kruger National Park	South Africa, Eastern Mpumulanga and Limpopo Provinces	24 06 13 S, 31 20 41 E	1898	19485	South African Lowveld ecoregion	Alien biota; water quantity; fire management; ungulates; carnivores; heterogeneity; large population density on border of park
Kgalagadi National Park	Northern tip of Northern Cape Province bordering Namibia and Botswana	26 25 48 S, 20 37 39 E	1931	9 591	Southern Kalahari ecoregion	Native vegetation, ungulate migration, predator/prey interactions

relevance to current park management actions. This was important as the park management plans from Pacific Rim and Kgalagadi were relatively old (1994 and 2003, respectively), and monitoring data were used for several indicators that had not been identified as priorities in these plans. For the Kgalagadi, this was also necessary because monitoring data were limited and the park's management plan only broadly identified species of concern rather than explicit management goals for target species. (Most indicators for the Kgalagadi were evaluated for the national park; however several indicators were also evaluated for the much larger Kgalagadi Transfrontier Park, depending on the availability of monitoring data).

As an essential component of this study was to evaluate the management targets important to each park, our evaluation for some parks included data previously obtained from population surveys for specific species, water quality, and plant distribution. Concurrently, SoPRs were used if available, and included broader indicators such as songbirds or seabirds. Unstructured interviews were conducted with park ecologists to complement the monitoring data, and to provide expert opinion on status and trend of indicators where ecological monitoring data were not available. The number of indicators evaluated for each park varied from 17 for Waterton Lakes, to 40 for Kruger so the individual context and the differences among parks in terms of the focal species, specific threats, etc. could be accurately reflected (Table 3.2).

3.3.4 Data Analysis

The following four main components were involved in calculating the effectiveness with which the parks protected ecological integrity: indicator assessment and rating; conversion of indicator ratings into numerical values; calculation of the effectiveness with which ecological integrity was protected; and completion of a sensitivity analysis.

Table 3.2. Indicators listed according to the three ecological criteria used to evaluate the effectiveness with which six national parks in Canada and Africa protected ecological integrity. 'Data indicators' reflected the concept of ecological integrity and included such things as focal species distributions, water quality, and water quantity (see text for details); these were assessed using the state of the park reports, status and trend assessment, effectiveness evaluations, or expert opinion. 'Dataless indicators' were classified as 'in progress' if monitoring or management actions were being initiated or would be in the immediate future, and as 'no data' if monitoring or management actions were not going to be initiated in the immediate future (see text for details). N=number of indicators evaluated for each park.

	Criteria		
	Conservation of Biological Diversity	Conservation of Ecosystem Processes	Adaptation to and Mitigation of Stressors and Threats
National Park			
Waterton Lakes (n=17)	*Cygnus buccinator*[a]; *Isoetes bolanderi*[b]; *Salvelinus confluentis*[a]; *Tympanuchus phasianellus*[a]; Grizzly Bear (*Ursus arctos)* monitoring[a]; Amphibian Presence/ Absence[a]; Avian Productivity[a]; Ungulate Monitoring[a]	Long-Term Average Fire Cycles[a]; Water Quantity[a]; Disturbance Type[c]; Hydrology/Water Quantity[c]	Non-Native Vegetation[a]; White Pine Blister Rust[a]; Wildlife Mortality[a]; Road Development[a]; Climate Change[c]
Kluane (n=19)	*Oncorhynchus nerka*[a]; *Ovis dalli*[a]; *Lepus americanus*[a]; *Alces alces*[a]; *Oreamnos americanus*[a]; *Ursus arctos*[a]; *Tamiasciurus hudsonicus*[a]; *Spermophilus parryii*[a]; *Arctostaphylos uva-ursi*[a]; Mushrooms[a]; Birds[a]; Mice and Voles[a]	Kathleen Lake Aquatic System[b]; Sockeye Creek Water Quality[b]; Dezadeash River Water Quality[a]; Primary Productivity[c]	*Dendroctonus rufipennus*[a]; Climate Change[a]; Recreational Use[a]
Gwaii Haanas (n=26)	*Brachyramphus marmoratus*[a]; *Falco peregrinus pealei*[a]; *Eumetopias jubatus*[a]; *Haematopus bachmani*[a]; Spawning Pacific Herring (*Clupea pallasii*)[a]; Spawning Salmon (*Oncorhynchus* spp.)[a]; Rare Vascular Plants[a]; Colony-nesting Seabirds[a]; *Bufo boreas*[c]; *Ardea herodias*[c]	Water Quality[a]; Coastal Erosion[a]; Coastal Health Assessment Program[a]; Forest Productivity[c]	Deer Culls[b]; *Odocoileus hemionus* (forests)[a]; *Odocoileus hemionus* (non-forested)[a]; Raccoons (*Procyon lotor vancouverensis*) on Seabird Island[b]; Rat Culls[b]; Non-native Vegetation (forests)[a]; Forest Insects and Disease[a]; Non-Native Mammals[a]; Non-Native Amphibians[a]; Non-Native Vegetation (shorelines)[a]; Post-establishment Footprint[a]; Extent of Alpine Zone[c]

Pacific Rim (n=21)	*Haematopus bachmani* [b]; *Heterodermia sitchensis* [b]; *Abronia unbellata* [b]; *Haliotis kamtschatkana* [b]; *Eumetopias jubatus* [c]; *Brachyramphus marmoratus* [c]; Forest Biodiversity Plots[c]; Rockfish (*Sebastes* spp.)[c]; Eelgrass (*Zostera marina)* Beds[c]; Forest Songbirds[c]	Water Quality (Airport, Esowista, Landfill Creek, Golf Course, Sewage Lagoon) [c]	*Hedera helix* [a]; *Cytisus scoparius* [a]; *Ammophila breviligulata* [a]; *Nuttallia obscurata*[a]; *Ceratostoma inoratum* [a]; Northern Abalone (*Haliotis kamtschatkana)* poaching[a]
Kruger (n=40)	*Lycaon pictus* (nos of packs) [b]; *Lycaon pictus* (pack size) [b]; *Panthera leo* (TPC1a=33%popl'n deviation) [b]; *Panthera leo* (TPC1b=16%popl'n deviation) [b]; *Diceros bicornis*[c]; *Adenium swazicum*[c]; *Siphonochilus aethiopicus*[c]; Fish Assemblages[c]	Fire Intensity TPC1a, b,c[b]; Fire Intensity TPC2[b]; Instream Flow Rates (Mhinga-Luvuvhu, Olifants, Letaba, Sabie, Crocodile) [b]; Water Quality (Luvuvhu, Olifants, Letaba, Sabie, Crocodile, Shingwedzi) [b]; Heterogeneity/ Homogenization TPC[c]	*Tarebia granifera*[b]; *Bryophyllum delegoense*[b]; *Opuntia stricta*[b]; *Harrisia martinii*[b]; *Parthenium hysterophorus*[b]; *Pistia stratiotes*[b]; *Salvinia molesta*[b]; *Eichhornia crassipes*[b]; *Opuntia imbricata*[b]; *Thelechitonia trilobata*[b]; *Arundo donax*[b]; *Austrocylindropuntia cylindrical*[b]; *Acacia decurrens*[b]; Anthrax[b]; Rabies[b]; Lion (*Panthera leo*) Tuberculosis[c]
Kgalagadi (n=23)	*Ardeotis kori* [b]; *Antidorcas marsupialis* [b]; *Oryx gazella* [b]; *Panthera leo*[b]; *Taurotragus oryx* [b]; *Alcelaphus buselaphus*[b]; *Struthoi camelus*[b]; *Polemaetus bellicosus* [b]; *Connochaetes taurinus* [b]; *Sagittarius serpentarius* [b]; *Raphicerus campestris* [b]; *Acinonyx jubatus* [c]; *Felis lybica* [c]; *Crocuta crocuta*[d]; *Panthera pardus* [d]; *Hyaena brunnea* [d]	Fire Cycles[c]	*Rhigozum trichotomum*[b]; *Argemone ochroleuca*[b]; *Prosopis glandulosa*[c]; *Schinus molle*[c]; *Salsola kali*[c]; *Galinia africana*[c]

Key: Data Indicators= [a]State of the Park Report, [b]Status and Trend assessments, effectiveness evaluations, expert opinion, Dataless Indicators= [c]indicators 'in progress', [d]indicators designated as 'no data'. TPC=Threshold of Potential Concern

3.3.4.1 Indicator assessment and rating

3.3.4.1.1 Determining indicator status

Each indicator was assessed according to the following hierarchy:

- SoPR ratings for each indicator, if available,
- monitoring data evaluated according to Parks Canada's Ecological Integrity monitoring program (Parks Canada Agency 2007a),
- other monitoring data,
- expert opinion, and
- data from published or unpublished reports.

Parks Canada's ecological integrity monitoring program (Parks Canada Agency 2007a) was selected for three reasons: the majority of the parks involved in this study were Canadian parks falling under Parks Canada's jurisdiction, managers from several of these parks had just completed an SoPR whose results could be directly used in this study and, provided monitoring data was available, the methodology for determining status and trend was simple, straight forward to use, and easily replicable in the other case studies.

SoPRs were used for three parks (Waterton Lakes, Kluane, Gwaii Haanas), and evaluations using a combination of status and trend assessments, effectiveness evaluations, and expert opinion were completed for the remaining three parks (Pacific Rim, Kluane, Kgalagadi). Monitoring data obtained from Kluane and Gwaii Haanas were originally used to complete status and trend assessments for these parks, and these results were compared to the park's SoPR results obtained at a later date. The results for both analyses were the same, confirming that we were calculating status and trend correctly, and the SoPR results were subsequently used. SoPR results for Gwaii Haanas were also complemented by an evaluation of monitoring data from introduced rats (*Rattus rattus* and *Rattus norvegicus*) and Sitka black-tailed deer (*Odocoileus hemionus*) culling operations in order to demonstrate the effectiveness of these management actions.

Wherever possible, we evaluated indicators for Pacific Rim, Kluane and Kgalagadi against a standard, threshold, or target set by the park and according to the method described in Parks Canada Agency (2007a). Essentially, we assigned a value to each measure for an indicator (measures within thresholds or within one standard deviation of the mean=2, measures in the intermediate zone or within two standard deviations of the mean=1, and measures outside the threshold or outside two standard deviations of the mean=0). When we were assigning values to each measure, we decided that an increase in the population of a threatened species was positive. We assumed that if a measure for such a species exceeded the upper limits set for that species, the measure was assigned a 'green' rating as it suggested the management was having the intended outcome of increasing that species. (Although it was not an issue in this study, we also acknowledge that there are examples of species (e.g., elephants, snow geese) that have exceeded the upper limit after protection measures have been established, resulting in an increased and negative pressure on the ecosystem). Likewise, decreases in distribution or populations of alien biota below the lower thresholds were assigned a 'green' rating.

If one-third of the measures for an indicator were '0', the status of an indicator was classified as poor; otherwise, indicator status was calculated as the sum of the measure scores divided by the number of measures and then multiplied by 50 (Parks Canada Agency 2007a). These indicator values were then assigned a status colour according to Table 3.3. All remaining indicators were designated either as being 'in progress' if monitoring or management actions were being initiated or would be in the immediate future, or as having 'no data' if monitoring or management actions were not going to be initiated in the immediate future. Broadly, we use the term 'data indicators' if the indicators were evaluated using the SoPRs, status and trend assessments, effectiveness evaluations, or expert opinions, and 'dataless indicators' if they were designated as either 'in progress' or 'no data. The total number and type of indicators assessed for the parks are listed in Table 3.4.

Table 3.3. Cumulative indicator status scores and associated colour (Parks Canada Agency 2007a). Scores for indicator status were calculated as the sum of the individual measure scores divided by the number of measures and then multiplied by 50 (see text for detail).

Indicator Scores	Status Colour
67-100	Green
34-66	Yellow
0-33	Red

Table 3.4. Total number and type of 'data indicators' and 'dataless indicators' assessed for six case study national parks in Canada and South Africa. 'Data indicators' reflect the concept of ecological integrity and were assessed using the SoPRs, status and trend assessment, effectiveness evaluations, or expert opinion. 'Dataless indicators' were classified as being 'in progress' or as having 'no data' (see text for details).

		National Parks					
		Canada				South Africa	
		Waterton Lakes	Kluane	Gwaii Haanas	Pacific Rim	Kruger	Kgalagadi
Data Indicators	State of the Parks Report (SOPR)	12	16	19	-	-	-
	Status and Trend Assessment/ Effectiveness Evaluation	-	-	0	6	16	10
	Expert Opinion/ Secondary Data	-	3	3	9	18	3
Dataless Indicators	Indicators 'in progress'	5	-	4	6	6	7
	Indicators with 'no data'	-	-	-	-	-	3
Total Number of Indicators		17	19	26	21	40	23

The monitoring data for the following types of indicators could not be evaluated using the Parks Canada Agency (2007a) method: water quantity and quality, fire management, and alien biota. Instead, we used available monitoring data and developed an evaluation for each indicator as follows. In Kruger, data were obtained for minimum and drought instream flow rates for the park's major river systems. We considered each river to be a separate indicator, with several sampling sites along that river being the measures. We first assigned a weighted value to each measure for each site along a river using the following: measure is above the minimum instream flow rate=2, measure is located

between the minimum and drought instream flow rates=1, measure is below the drought instream flow rate=0. If one-third of the measures for an indicator were '0', the status of an indicator was classified as poor; otherwise, indicator status was calculated as the sum of the measure scores divided by the number of measures and then multiplied by 50 (Parks Canada Agency 2007a) and a status colour was assigned according to Table 3.3.

The water quality data used for Pacific Rim consisted of raw data for a variety of elements (e.g., phosphorous, iron) and components (e.g., pH, conductivity) from several sampling sites within a specific region (e.g., airport, golf course) of concern to the park. These were evaluated using percent compliance against the *Working Water Quality Guidelines for British Columbia* (Ministry of Environment, Lands and Parks 1998). Data points were separated for each sampling site (e.g., Esowista Tributary and Esowista Creek) for the same region (e.g., Esowista) according to year and element or component being measured. If the data point was within the limit, it was rated as 100% compliant; if it exceeded the limit it was rated as 0% compliant. Scores for all elements or components measured at a sampling site were averaged to obtain total site compliance (for example, if three of four data points were rated as 100% compliant, the overall score for that site was 75%). Total site compliances for all sample sites in a region were then averaged according to year, and this final percentage was assigned a status colour according to Table 3.3.

Water quality data for Kruger extended from November 2003 to December 2006 and were in the form of graphs depicting one of the elements or components being measured at each site. These were evaluated using percent compliance against the specific water quality guidelines identified in Venter (2007). Data points were separated for each site along the same river according to year and element or component being measured. If the data point was within the limit, it was rated as 100% compliant; if it exceeded the limit it was rated as 0% compliant. Data points for each element or component were summed and averaged for each sampling site to determine the total site compliance (for example, if three of four data points were rated as 100% compliant and one data point was 50% compliant, the overall score for that element was 87.5%). The site compliance scores for

all elements and components for each river were then summed and averaged to produce a total score for the entire river system. As with Pacific Rim, these final percentages were assigned a status colour according to Table 3.3.

Kruger has identified three TPCs for fire intensity and one TPC for fire pattern in the park. Using these TPCs as the upper and lower limits, the location of each measure was evaluated in relation to the TPC. For instance, TPC 1a states that the TPC limit for each fire intensity class is: <20% or >50% of the area burnt for each class. The following status colours and values were designated for each measure: 0-10% of the area burnt for each class=red (0), 10-20%=yellow (1), 20-50%=green (2), 50-75%=yellow (1), >75%=red (0). If one-third of the measures for an indicator were '0', the status of an indicator was classified as poor; otherwise, indicator status was calculated as the sum of the measure scores divided by the number of measures and then multiplied by 50 (Parks Canada Agency 2007a).The scores for the measures within each TPC were multiplied by their value, summed and divided by the number of measures and then multiplied by 50 (Parks Canada Agency 2007a). These scores were then assigned a status colour according to Table 3.3.

Stressors and threats facing the Kruger were evaluated using meeting minutes from the park's *Conservation Services Management Committee*. Progress was tracked for 15 alien or invasive species and three diseases (bovine tuberculosis in lions (*Panthera leo*), anthrax, and rabies) from 2004 until mid-2007. (The park's invasive species biologist agreed that 2004 onward was representative of park efforts to curb invasive alien plant threats (L. Foxcroft, 28 August 2007, pers. comm.)). If the threat was removed from the TPC list or was considered to be under control due to a management action, it was designated a 'green' status. If management actions were continuing and the threat was less than a Level 1 TPC (see SANParks, No Date), it was considered to be a concern and was designated a 'yellow' status. If the threat was ongoing or increasing or if it was a Level 1 TPC, it was designated a 'red' status. The interpretation of these results were reviewed and agreed to by the invasive species biologist at Kruger (L. Foxcroft, 16 May 2007, pers. comm.).

Finally, if park managers or biologists felt confident providing their expert opinions and qualitative judgements, these were used to designate status for the remaining indicators according to a more nuanced effectiveness rating scale (Table 3.5). On this scale, a score of two or three was considered 'effective'. Experts were asked to err on the side of caution and provide conservative estimates, opinions or qualitative judgements of status; hence, these were likely lower than the actual status of the indicator concerned.

Table 3.5. Rating scale for determining protected area management effectiveness in which a rating of '2' or '3' denotes effectiveness (adapted from Arias and Valery 1999). These scores were used for any assessment that relied exclusively on the expert opinions or qualitative judgements of park managers or park biologists.

Rating	% of Optimum	Colour	Effectiveness Description
3	76-100	Dark Green	Very Satisfactory
2	52-75	Light Green	Satisfactory
1	26-51	Yellow	Dissatisfactory
0	0-25	Red	Very Dissatisfactory

3.3.4.1.2 Determining indicator trend

If a case study park had prepared a SoPR, its indicator trends were used. For all other parks, the following three methods developed by Parks Canada Agency (2007a) were followed. First, if the current status of the indicator has crossed a threshold it was rated accordingly (e.g., red-yellow=increasing trend, green-red=decreasing trend). If no threshold was crossed and the status of the indicator had not changed but if one third or more of the measures were declining, it was assigned a declining/decreasing trend. This scoring system is more sensitive to declines in the ecological integrity of measures than to no change or increasing status (Parks Canada Agency 2007a). Finally, the last level of evaluation subtracts the number of declining measures from the number of increasing measures and, if the net number of changing measures was greater than 2 or less than –2,

the indicator was designated a trend reflecting the more abundant group of changing measures. Otherwise, it was designated as having no change.

For several indicators (e.g., water quality, instream flow rates) it was not possible to determine a present trend because of insufficient historical data. In such cases, the trend was designated as "unknown". Trends for water quality data from Pacific Rim were determined by graphing the average compliance for each year at each site, and reading a linear trend line for these data. Finally, if park managers or biologists felt confident providing their expert opinions and qualitative judgements, these were used to designate trends for all remaining indicators, using the scale shown in Table 3.5. A trend was not assigned for indicators designated as 'in progress' or 'no data' in the status assessment.

3.3.4.2 Converting indicator ratings into numerical values

Once a status and trend had been determined for each indicator, they were converted into numerical format using the scale shown in Table 3-6. Appendix I presents the numerical values for each park's set of indicators.

Table 3.6. Scale used to convert status and trend into a numerical format. Status is the relationship of the current state of a measure to an identified threshold or target. Trend marks the change in the ecological integrity status of an indicator from a previous status, and was recorded as increasing, stable, decreasing, or unknown change. 'Unknown' trend means there were insufficient historical data to determine a present trend.

Status	Trend	Numerical Value
GREEN	increasing	12
	stable	11
	decreasing	10
	unknown	9
YELLOW	increasing	8
	stable	7
	decreasing	6
	unknown	5
RED	increasing	4
	stable	3
	decreasing	2
	unknown	1

3.3.4.3 Calculating the effectiveness with which ecological integrity was protected

The effectiveness with which the ecological integrity of each park was protected was calculated in two ways. First, parks were evaluated against how well they performed on 'data indicators'. This involved only those indicators derived from SoPRs, status and trend assessments, effectiveness evaluations, or expert opinion. Second, parks were evaluated against how well they performed on all of their identified indicators, including the 'dataless indicators' that had been designated as 'in progress' or 'no data'. The two methods enabled a better understanding of the effectiveness of the management policies as, in the second method, the overall score took into account any failure (for whatever reason) to collect the necessary information.

3.3.4.3.1 Calculating how effectively ecological integrity was protected using 'data indicators' only

Parks were evaluated against how well they performed on 'data indicators' by dividing the total numerical score that a park achieved on its 'data indicators' (above) by the total potential score the park could have achieved on those indicators (calculated by multiplying the number of indicators included in the 'data indicator' phase by 12, the highest score possible; see Appendix I). A high quotient demonstrates that the park achieved a high score proportionate to the score that could have potentially been achieved, and was performing well on the priorities for which they had monitoring data. These scores were then multiplied by 100% to determine percent effectiveness achieved, and were designated an effectiveness description, rating, and colour using the ordinal rating scale in Table 3.5.

3.3.4.3.2 Calculating how effectively ecological integrity was protected using all ('data' and 'dataless') indicators

Parks were evaluated against how well they performed on all of their identified indicators, whether monitoring data were available or not. Each indicator was weighted in the following manner: indicators from the status and trend assessment=1, indicators in progress=0.5, indicators not in progress=0. The weight for each criterion's indicators were summed and divided by the total number of indicators for that criterion to get a

weighted value. This weighted value was multiplied by the total numerical score the park achieved on its 'data indicators', and was then divided by the same total potential score the park could have achieved on those indicators (as calculated above; see Appendix I). A high quotient demonstrates that the park achieved a high score proportionate to the score that could have potentially been achieved, and was performing effectively overall even though some indicators were lacking monitoring data. Based on the results of this calculation, an overall effectiveness score was determined for each park. These scores were then multiplied by 100% to determine the percent effectiveness achieved, and were designated an effectiveness description, rating, and colour using the ordinal rating scale in Table 3.5.

3.3.4.4 Sensitivity Analysis

The classification of a few indicators under a particular criterion was subjective for two parks: Waterton Lakes and Kluane. A sensitivity analysis was performed on these parks to determine how much the overall criterion scores would change if one or more indicators were moved to a different criterion. For both parks, climate change was moved to Ecosystem Processes from the Stressors & Threats criterion. Also for Kluane, Kokanee Salmon (*Oncorhynchus nerka*) was moved from the Biological Diversity criterion to Ecosystem Processes as it is recognized as an important component of the Kathleen watershed aquatic ecosystem (Parks Canada 2007b). We repeated the calculations to determine how effectively ecological integrity was protected using 'data indicators' and all indicators.

3.4 Results

Parks that received overall effectiveness descriptions of 'very satisfactory' or 'satisfactory' (Table 3.5) were considered effective at maintaining ecological integrity. When the parks were analysed using only the 'data indicators', all six were considered effective at addressing the ecological integrity criteria (Table 3.7). However, the effectiveness rating of each park decreased when all (both 'data' and 'dataless') indicators were included in the analysis. This indicates that the parks had generally identified more priority indicators than they were actually able to address (for whatever reason, including lack of budget or trained staff, managerial challenges). This change in

scores was least for Kluane and Pacific Rim because park managers have collected monitoring data for each of their priority ecological indicators in two of the three criteria. Indicators within only one criterion for each park had no monitoring data and hence were designated as 'in progress'.

Table 3.7. Overall score and individual criterion scores (displayed as a percentage) for 'data indicators' and all ('data' and 'dataless') indicators for how effectively the six national parks protected ecological integrity. The hatching follows the colour system described in Table 3.5.

		Criterion and Indicator Type						Overall Effectiveness at Protecting Ecological Integrity(%)	
		Conservation of Biological Diversity (%)		Conservation of Ecosystem Processes (%)		Adaptation to and Mitigation of Stressors & Threats (%)			
		Data	All	Data	All	Data	All	Data	All
National Parks									
Canada	Waterton Lakes	74	61	50	19	42	20	55	33
	Kluane	69	69	92	60	58	58	73	62
	Gwaii Haanas	65	47	72	48	61	53	66	49
	Pacific Rim	44	12	93	93	57	57	65	54
South Africa	Kruger	88	33	52	47	88	80	76	53
	Kgalagadi	84	43	0	0	79	18	54	20

Other than Kluane, all of the scores obtained for the 'data indicators' decreased when 'dataless indicators' were incorporated into the analysis of the *Conservation of Biological Diversity* (herein *Biological Diversity*) criterion. The Kruger's decrease between the two types of indicators was the most pronounced, with a decrease of 55%, because half of the eight indicators in this criterion were 'in progress'. The Kgalagadi also had a sharp decrease from a 'very satisfactory' score for the 'data indicators' to a 'dissatisfactory' score for all indicators because five of the park's 16 indicators were designated as either 'no data' or 'in progress'. Kluane maintained the same overall rating of 'satisfactory' for both types of indicators given that there was monitoring data to address all indicators, while Waterton Lakes received 'very satisfactory' and 'satisfactory' ratings for the 'data

indicators' and all indicators, respectively. Two of the 11 indicators for Gwaii Haanas were 'in progress', as were six of Pacific Rim's 10 indicators.

For the *Conservation of Ecosystem Processes* (herein *Ecosystem Processes)* criterion, Pacific Rim received a 'very satisfactory' score as park managers had monitoring data for all indicators and performed well on those indicators. The Kgalagadi was the only park to receive a 'very dissatisfactory' rating (0) for this criterion because it had only one indicator (fire cycles) which was still 'in progress' at the time of data collection (Table 3.7). Waterton Lakes received 'dissatisfactory' and 'very dissatisfactory' ratings for the 'data indicators' and all indicators, respectively, because two of the four indicators in this criterion were in progress. Kluane and Gwaii Haanas each had one of four indicators 'in progress', and this partly explains why the park's ratings decreased from 'very satisfactory' to 'satisfactory' and 'satisfactory' to 'dissatisfactory', respectively. The Kruger had 16 indicators in this criterion, only one of which was 'in progress'.

Kluane and Pacific Rim maintained the same score across both types of indicators within the *Adaptation to and Mitigation of Stressors and Threats* (herein *Stressors and Threats)* criterion as each park had monitoring data for all indicators. Kluane received a 'satisfactory' rating for its three indicators while Pacific Rim maintained a 'satisfactory' rating for its six indicators. Gwaii Haanas also maintained the same 'satisfactory' rating across both types of indicators because only one (extent of the alpine zone) of the park's 11 indicators was 'in progress'. The Kruger maintained the highest scores across both types of indicators because only one of the park's 16 indicators was 'in progress' and the park received a 'green' on eleven of the remaining indicators. In comparison, the Kgalagadi's rating for this criterion decreased substantially from 'very satisfactory' to 'very dissatisfactory' because four of the six indicators were still 'in progress'. Waterton Lakes received 'dissatisfactory' and 'very dissatisfactory' ratings for the 'data indicators' and all indicators, respectively, because three of five indicators were 'in progress'.

A sensitivity analysis was performed on Waterton Lakes and Kluane to determine if the overall criterion scores would change if one or more indicators were moved to a different

criterion. For Waterton Lakes, climate change was moved to the *Ecosystem Processes* from the *Stressors and Threats* criterion. The score for all indicators for the *Ecosystem Processes* criterion decreased to 14% (from the previous 19%; Table 3.7), while the score for the *Stressors and Threats* criterion increased from 20% ('very dissatisfactory') to 28% ('dissatisfactory'). Despite the changes in the criterion scores, the overall effectiveness rating for the park remained unchanged. Two indicators were changed for Kluane: Kokanee Salmon and climate change were moved from *Biological Diversity* and *Stressors and Threats*, respectively, to *Ecosystem Processes*. Several scores changed when the effectiveness calculations were repeated. If only Kokanee Salmon was moved to *Ecosystem Processes*, the score for that criterion decreased from 60% to 53% but the criterion rating remained 'satisfactory'; the other two criterion ratings remained the same (while ratings remained the same, the actual scores within a rating class could have changed). If only climate change was moved to *Ecosystem Processes*, the score for that criterion decreased from 60% to 59% but the rating remained unchanged at 'satisfactory' and the score for *Stressors and Threats* increased from 58% to 63% ('satisfactory'). However, if both indicators were added to *Ecosystem Processes*, the score for *Ecosystem Processes* decreased from 60% ('satisfactory') to 51% ('dissatisfactory'), while the ratings for *Biological Diversity* and *Stressors and Threats* remained 'satisfactory'. Despite changing the criterion under which these indicators were located, the overall effectiveness rating for each park remained unchanged.

3.5 Discussion

All the national parks included in this study had management plans, and had identified issues of concern that they were attempting to manage. However, monitoring data was not being collected on all of the indicators associated with these concerns. When the parks were analysed using only the 'data indicators', all six were considered effective at protecting ecological integrity (Table 3.7). Yet, when the parks were analysed using all (both 'data' and 'dataless') indicators, only three of the parks were ecologically effective overall (Table 3.7). This raises two important issues with indicators used in the management of national parks. First, while the indicators we evaluated in this study were

explicitly identified, we must question whether these are actually the managers' highest priorities. There are at least three types of indicators park managers can monitor:

- those that are the easiest to monitor but are not necessarily the most informative ecologically;
- those that are the most important to understanding park ecological integrity; and
- those that are monitored more because of the intended audience than for their ecological value as indicators (such as 'charismatic megafauna').

At the same time, we recognize that some of the stressors and threats (e.g., climate change) facing the parks are beyond local control, although there could be ways to manage the impacts. In all cases, it is clear that without sound data on trends in the indicators, the effectiveness of any management action will remain uncertain. However, evaluating the full effectiveness of any management action requires moving beyond the collection of data on trends in specific indicators, as it requires an understanding of the cause-effect relationships between the management actions and the indicator. In some cases, this can only be determined through an experimental approach, often involving ecosystem manipulations. Such studies may be beyond the resources of some parks, may be contrary to the regulations governing the management of the park, or may be contrary to the assumption that protection alone is the only management action appropriate for a national park.

At the outset of the study, we anticipated two results. First, we considered that national parks with comprehensive management plans and explicit management objectives would have more robust monitoring programs, better data sets, and would be the most ecologically effective overall. This was not necessarily the case for the parks included in this study. Waterton Lakes, Kluane, and Kruger had comprehensive management plans with explicit management objectives and readily available data sets for the analyses required in this study. Kluane and Kruger were overall ecologically effective, yet Waterton Lakes was one of the most ecologically ineffective parks overall when all indicators were analysed. Comparatively, the management plan for Gwaii Haanas did not have explicit management objectives, yet the park managers had completed a SoPR, had

readily available data sets, and the park was more ecologically effective than Waterton Lakes.

We also anticipated that parks would have higher effectiveness scores for the finer scale, species-specific indicators in the *Biological Diversity* criterion than for the indicators in the larger scale *Ecosystem Processes* criterion. Three parks (Waterton Lakes, Kruger, Kgalagadi) met this expectation and had higher 'data indicator' scores for the *Biological Diversity* than the *Ecosystem Processes* criterion (Table 3.7). However, this was not the case for Kluane, Gwaii Haanas and Pacific Rim. In general, these three parks had high numerical scores for the (mostly water quality) 'data indicators' in the *Ecosystem Processes* criterion, yet each park had a 'very dissatisfactory' rating for at least one 'data indicator' in the *Biological Diversity* criterion, reducing each park's overall score for that criterion.

There were a number of ways in which we could have influenced the results of this study. The classification of some of the indicators under a particular criterion could have been considered subjective, and our sensitivity analysis demonstrates that relocating these indicators would not have influenced the overall effectiveness scores. The most obvious example is with the indicator 'climate change'. We elected to locate this indicator in the *Stressors and Threats* criterion because it is a threat to both biological diversity and ecosystem processes in many parks. However, it could be argued that climate is an important ecosystem process, and the indicator could have been located under *Ecosystem Processes* instead. Because both of the parks in which this dilemma was present were managed by Parks Canada and had a SoPR, we deferred to the indicator assignations in those reports.

The rating scale used for this research (Table 3.5) appeared logical and reasonably straightforward to use (Salafsky and Wollenberg 2000). However, there is always a risk associated with the use of interview and expert opinion data given the different perceptions and experiences of these individuals. What for one respondent may seem 'satisfactory' may be 'dissatisfactory' for another. For the parks where expert opinion

was used, overall effectiveness scores could have been higher than those found in this study because respondents were asked to err on the side of caution when providing their opinion on status and trend designations. Likewise, if it was not possible to determine a trend for an indicator, it was listed as 'unknown'. The corresponding numerical score (Table 3.6) was lower than if any trend (including a decreasing trend) had been determined. Thus, most of the parks probably have a higher actual overall effectiveness score than indicated in this study.

Finally, we assumed that each criterion was equally important to the effectiveness with which a park protected ecological integrity, and attributed an equal weight to each. Further research into the relative importance of each of these and other criteria to the ecological integrity of parks could inform this weighting. Similarly, we completed the evaluations as though each indicator was equally important within a given criterion. It is possible that certain indicators in some parks may be given a higher priority than others. One of the biologists at Kruger had indicated that some of their indicators could be considered a higher priority than others (S. Freitag-Ronaldson, 8 August 2007, pers. comm.) This demonstrates that effectiveness evaluations must remain dynamic in order to respond appropriately to individual park circumstances.

3.6 Conclusion

National parks and protected areas are amongst our best current options for maintaining and restoring biodiversity, if we manage them within the 'matrix' of uses across a landscape and with consideration for shifting climatic conditions and atmospheric pollution (Noss 2001; Lindenmayer and Franklin 2002). Yet, national parks cannot be expected to conserve the biological diversity and ecosystem processes within their borders if park managers are unable to determine if management actions are directly resulting in desired outcomes.

This study evaluated how effectively six national parks in Canada and South Africa protected ecological integrity. Each park was effective at addressing the priorities for which they had monitoring data. However, when all (both 'data' and 'dataless')

indicators were included in the analysis, only three of the parks were considered ecologically effective. This demonstrates that while the parks effectively addressed indicators for which they had a monitoring program or monitoring data, the park managers had generally identified more priority indicators than they were able to address. There is a need to strengthen those parks that are failing to protect ecological integrity, and to understand and replicate those that are succeeding. This study identifies criteria and indicators where each of the case study parks could be improved. The results of this study could be used by managers to strengthen their management efforts where they appear to be failing. This study utilised the SoPR results for three of the Canadian case studies in a novel way in order to determine overall criterion scores for the parks. The comparative evaluation used in this study could serve to expose SANParks to the Parks Canada SoPR programme, and Parks Canada to the Kruger's highly regarded *Thresholds of Potential Concern* approach.

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4 SEEKING SOCIAL EQUITY IN NATIONAL PARKS: A COMPARATIVE CASE STUDY EVALUATION OF NATIONAL PARKS IN CANADA AND SOUTH AFRICA[6]

4.1 Overview

There are concerns that many national parks and protected areas worldwide are operating under difficult social and political conditions, including poor relations with local communities. A variety of co-management initiatives have emerged as a result of an increased emphasis on the involvement of Indigenous people by park agencies and international organizations, yet there is still controversy over what constitutes an appropriate role for these groups in parks management and conservation strategies. This paper argues that national parks need to effectively address issues of equity, including property and human rights, and the relationship of rights holders and duty bearers. The results from a systematic evaluation of equity in a purposive sample of six national parks in Canada and South Africa are presented. All but one of the case study parks has been equitable, parks with more comprehensive co-management and support from neighbouring Indigenous groups have been more equitable than parks with lower levels of co-management, the parks with settled land claims have not necessarily been more equitable overall, and a few parks have been co-managed in name only.

4.2 Introduction

National parks and other protected areas remain central to enhancing biodiversity conservation across landscapes. Yet many national parks are operating under difficult social and political conditions, including unnecessarily poor relations with local communities. For conservation to be successful and enduring in national parks and protected areas, they must address equity concerns (Blaustein 2007). Equity - fairness in the distribution of benefits (Berkes 2004) - includes prior informed consent, property and

[6] A version of this paper has been submitted for publication. Timko, J.A. and T. Satterfield. In Review. Seeking Social Equity in National Parks: Experiments with Evaluation in Canada and South Africa. Conservation & Society.

human rights, and the relationship between rights holders (Indigenous people) and duty bearers (park managers) (Blaustein 2007).

Equity in parks encompasses three issues of fundamental importance to Indigenous groups: land ownership and tenure, participation in governance, and access to livelihoods and resources. Tense relations between local people and park officials have raised issues of restitution which in the past have been ignored (Blaustein 2007). Understandably, Indigenous people around the world are seeking compensation for lost rights, which includes in many post-colonial states the pursuit of land claims in and around national parks. Concurrently, a commitment to involving Indigenous people in establishing and managing protected areas, and participating in governance on a fair and equitable basis, has been urged by *The Durban Accord*, developed during the fifth World Parks Congress (Colchester 2004). This increased emphasis on Indigenous involvement by park agencies and international organizations has resulted in the pursuit of co-management, understood to mean the substantial sharing of (protected-area) management responsibilities and authority between local- and state-level systems and in many cases key Indigenous stakeholders (Berkes 1994; Brechin et al. 2001). There is still significant controversy over the appropriate role for Indigenous people in parks management and conservation strategies. Some argue that a focus on local human needs have compromised conservation efforts (Sanderson and Redford 2003; Terborgh 2004), while others see human issues as inalienable from discussions on conservation in general, and on parks in particular (Brosius 2004; Faizi 2006).

Despite expectations that they account for the needs of Indigenous people, the establishment and management of many national parks has reflected ‘fortress conservation’, a top-down protectionist approach to park management (Bruner et al. 2001; Wilshusen et al. 2002), made possible by colonial imperialism (Buscher and Whande 2007). Parks of this kind are envisaged as places where rural livelihoods do not belong (Brockington et al 2006), where nature needs to be preserved as ‘wilderness’ (Colchester 2004), and human habitation is excluded often through the forced removal of local populations (Magome and Murombedzi 2003). This type of preservation has

generally occurred at the expense of those local inhabitants who were displaced, with the consequences often being impoverishment and psychological harm (Brockington 2002; Brockington and Igoe 2006; Rangarajan and Shahabuddin 2006). In addition to these costs, many communities bordering national parks also suffer from the burden of lost access to resources and increased threats from wild animals (Balint 2006). When park managers have acknowledged the rights of local people, employment, rather than the provision of access to park resources and genuine participation in park governance, has often been seen as a means to mitigate the impact of parks on the livelihoods of neighbouring Indigenous people.

Global society expects national governments to conserve their country's biological diversity, and uphold values of human rights and social justice. National parks are political entities managed (generally) by national governments; as parastatal agencies, park managers must be held to the same level of accountability as their respective governments. Expectations for Canada and South Africa are no different. Both countries are signatories to the *Convention on Biological Diversity* which contains several provisions for equitable access and customary use of natural resources by Indigenous groups (UNEP 2007).

This paper presents the results from a systematic evaluation of how effectively six national parks and national park reserves in Canada and South Africa have addressed questions of equity. As per the points above and as stated more fully in Chapter Two of this dissertation, three criteria emerged as primary when considering concerns most important to Indigenous people. Specifically, in this study a park (or its management system) is considered equitable if it successfully addresses land tenure and access rights to the park (including unresolved historical loss of rights and those transgressed in the genesis of new parks), eases tensions and addresses concerns over local participation and decision-making authority in park governance, and has or is resolving conflicts stemming from loss or change in local livelihoods.

This paper is organized into four main sections. The introduction elucidates the need to examine equity in national parks and introduces the main purpose of our study. This is followed by a detailed description of the methods used to evaluate the extent to which case study parks addressed or fulfilled equity criteria, and presents background information on the social, ecological and political features of the case study national parks. The results section describes the primary research findings of the study. These results are discussed in reference to the study's main purpose statement and to national parks management in general. The paper concludes by indicating that more can be done in terms of mitigating the social and economic impacts of the national parks to improve access to park resources and livelihood opportunities for local Indigenous people.

4.3 Methods

The goal of this study was to systematically evaluate the extent to which national parks addressed the above described criteria for equity. To do this, we selected six case study parks in Canada and South Africa and evaluated each case study using extant data sources and expert interviews (described below) as the basis from which to assess equity where equity could be expressed as a set of criteria and indicators using the analytic procedures described below.

4.3.1 Logic of Case Study National Park Selection

Ideally, we would have liked to include the broadest-based representation of peoples impacted by national parks, but due to constraints we selected groups meeting the ILO (1989) definition of Indigenous. This in no way indicates that the concerns of other non-Indigenous communities are illegitimate. This study was restricted to Canada and South Africa for logistical reasons and because both countries maintain extensive and well-established national parks that are under claim (in part or in whole) by neighbouring Indigenous groups.

Despite the many differences across nation states and the sovereign peoples within those states, Canada and South Africa both have a legacy of land dispossession followed by the subsequent pursuit of land claims by Indigenous peoples seeking compensation for lost land and rights. National park agencies in both countries have attempted to deal with

claims on national park lands in a similar manner. In Canada, Indigenous peoples' experiences of much of the twentieth century could be characterized as a continuing process of encroachment on (and sometimes transformation of) their traditional territories, and of restriction of their customary livelihood including government restrictions on hunting and fishing and population relocation and sedentarisation (Usher 2003). National parks have further exacerbated these hardships.

In response, Parks Canada has pursued a proactive *national park reserve* designation which specifically acknowledges that First Nations (the term given to Indigenous people in Canada) claim outstanding rights or interest to some national park lands. Pending the settlement of any such rights or interests through treaty or other negotiations, the *park reserve* status allows the area to be managed with the protection afforded all national parks under the Canada Parks Act (Parks Canada 2003). In South Africa, land dispossession was based on an apartheid policy which forced 'black' and 'coloured' people onto *black homelands* or *coloured reserves*, respectively (Reid et al. 2004).[7] National parks established during apartheid meant that the majority of people who had been alienated from much needed natural resources remained so after the end of apartheid. Since majority rule in 1994, the South African government has instituted a process of land reform. As such, *contract national parks* have arisen from the settlement of several land claims, are managed by the national conservation authority according to the terms of a joint management agreement, and are emerging as a mechanism for meeting the country's conservation and development objectives (Reid et al. 2004).

National Parks in Canada and South Africa differ in the extent of Indigenous involvement in park management, employment, and decision-making processes. For instance, the Haida Nation (Canada) has recognised that the natural and cultural elements of their home island of Haida Gwaii are inseparably intertwined. Consequently they initiated the designation of Gwaii Haanas as a Heritage Site in 1985 in response to logging on Lyell

[7] We recognize that 'race' is (and should be) a contested term in the social sciences as efforts to distinguish biophysical features of racial groups have failed both genetically and phenotypically. The construct 'race' expressed as 'visible minorities' is nonetheless the defining feature of formal apartheid systems and their post-apartheid derivatives.

Island (AMB 2002).[8] In 1988, the Government of Canada protected Gwaii Haanas as a national park reserve, and together with the Council of the Haida Nation, cooperatively manages the park under an Archipelago Management Board (AMB) (AMB 2002). In Canada's Yukon Territory, Kluane National Park & Reserve is cooperatively managed based on shared responsibility and requires a sound and effective government-to-government relationship between Parks Canada and the Champagne-Aishihik and Kluane First Nations (Parks Canada 2004). While all *national park reserves* in Canada pursue co-management initiatives with the local First Nations, many of the country's other national parks also have varying levels of co-management. There are indications that all future national parks will be negotiated via some form of co-management agreement, reflecting a Parks Canada policy shift towards these initiatives (Weitzner and Manseau 2001).

Comparatively, a strong commitment to co-management in South Africa's national parks is not as yet evident. South African National Parks (SANParks) sees commercialization and employment of 'black' and 'coloured' South Africans as more effective routes to empowerment than co-management (Reid et al. 2004). SANParks has in the past been accused by both park observers and tribal groups of using participation to improve public relations rather than to devolve any genuine decision-making powers (Gibson and Marks 1995). The two South African parks included in this study have both settled land claims and established contract parks. Kruger National Park settled a formal land claim with the Makuleke tribe at the park's northern end, turning that region into a contract park, while also establishing a comprehensive park forum structure to aid communication between the park and the approximately 187 villages situated near its border. The Kgalagadi National Park settled a formal land claim with the ǂKhomani San and Mier communities in 1999, turning a portion of the national park into a contract park. The ǂKhomani San people of the Kalahari are part of the San, some of the 'first people' of Southern Africa and believed to have been living in the region for more than 20 000 years; they cannot maintain their lifestyle fully anywhere else than in and around the Park, where their ancestors lived and migrated as hunter-gatherers (Bosch and Hirschfeld 2002). The Mier,

[8] Haida Gwaii is the Haida name given to the archipelago which has also commonly been referred to by its colonial name *Queen Charlotte Islands.* Gwaii Haanas is the name of the national park reserve and Haida heritage site.

are an Afrikaans-speaking, marginalized minority who came to live in the Northern Cape in 1865, possessed their own form of self-government, and had lived on and farmed land in the Kgalagadi National Parks and now occupy a former 'coloured' reserve (Bosch 2003). The Mier community has also experienced a history of dispossession, and their settlements have poor water supplies and no electricity, education and job opportunities are limited, literacy is estimated to be 10 per cent, and most rely on farming for their income (see Reid et al. 2004: 388). The Mier and the ǂKhomani San have been living in close proximity for a very long time and many are now linked through familial lines.

The selection of specific parks for this study was based on expert opinion and our knowledge of national parks in these countries. Purposive sampling (Babbie and Benaquisto 2002) was used to select the World Conservation Union's (IUCN) Category II (IUCN 1994) case study national parks. The sampling logic was a theoretical replication wherein the case studies were selected because they would provide contrasting results but for predictable reasons (such as the level of co-management) (Yin 2003). Each of the case study parks had varying levels of Indigenous involvement in park governance as a variety of partnership arrangements involving various degrees of power-sharing are possible (Berkes 1994). Because of the broader aims of the study and the concomitant need for data sources, the selection of case studies was also restricted to parks that had an explicit management plan and ecological monitoring data.

Case study parks varied in size, regional ecosystem type, co-management strategy, and main management and conservation issues (Table 4.1). Specifically, the national parks and national park reserves included in this study were: Kluane, Gwaii Haanas and Pacific Rim National Park Reserves and Waterton Lakes National Park in Canada, and the Kruger and Kgalagadi National Parks in South Africa. Gwaii Haanas was selected because it is a fully co-managed park; the co-management board has the authority to make a variety of decisions about the national park, despite the lack of a settled land claim. It is also the most-recently established park in this study. This is contrasted with Waterton Lakes, which was established in 1895 and has no formal co-management arrangement with neighbouring Indigenous groups. Kluane was established in 1976 yet

co-management responsibilities only arose out of the 1993 final agreement; the co-management board's level of authority over decision-making is also restricted. Pacific Rim operates in a 'post treaty' environment with some co-operative initiatives, though no formal park co-management exists as yet. Finally, the Kruger and the Kgalagadi have both settled land claims and established portions of the national park as 'contract parks' with the relevant Indigenous and tribal neighbours. For the sake of brevity, throughout the paper I refer to each park by its first name (e.g., Kluane for Kluane National Park Reserve).

4.3.2 Selection of Criteria and Indicators of Equity

A comprehensive review of the literature on communities and natural resources, critiques of parks, sustainable livelihoods, social impact assessment, and common property theory in relation to protected areas elucidated the need to examine how effectively equity issues are addressed in national parks and other protected areas. The three criteria selected for evaluating social equity in the parks were: the resolution of land tenure and ownership (including the provision of compensation for lost land rights); the maintenance of livelihood opportunities (in order to mitigate further impacts on Indigenous peoples' livelihoods, to guarantee Indigenous people access to resources, and to provide employment); and participation in park governance (in order to enable Indigenous and tribal people to influence decisions that will affect them).

A preliminary list of indicators was outlined through an analysis of management plans and management direction statements from a purposive sample of 14 national and provincial parks in Canada, Australia and South Africa (see Timko and Satterfield, in press). Case study investigation (Yin 2003) of six of these national parks allowed the list of indicators generated inductively from the interviews and document data to complement those generated deductively from the literature (Boyatzis 1998). 39 indicators of equity were evaluated for each park (Table 4.2). Each indicators was

Table 4.1. Location, year of park establishment, size, regional description, Indigenous co-management strategy, and main management and conservation challenges facing the six case study national parks in Canada and South Africa.

National Park/ National Park Reserve	Country and Location	Year Established	Size (sq km)	Indigenous Groups	Co-management Board (if applicable)	Main Management/ Conservation Challenges
Waterton Lakes National Park	Canada, SW corner of Alberta, northern portion of the Waterton-Glacier International Peace Park	1895	525	Kainai (Blood) First Nation, Piikani (Peigan) First Nation	None	Small size of park relative to large migratory wildlife using the park; external influences from increasing human populations; climate change
Kluane National Park & Reserve	Canada, SW corner of Yukon Territory	1976	21 980	Champagne and Aishihik First Nation; Kluane First Nation	Kluane Park Management Board	Climate change, predator/prey interactions; forest pests
Gwaii Haanas National Park Reserve and Haida Heritage Site	Canada, 130km off northwest coast of British Columbia	1993	1470	Haida Nation	Archipelago Management Board	Spread of invasive and alien biota; seabird conservation
Pacific Rim National Park Reserve	Canada, West side of Vancouver Island	1970	499	Ditidhat First Nation; Hupacasath First Nation; Huu-ay-aht First Nation; Pacheedaht First Nation; Tla-o-quiaht First Nation; Toquaht First Nation; Tseshaht First Nation; Uchucklesaht First Nation; Ucluelet First Nation	Qu'aas West Coast Trail Society for West Coast Trail unit of park only; full co-management board will be established once treaties settled	Narrowness of the Long Beach Unit, anthropogenic impacts on water quality, shoreline protection, large numbers of tourists

Kruger National Park	South Africa, Eastern Mpumulanga and Limpopo Provinces	1898	19485.28	37 claims pending; one settled with the Makuleke tribe	Contract park with Makuleke and seven park forums[a]	Alien biota; internationally significant biodiversity; water quantity; fire management; heterogeneity; large population density on border of park
Kgalagadi National Park	Northern portion of Northern Cape Province bordering Namibia and Botswana, part of the Kgalagadi Transfrontier Park	1931	9 591	ǂKhomani San and Mier communities	Contract park with Mier and ǂKhomani San Communities and one park forum[a]	Nama-Karoo vegetation; ungulate migration, predator/prey interactions

[a] Park forums are structures established by South African National Parks (SANParks) whereby communities are encouraged to participate in the management of their local park and raise issues affecting their lives and the environment. The scope of concern is extensive and ranges from HIV/AIDS to employment and problems such as the security of park fences; representatives elected by the community help to minimize friction between the park and its neighbours (SANParks 2007). People involved in the park forums have the ability to influence decision-making and management in the parks, but the forums are not themselves decision-making bodies.

Table 4.2. Criteria and indicators (N=39) used in interviews with Indigenous co-managers to evaluate how effectively six national parks in Canada and South Africa addressed equity issues (based on Timko and Satterfield in press).

Criterion	Indicator [a]
Resolution of Land Tenure and Ownership	…there is satisfaction with land claim [b]
	…local Indigenous people were not dispossessed of land or relocated by Park
	…relocation was negotiated with local Indigenous people
	…there was relocation or land dispossession compensation (by Park, other government agency, etc.) [b]
	…the Park's establishment was negotiated with local Indigenous people [b]
	…there is satisfaction with co-m agreement/ contract park agreement [b]
	…there is an opportunity to review a co-management agreement [b]
Maintenance of Livelihood Opportunities	…damage-causing animals are being addressed [b]
	…there is compensation for damage-causing animals [b]
	…there is satisfaction with compensation for damage-causing animals [b]
	…local Indigenous people do not have to pay access fees for the park [b]
	…access rights are specified [b]
	…access has been negotiated [b]
	…access permits are not required by local Indigenous people (including guides) [b]
	…there is access for hunting/fishing
	…there is access for medicinal/food plants
	…there is access for timber/trees
	…there is access for cultural/ceremonial purposes
	…there is satisfaction with access [b]
	…there are commercial access opportunities for local Indigenous people (e.g., Indigenous tours and guiding, trophy hunting) [b]
	…the local Indigenous communities indicate support for conservation in general [b]
	…there is an ability for local Indigenous people to maintain their cultures and livelihoods [b]
	…there are enough local employment opportunities and local recruitment for Indigenous people in skilled (vs. unskilled) positions [b]
	..there are capacity building and training opportunities provided by the park [b]
	…local Indigenous people are employed at upper level management levels (vs. junior staff levels) [b]
	…the park has an employment policy for employing local Indigenous people [b]
	…the employees in the park are representative of the regional population
	…employment opportunities are permanent (vs. seasonal or temporary) [b]

	…there is extra-project funding (provided by park) for local initiatives (e.g., small-medium economic enterprises, build-operate-transfer agreements) [b]
Participation in Park Governance	…the legal framework of the park clarifies opportunities for participation in decision-making and park governance [b]
	…the joint or co-management board has genuine authority over decision-making
	…the Board is representative of the population of the region (Indigenous majority preferable)
	…there are no or few conflicts between the co-management board members [b]
	…the co-management board members are satisfied with their co-management board experience [b]
	…the co-management board has the capacity to do the work they are tasked with [b]
	…decisions are reached by consensus (vs. majority rule) [b]
	… the co-management board is compensated for their work on the board (e.g., not necessarily pay but expenses for travel, etc. covered) [b]
	…there is a respectful relationship between the local Indigenous community and the park [b]
	…there are other opportunities for public involvement in decision-making (e.g., park forum, presentations, meetings, etc) [b]

[a] Each of the indicators was measured for 'the extent to which' it achieved the indicator using a 4-point satisfaction scale.
[b] Denotes indicators that emerged inductively through analysis of interview transcripts

measured for 'the extent to which' it achieved the indicator using a 4-point ordinal satisfaction scale.

4.3.3 Data Collection

Two sources of primary data were used to evaluate the six case study parks: semi-structured interviews and key documents (as noted below). Data collection was conducted between October 2005 and May 2007 on research trips to each case study park (see Appendix II for the UBC Research Ethics Board's *Certificate of Approval*). Semi-structured interviews were conducted in English using an open-ended set of questions. The interviews were designed to elicit qualitative data on each of the criteria and indicators. The goal was to interview as many Indigenous representatives on park co-management boards and park forums as possible, along with the park superintendent or manager and other park staff involved in co-management activities and Indigenous liaison (Table 4.3). A total of 30 interviews were conducted across the six parks. The number of interviews conducted with Indigenous people

at each park varied, and ranged from two Indigenous members of park co-management boards at Kluane, Gwaii Haanas, Pacific Rim and Waterton Lakes, to four at the Kruger and Kgalagadi (Table 4.3). In Pacific Rim and Waterton Lakes where formal co-management boards did not exist, interviews were conducted with First Nations representatives who liaise with the park on land management issues.

Table 4.3. Semi-structured interview respondents from case study parks in Canada and South Africa involved in an evaluation of national parks and equity.

National Park	Individuals interviewed (and their positions)
Waterton Lakes	Park superintendent and two representatives from the Kainai Nation who liaise with the park[a]
Kluane	Park superintendent, and the Chair, Manager, and two Champagne-Aishihik First Nations members of the Kluane Park Management Board (KPMB)
Gwaii Haanas	Archipelago Management Board consisting of two Haida and two Parks Canada representatives (including the acting park superintendent)
Pacific Rim	Park's Indigenous Liaison Specialist, President and Coordinator of the Quu'as West Coast Trail Society
Kruger	Head of Kruger's People & Conservation Program, the coordinator of the Makuleke contract park's co-management board, four of the park's social ecologists involved in the park forums, community chairpersons for three of the park forums
Kgalagadi	Park Manager, Head of Kgalagadi's People & Conservation Program, two Mier and one ǂKhomani San representative from the contract park's co-management board, one ǂKhomani San representative from the park forum

[a] Representatives from the Piikani Reserve were not contacted for this study

The interview guide itself was comprised of 22 main questions; its central aim was to capture the level of satisfaction of the Indigenous co-managers with access to park resources, livelihood and employment opportunities, and participation in decision-making (see Appendix III). Respondents were given a copy of the rating scale (Table 4.4) to aid their responses, however they were not required to provide their answers using the scale. Each interview was recorded and lasted on average 60 minutes, depending upon the level of detail and the amount of information provided by the respondents. Each interview was conducted in confidence at a place deemed safe, comfortable and convenient by the respondent, including a remote restaurant in the Kalahari countryside, workplace offices, and at a cultural celebration in the backcountry. These sources were triangulated with other sources wherever possible to help verify qualitative data (Yin 2003). In particular, document analysis complemented data obtained from interviews, and included: contracts and joint management

plans, park management plans, and co-management board and park forum meeting minutes. Additional clarification and data were collected via email after these visits as necessary.

Table 4.4. Rating scale for evaluating equity in case study national parks in Canada and South Africa. A rating of '2' or '3' denotes a satisfactory level of equity (adapted from Arias and Valery 1999).

Rating	% of Optimum	Colour	Effectiveness Description
3	76-100	Dark Green	Very Satisfactory
2	52-75	Light Green	Satisfactory
1	26-51	Yellow	Dissatisfactory
0	0-25	Red	Very Dissatisfactory

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4.3.4 Data Analysis & Evaluation

The following four main components were involved in calculating the effectiveness with which the case study parks addressed equity: data coding and the assignation of ratings according to a 4-point ordinal satisfaction scale, the calculation of overall park equitability, a density test, and an assessment of the contribution of the three criteria to each park's overall equity score.

4.3.4.1 Data coding and the assignation of ratings

The initial analysis of interview and document data (such as joint management plans, and co-management board and park forum meeting minutes) consisted of coding segments of the transcripts according to the pre-existing themes (Lincoln and Guba 1985; Boyatzis 1998). These themes reflected the three criteria of equity used in this study and included the main topics covered by the interview schedule (Appendix III). The data analysis software QSR N6 (QSR International Pty Ltd 2002) was used to store interview and archival data for coding and analysis. Once all of the data had been separated according to the main themes, more nuanced codes were assigned to each piece of data (which could have been a respondent's quote or statement, a section of a final land claim agreement, or a statement from meeting minutes). These specific codes pertained to such topics as: permits required for Indigenous access into the park; access to specific resources (plants, timber, bushmeat); level of satisfaction with co-management agreement; level of satisfaction with experience on the co-

management board; and conflict amongst members of the co-management board. Even if a piece of data could have been assigned more than one code, it was assigned only the most appropriate one.

We continually revisited, condensed, and refined these 50+ themes into the final list of 39 indicators used for analysis. Results from different interviews were compared and contrasted to build a coherent justification for the indicators. Once all of the interview and archival data was separated according to themes for each park, we used Microsoft Excel software to compile each of the codes pertaining to a given indicator. Parks varied in the amount of information available for each indicator, from as low as one to as many as seven pieces of interview and/or archival data for each indicator. For each park, each piece of datum for each indicator was assigned a score and a rationale using a 4-point ordinal satisfaction rating scale in which a '3' was 'very satisfactory' and a '0' was 'very dissatisfactory' (Table 4.4).

If a particular indicator was not an issue for a park at the time of interviews, it was rated a '3'. For example, damage-causing animals were not an issue at any of the Canadian case study parks. The scores for each indicator for each park were then tallied and averaged to determine an overall score for that indicator. For instance, Gwaii Haanas was assigned a '3' for the extent to which the Park's establishment was negotiated with Indigenous neighbours because the park was initiated by and fully negotiated with the Council of the Haida Nation. The quality of our data analysis was checked and cross-checked for verification purposes at two of the six case study parks. The primary author presented the final results to several co-managers at Gwaii Haanas and the Kgalagadi and asked them to review the interpretation of the findings and comment on their accuracy. Very positive feedback was received during these meetings, including from one co-manager at Gwaii Haanas who commented that 'these results make sense to me…I understand these results".

4.3.4.2 Calculating overall park equitability

In order to calculate an overall 'equity' score for each park, we first calculated the individual criteria scores for each park using the following formula:

$$\text{Criterion Equity} = \frac{\text{Sum of indicator scores for criterion}}{\text{Total possible score for criterion (e.g., number of indicators x 3)}}$$

Appendix IV presents the calculations of overall park equitability for each case study. A high quotient meant the park had achieved a high score proportionate to the score that could have potentially been achieved, hence was performing well on the indicators within that criterion. We then converted these proportions into percentages, and averaged the percentage scores for each of the three criteria to obtain a park's overall equity score.

4.3.4.3 Controlling for park-population density

Several of the case study parks (e.g., Kruger and Waterton Lakes) were characterised by having one or more communities and/or high land-use pressures located on their periphery. Other parks (e.g., Kluane and Gwaii Haanas) had very low to no population densities on their borders. In theory, some evaluation outcomes could be a function of 'low-density' and not intentional management actions *per se*, therefore some accounting for such possibilities was necessary. We ensured that results were not biased in favour of parks with low population densities on their periphery by conducting what we refer to here and below as a 'density test'. To accomplish this, the individual score for each indicator was re-assessed to ensure that parks were not given 'extra' points for management actions they simply didn't do or need to do given an absence of dense local populations. This was accomplished by isolating each indicator that reflected actions that were not an issue in a given park precisely because of low population density. In such cases, we attributed a '0' or 'very dissatisfactory' score so as to ensure no assignation of points for unintentional actions. For example, damage-causing animals (the term used by SANParks for park wildlife such as elephants, lions, leopards that are said to have pushed through a weak portion of the park's boundary fence and damaged local agricultural lands, gardens, etc. of those living on the park periphery) were only considered a concern in a few parks in this study. Moreover, the concern is only likely when population density exists on the boundary of the park. After attributing a '0' for these

indicators, each park's overall equity score was calculated as above and compared with the 'pre-density test' results.

4.3.4.4 Contribution of each criterion to overall park equity

Lastly, the relative contribution of the three criteria to each park's overall equity score was assessed. For each park, the scores for the three criteria were summed. The individual criterion scores were then divided by that sum to determine what proportion of the overall equity score could be attributed to each criterion.

4.3.4.5 Sensitivity analysis

While five of the six national parks and national park reserves in this study did not originate through negotiations with neighbouring Indigenous groups, Gwaii Haanas is unique in having done so. Admittedly, Gwaii Haanas is a park of a potentially new era wherein parks are not by-products of colonialism where land was taken without question and often with force from traditional inhabitants. That said, it is important to note that Gwaii Haanas did take steps of this new and more equitable kind and key outcomes can be reasonably attributed to that effort toward change. In order to determine how effectively Gwaii Haanas would perform had it not received points for its negotiated establishment, we recalculated the park's aggregate score by attributing a dissatisfactory score to the five indicators related to land dispossession, relocation from the park, negotiated park establishment, and satisfaction with the co-management agreement.

4.4 Results

Table 4.5 presents the overall equity scores (indicated in the tables below by a percentage, a numerical rating score, and a hatched colour) and individual criterion equity scores (indicated as percentages and a hatched colour) for each park. Five of the six parks have been equitable overall; only Waterton Lakes received an overall equity score of 'dissatisfactory' (Table 4.5). Gwaii Haanas and Pacific Rim received overall scores indicating their level of equitability as 'very satisfactory'. All descriptors of satisfaction in this section refer to Table 4.4. Overall park equity scores (Table 4.5) were recalculated using the adjusted indicator values in the density test, and are found in Table 4.6. While the percentage scores did change slightly from those in Table 4.5, only Waterton Lakes' overall equity rating decreased slightly after

compensating for density (Table 4.6). This indicates that population densities of neighbouring communities were generally not having an impact on park equity scores. The relative proportion of the three criteria to each park's overall equity score was also assessed (Fig 4.1). Only Gwaii Haanas and Pacific Rim balanced the three equity criteria equally while Kruger was close to doing so.

Appendix IV presents the indicator ratings for each park. Only Gwaii Haanas and Pacific Rim received 'very satisfactory' scores overall for the *resolution of land tenure and ownership* (herein *land tenure and ownership*) criterion (Table 4.5). Both parks performed essentially as well on this criterion as they did on the other two (Fig. 4.1). Kluane, Kruger and the Kgalagadi received 'dissatisfactory' scores overall, while Waterton Lakes received a score of 'very dissatisfactory' (Table 4.5). The contribution of the *land tenure and ownership* criterion to the overall park equity score was lower for Waterton Lakes and Kluane than for other parks (Fig. 4.1).

Five parks received 'very dissatisfactory' scores on the indicator pertaining to the negotiated establishment of the park as the establishment of these national parks or national park reserves were not negotiated with the neighbouring Indigenous groups. Only Gwaii Haanas received a 'very satisfactory' score on this indicator as it was a negotiated establishment. Relocation from park land was an important issue for four of the parks. Waterton Lakes, Kluane, the Kruger and the Kgalagadi all received 'dissatisfactory' and 'very dissatisfactory' scores on these indicators as many people were relocated from the national parks without negotiation or compensation, though the settlement of land claims and the establishment of the contract parks in the Kruger and the Kgalagadi were considered part of the compensation for relocation. Pacific Rim and Gwaii Haanas received 'very satisfactory' scores for the indicators about relocation and compensation.

Table 4.5. Overall park equity scores (indicated by a percentage and a numerical rating score) and individual criterion equity scores (indicated as percentages) for six national parks in Canada and South Africa: Kluane, Gwaii Haanas and Pacific Rim National Park Reserves and Waterton Lakes National Park in Canada, and the Kruger and Kgalagadi National Parks in South Africa. The hatching follows the colour system described in Table 4.4.

	NATIONAL PARK					
	Waterton Lakes	Kluane	Gwaii Haanas	Pacific Rim	Kruger	Kgalagadi
Criteria						
Land Tenure & Ownership	14	29	95	86	48	38
Livelihood Opportunities	48	83	100	95	71	58
Participation in Park Governance	17	77	100	97	90	87
Overall Park Equity Score (%=score)	26=1	63=2	98=3	93=3	70=2	61=2

Table 4.6. Comparison of the overall equity scores and the equity scores after completing a density test (all indicated by a percentage and a numerical rating score) for six national parks in Canada and South Africa: Kluane, Gwaii Haanas and Pacific Rim National Park Reserves and Waterton Lakes National Park in Canada, and the Kruger and Kgalagadi National Parks in South Africa. The hatching follows the colour system described in Table 4.4.

	NATIONAL PARK					
	Waterton Lakes	Kluane	Gwaii Haanas	Pacific Rim	Kruger	Kgalagadi
Overall Park Equity Score (%=score)	26=1	63=2	98=3	93=3	70=2	61=2
Park Equity Score After Density Test (%=score)	22=1	61=2	95=3	88=3	70=2	60=2

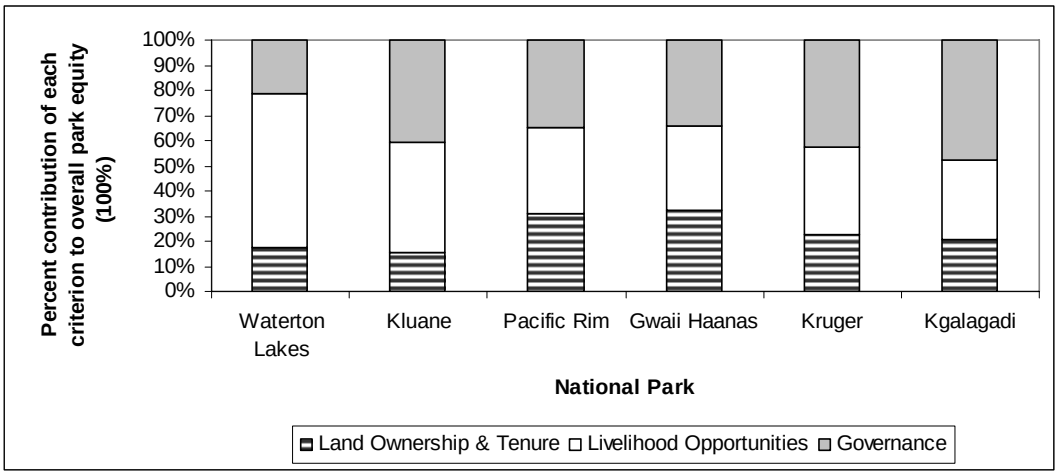

Figure 4-1. Stacked columns depicting the contribution of each criterion to overall park equity for six case study national parks in Canada and South Africa.

'Prior and informed consent' to the establishment of Gwaii Haanas was likely a determining factor in the extent of decision-making authority delegated to the AMB, which has probably influenced the high level of Indigenous employment and access to the park reserve; this park received the highest (98%) score for how effectively equity has been addressed. In order to determine if the park's high overall effectiveness score was primarily due to high scores for the *land tenure and ownership* criterion, we recalculated Gwaii Haanas' aggregate score by attributing a dissatisfactory score to the five indicators related to land dispossession, relocation from the park, negotiated park establishment, and satisfaction with the co-management agreement. While the park's score for the *land tenure and ownership* criterion decreased to 24% ('very dissatisfactory'), the park still achieves an overall score of 75% (the upper end of 'satisfactory' and only 1% from being 'very satisfactory') which would place it as the second most equitable park in this study after Pacific Rim.

In regard to land claims, Waterton Lakes received 'dissatisfactory' scores because the Kainai First Nation interview respondents indicated that they were dissatisfied with the settled land claim and because there was not currently a co-management agreement between the park and the Kainai and Piikani First Nations. The other five parks received 'satisfactory' and 'very satisfactory' scores for their settled land claims. The Champagne-Aishihik First Nations (CA-FN) interview respondents indicated the extent of the co-management agreement with

Kluane (in terms of allowing direct decision-making) was ‘dissatisfactory’. The Kruger, Gwaii Haanas, and Pacific Rim respondents indicated that the co-management agreements in their parks were ‘very satisfactory’; the Kgalagadi respondents indicated their level of satisfaction with their co-management agreement was ‘dissatisfactory’. Gwaii Haanas scored ‘very satisfactory’ on all indicators in this criterion, except for the completed land claim indicator. For this indicator, the park received a ‘satisfactory’ score because the land claim was unsettled but was being negotiated between the Council of the Haida Nation and the Governments of Canada and British Columbia at the time of research.

The *maintenance of livelihood opportunities* criterion examined several different issues, including the impact of damage-causing animals (believed to originate in the park) on the lands or lives of Indigenous and tribal neighbours, access into the park to obtain natural resources such as timber or medicinal plants and for cultural (e.g., vision quest) purposes, and employment. Three parks (Kluane, Gwaii Haanas and Pacific Rim) received ‘very satisfactory’ scores overall for this criterion, two (Kruger and the Kgalagadi) received ‘satisfactory’ scores overall, and one (Waterton Lakes) received an overall score of ‘dissatisfactory’ (Table 4.5). Again, Gwaii Haanas and Pacific Rim performed as well on this criterion as they did on the other two (Fig. 4.1). At Waterton Lakes, the contribution of this criterion to the overall park equity score was much higher than it was for the other two criteria (Fig. 4.1). Each park received ‘very satisfactory’ scores for the following three indicators: access rights were explicitly specified in some form of final agreement or treaty, access was permitted for cultural purposes (such as for vision quests), and the interview respondents emphasised their support for conservation in the park. Waterton Lakes and the Kgalagadi received ‘dissatisfactory’ and ‘very dissatisfactory’ scores, respectively, because the neighbouring Indigenous groups were required to pay regular access fees into the park unless it was for a cultural purpose. This was unlike the rest of the case study parks where entrance fees were not required. Waterton Lakes received a ‘very dissatisfactory’ score because the access rights for the Kainai and Piikani First Nations were not negotiated but were decided upon by Parks Canada. The other five parks each received scores of ‘very satisfactory’ for this indicator.

Waterton Lakes received a ‘dissatisfactory’ score for the hunting, fishing, and timber cutting and plant collection indicators, while the Kgalagadi received a ‘dissatisfactory’ score for the hunting indicator but a ‘very satisfactory’ score for the indicator on the extent to which plants could be collected in the park. The other four parks received either ‘satisfactory’ or ‘very satisfactory’ scores for these indicators. The respondents from three of the parks (Kluane, Pacific Rim and Gwaii Haanas) indicated that they also felt ‘very satisfactory’ about their level of access to the park and its resources while respondents at two parks (Waterton Lakes and the Kgalagadi) felt their level of access was ‘dissatisfactory’. Only respondents at Kruger felt their level of access was ‘very dissatisfactory’.

Damage-causing animals were not considered problematic in any of the Canadian parks. However, this was a serious problem for both South African parks which received ‘dissatisfactory’ scores for the extent to which these types of animals were being addressed and the compensation for damage caused by such animals, and ‘very dissatisfactory’ scores for the extent of satisfaction with any compensation for these animals. The Canadian parks were considered to provide enough employment and received scores of ‘satisfactory’ and ‘very satisfactory’ for this indicator. The Kruger and Kgalagadi were considered to provide a ‘dissatisfactory’ amount of employment. Waterton Lakes and the Kgalagadi were considered to have a ‘dissatisfactory’ number of capacity building and training opportunities while the other four parks were considered ‘satisfactory’ to ‘very satisfactory’. In terms of Indigenous people occupying upper-level management positions, Kruger, Gwaii Haanas and Pacific Rim were considered ‘satisfactory’ or ‘very satisfactory’; the other three parks (Waterton Lakes, Kluane, and Kgalagadi) were considered ‘dissatisfactory’.

Five of the parks received ‘very satisfactory’ scores overall on the *participation in park governance* criterion; only Waterton Lakes received a ‘very dissatisfactory’ score (Table 4.5). The managers at Gwaii Haanas and Pacific Rim balanced this criterion equally with the other two, while the contribution of this criterion to the overall park equity score for the Kgalagadi was higher than it was for the other two criteria (Fig. 4.1).

The co-management boards at Gwaii Haanas, Pacific Rim and the Kruger were considered to have a ‘satisfactory’ and ‘very satisfactory’ level of authority over decision-making. Kluane and the Kgalagadi scored ‘dissatisfactory’ on this indicator, while Waterton Lakes was ‘very dissatisfactory’ because there was no co-management board that could affect decision-making. All parks except for Waterton Lakes received a ‘very satisfactory’ score for the co-management board being representative of the regional population; again Waterton Lakes was ‘very dissatisfactory’ because there was no co-management board. Aside from Waterton Lakes which received ‘very dissatisfactory’ scores for the following indicators, respondents from the rest of the parks indicated their experiences on the co-management boards, the capacity of the co-management board to accomplish the work it was tasked with, and the extent of compensation received for participation in the co-management boards were ‘satisfactory’ and ‘very satisfactory’. Finally, all of the parks were considered to be ‘satisfactory’ and ‘very satisfactory’ in terms of other types of opportunities to involve Indigenous neighbours in decision-making (such as park forums).

4.5 Discussion

National parks and other protected areas must strive to involve Indigenous people in protected area management, protect property and access rights, and commit to their involvement in decision-making on a fair and equitable basis if these areas are to be considered equitable from an Indigenous perspective (Colchester 2004; Blaustein 2007). The establishment of five of the six national parks and national park reserves in this study were not negotiated with neighbouring Indigenous groups. This lack of negotiation, along with dissatisfactory compensation for park establishment, relocation compensation, and negotiated relocation (whether due to park establishment or other political drivers) meant the parks in this study generally received ‘dissatisfactory’ scores on the *land tenure and ownership* criterion. Cernea and Schmidt-Soltau (2006) emphasise that park managers (and, it could be argued, national governments) have refused to acknowledge the disastrous socio-economic effects of displacement on people and have avoided an objective consideration of the empirical evidence into the impact of such practices on people already below poverty level. While relocation from the park lands in this study may not have been related to conservation efforts *per se* (being mandated instead by Apartheid policies, for example), these long

standing issues must be adequately addressed by the national park managers as they belong to parastatal agencies managed (generally) by national governments. As long as park land is contested space that continues to affect the lives and livelihoods of Indigenous groups and suitable resolutions have yet to be reached, the sustainability and social acceptability of parks will continue to be challenged.

At the outset of the study, we anticipated that the settlement of a land claim would be the most important criterion in determining how equitable a park was. By this we mean that if a land claim had been settled, we anticipated the park would perform very well on all other aspects, including access to resources and livelihood opportunities, employment, and governance in decision-making. This expectation was not supported by the results. Gwaii Haanas was the most equitable park in the study, yet the Haida Nation were one of only two Indigenous groups in the study that had not settled a land claim. While the Maa-nulth land claim encompassing Pacific Rim and including several of the region's First Nations had not been formally settled at the time of research (the Final Agreement was accepted by the relevant First Nations in October 2007), this park also performed well on all other criteria and indicators and was considered equitable. Comparatively, the Kainai and Piikani First Nations near Waterton Lakes had settled a numbered treaty in the late 1800s; the park received a 'very dissatisfactory' score for this criterion. Similarly, the Makuleke, and the Mier and ǂKhomani San had settled their land claims near the Kruger and Kgalagadi respectively, however both parks received 'dissatisfactory' scores on this criterion. Only Kluane performed the way we had anticipated; the Kluane and Champagne-Aishihik First Nations deemed their land claim to be 'very satisfactory' and the park also received 'satisfactory' scores on the *maintenance of livelihood opportunities* and *participation in park governance* criteria.

National parks must also protect the property and access rights of Indigenous people in order to be considered equitable. For each of the parks in this study, access rights were explicitly stated in some form of final agreement or treaty and in all parks access was permitted for cultural purposes. Four of the parks had 'satisfactory' access for hunting, fishing, or timber cutting and plant collection. The respondents from three of the parks (Kluane, Pacific Rim

and Gwaii Haanas) indicated that their level of access to the park and its resources was ‘very satisfactory’ while respondents at two parks (Waterton Lakes and the Kgalagadi) felt their level of access was ‘dissatisfactory’. Only respondents at Kruger felt their level of access was ‘very dissatisfactory’. While damage-causing animals were not considered an issue in any of the Canadian parks, they were a serious issue for both South African parks and local property and livelihoods were not well protected. Both South African parks received ‘dissatisfactory’ scores for the extent to which these types of animals were being addressed and the compensation for damage caused by such animals, and ‘very dissatisfactory’ scores for the extent of satisfaction with any compensation for these animals.

It is also important to determine if national parks are providing equitable access to employment opportunities as much as possible. The Canadian parks were considered to provide a ‘satisfactory’ amount of employment, while the South African parks were considered to provide a ‘dissatisfactory’ amount of employment. Four parks were considered to have an acceptable number of capacity building and training opportunities, while two parks (Waterton Lakes and the Kgalagadi) were considered to be ‘dissatisfactory’ in this regard. Finally, Kruger, Gwaii Haanas and Pacific Rim were considered satisfactory in terms of Indigenous people occupying upper-level management positions while the other three parks were considered ‘dissatisfactory’.

Finally, national parks must commit to the participation of Indigenous people in decision-making on a fair and equitable basis. Our purposive sample of parks with varying levels of co-management demonstrates that effective and equitable participation in governance can be achieved. On this criterion, five of the parks received ‘very satisfactory’ scores overall. The co-management boards at three parks (Gwaii Haanas, Pacific Rim and the Kruger) were given a certain level of authority over decision-making, while two parks (Kluane and the Kgalagadi) were ‘dissatisfactory’ and one park (Waterton Lakes) was ‘very dissatisfactory’ in this regard. All parks except for Waterton Lakes received a ‘very satisfactory’ score for the co-management board being representative of the regional population. Likewise, the respondents from all parks (aside from Waterton Lakes) indicated their experiences on the co-management boards, the capacity of the co-management board to accomplish the work it

was tasked with, and the extent of compensation received for participation in the co-management boards were satisfactory. Finally, all of the parks were satisfactory in terms of other opportunities to involve Indigenous neighbours in decision-making (such as park forums).

Initially, our logic on this point led to the tentative expectation that parks with more intricate levels of co-management and support from neighbouring Indigenous groups would be more equitable than parks with lower levels of co-management. The results did in fact support this hypothesis. Waterton Lakes was the only park without some formal co-management structure (such as a co-management board or a contract park), and had very little opportunity for neighbouring First Nations to access resources in the park or to influence park governance. Its overall equity score was 'dissatisfactory' (Table 4.5). The other five case study parks either had co-management boards, co-management arrangements, contract parks or park forums as mechanisms for communicating with local Indigenous and tribal groups and for these groups to have some influence on park governance.

We also anticipated finding that some parks were co-managed in name only. By this we mean that while a co-management board might have existed, delegated decision-making to the board only occurred on a partial basis. This expectation was supported by the results for three of the case study parks. The co-management boards between the neighbouring Indigenous groups at each of Kluane, Kruger and the Kgalagadi were all restricted in the kinds of decisions they could make. In particular, none of these boards made decisions about conservation actions within the park. The Kgalagadi co-management board was generally restricted to making decisions about infrastructure (e.g., roads, tourist lodges, new park gate and gate fees) in the park, while the Kruger co-management board made decisions about similar issues and also could determine who could hunt and collect resources, maintenance of the western boundary fence, how concessions for game drives are made and which roads are used for game drives. Only the AMB at Gwaii Haanas made decisions about all aspects of the park, including on issues of science and specific conservation management actions.

There were four ways that we could have influenced the results of this study. First, we had some influence over the selection of interview respondents. For instance, the primary author interviewed one of the ǂKhomani San representatives from the co-management board. This was due to an inability to contact the other three representatives despite repeated attempts (it is common for phone lines to be inoperative (often due to the theft of copper cables) in that part of South Africa. Likewise, we interviewed three of the seven park forum chairmen from Kruger. Second, it was our discretion under which criterion several of the indicators were categorised. We could have had a moderate influence over the final equity scores depending on which criterion we attributed these indicators. For example, we elected to categorise the indicator 'extent of satisfaction with co-management agreement/contract park agreement' in the 'land claims' criterion rather than under the 'governance' criterion because these agreements were directly linked to the settlement of formal land claims. If this indicator had been placed under the 'governance' criterion, the park's overall equity score and those for the individual criteria could have changed.

Third, the rating scale amended for this research (Table 4.5) seems logical and is reasonably straightforward to use (Salafsky and Wollenberg 2000). However, several issues may need to be addressed. Our attribution of scores to individual indicators was often subjective, depending upon the nature of the topic at hand. Thus, there is a risk of a circular argument in looking for patterns in our data set as observed patterns may be a result of biases in the rankings (Salafsky and Wollenberg 2000). While interview respondents often indicated their direct level of satisfaction (e.g., 75% satisfied) or gave a clear answer to which a score could easily be assigned, we had to attribute a score based upon our assessment of their response for several indicators (particularly for those which emerged inductively through the analysis of interview transcripts). Furthermore, several indicators (particularly in the 'land claims' criterion) were based on documented fact rather than personal experience by the respondents. For instance, the indicator dealing with the extent to which local Indigenous and tribal people were dispossessed of land or relocated due to park establishment was based on documented history or oral history, but did not solicit the respondent's satisfaction with that process. In order to deal with these cases, we examined responses to the same indicator across all the parks and scored each park according to an ideal or the 'best case scenario'.

Fourth, we assumed that each criterion was equally important to the equity evaluation and attributed an equal weight to each. Further research into the relative importance of each of these, and other, criteria to equity in national parks, could inform this weighting.

4.6 Conclusion

As parastatal agencies, national park managers must be held to the same level of accountability as their respective governments. This means they must not unnecessarily breach global agreements to which their governments are signatories (such as the *Convention on Biological Diversity*). They must also address equity concerns including property and human rights and the relationship between rights holders (Indigenous people) and duty bearers (park managers) (Blaustein 2007).

In this study, five of the six case study parks were not established through negotiation. Four of the parks were considered to have a 'satisfactory' level of access, while respondents from only three of the parks indicated their level of access was 'satisfactory'. These results indicate that more can be done in terms of mitigating the social and economic impacts of the national parks, in particular, to improve access to park resources and livelihood opportunities for local Indigenous people. Five of the parks in this study performed very well on processes of governance. Respondents from five of six parks were very satisfied overall on issues of participation in governance. While only one of the parks performed poorly on this criterion overall, the respondents from the other five parks indicated their experiences on the co-management boards, the capacity of the co-management board to accomplish the work it was tasked with, and the extent of compensation received for participation in the co-management boards were 'satisfactory' and 'very satisfactory'. All of the parks were considered to be 'satisfactory' and 'very satisfactory' in terms of other opportunities to involve Indigenous neighbours in decision-making (such as park forums).

Although Waterton Lakes cannot be considered an equitable park at this time (given the lack of Indigenous participation in park governance and of access to park resources, among other things), even this park shows a good deal of promise and potential to improve this situation.

For instance, there is a respectful relationship between the park's superintendent and the tribal land manager for the Kainai Nation. The other parks involved in this study have all worked hard to overcome a common legacy of land dispossession, resolve land tenure and access rights into the parks, and address issues of participation in governance. There is no reason to assume Waterton Lakes cannot do the same even if a formal co-management board is not the final solution.

National parks will be challenged to conserve the biological diversity within their borders if they continue to operate under difficult social and political conditions and are faced with unnecessarily poor relations with local Indigenous communities. The need for genuine involvement of Indigenous and other local people in the governance of parks is evident when considering that many national parks face a diversity of threats, including inadequate management of resources, human encroachment, the collection of non-timber forest products, logging (mainly illegal), illegal harvesting (poaching), and adjacent land development (Hockings 2003; Lacerda 2004). Even in heavily fortified parks such as Kruger, the illegal harvesting of wildlife occurs on a regular basis. In the past, in all but the most strictly community-controlled protected areas, Indigenous people had very little equity in decision-making, and the relationship of park agencies with local communities was generally paternalistic and unidirectional (Stankey 1989). A shift in power over governance from bureaucratic authority to these people themselves may be difficult as governments could have trouble accepting that other viable management methods exist.

In order to encourage and enable the development of more equitable national parks, best practices need to be identified. For instance, best practices for resettlement require the prior, free, and informed consent of the affected people (Schmidt-Soltau and Brockington 2007). Likewise, a systematic approach to evaluating the equity of national parks would enable an efficient and effective assessment of the social and cultural context of national parks. The methods used in this study demonstrate that such an approach is possible.

The results of this study also demonstrate that equity in national parks is possible. Yet, success for people does not necessarily mean success for nature (Brockington

et al, 2006). “Differences and divisions regarding protected areas often run along professional and disciplinary lines” with social scientists and peoples’ rights advocates emphasising something different from ecologists and conservation biologists” (Blaustein 2007: 218). It is necessary to reconcile any differences between the social and ecological realms in order to ensure national parks are simultaneously ecologically effective and socially equitable.

4.7 References

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5 EVALUATING ECOLOGICAL INTEGRITY AND SOCIAL EQUITY IN NATIONAL PARKS: CASE STUDIES FROM CANADA AND SOUTH AFRICA[9]

5.1 Overview

There are concerns that many national parks worldwide are ecologically ineffective at conserving biological diversity and ecosystem processes, are socially unjust in their relations with Indigenous communities, or both. Efforts to improve the sustainability of national parks have often reflected professional and disciplinary lines, with ecologists and conservation biologists emphasising something different from social scientists and peoples' rights advocates. Yet success for nature does not necessarily mean success for people, and vice versa. This paper presents empirical results from a systematic evaluation of six case study national parks in Canada and South Africa that asked: can national parks effectively protect ecological integrity and concurrently uphold social equity? The results of this evaluation demonstrate that parks effective at protecting ecological integrity can also successfully address equity, but that more can be done in terms of balancing the ecological and social realms and mitigating the social and economic impacts of the national parks. Building upon existing integrative processes already institutionalised in parks, such as co-management and integrated conservation and development efforts, seems like a logical starting point to do this.

5.2 Introduction

Extensive efforts have been made to improve the sustainability of national parks. However, these often reflect professional and disciplinary lines, and a fragmentation and specialization of knowledge with ecologists and conservation biologists emphasising something different from social scientists and peoples' rights advocates (Blaustein 2007; King et al. 2007). For example, many park managers focus on protecting ecological integrity, where the dominant ecological characteristics (such as composition, structure, function, and ecological processes) of a system occur within their natural ranges of variation and can withstand and recover from

[9] A version of this paper has been submitted for publication. Timko, J.A. In Review. A Fine Balance: evaluating case study national parks in Canada and South Africa for ecological integrity and social equity. World Development.

perturbations caused by natural environmental or human factors (Parrish et al. 2003). While the management of national parks can be improved by evaluating the status of ecological integrity and the effectiveness of management actions and incorporating the findings to improve management actions (Dudley et al. 1999; Salafsky et al. 2002; Parrish et al. 2003; Hockings et al. 2004; Hockings et al. 2006), many parks still face threats to their sustainability.

Many national parks continue to be compromised by other land uses and socio-political processes, and often compromise in turn those who live on the periphery. As such, social scientists have argued that improvements need to be made to mitigate the impact of national parks and conservation strategies on local and Indigenous communities (Brechin et al. 2002; West et al. 2006). Tense relations between Indigenous people and park managers have raised issues of restitution which in the past have been ignored (Blaustein 2007), and Indigenous people around the world are seeking compensation for lost rights and pursuing land claims in and around national parks.[10] *The Durban Accord*, developed during the fifth World Parks Congress, urges a commitment to involving Indigenous peoples in establishing and managing protected areas, and participating in decision-making on a fair and equitable basis (Colchester 2004). An increased emphasis on the involvement of Indigenous people by park agencies and international organizations has resulted in the pursuit of co-management, the substantial sharing of (protected-area) management responsibilities and authority between local- and state-level systems (Berkes 1994; Brechin et al. 2001). The provision of access to park resources and employment opportunities has also been seen as a means to mitigate the impact of parks on the lives and livelihoods of neighbouring Indigenous people.

Amidst progress made to improve the ecological and social sustainability of national parks, we must remember that national parks are political entities managed (generally) by national governments. These same national governments are often signatories to different global,

[10] Indigenous in this paper includes "tribal peoples in independent countries whose social, cultural and economic conditions distinguish them from other sections of the national community, and whose status is regulated wholly or partially by their own customs or traditions or by special laws or regulations" and "peoples in independent countries who are regarded as indigenous on account of their descent from populations which inhabited the country, or a geographical region to which the country belongs, at the time of conquest or colonisation…and who, irrespective of their legal status, retain some or all of their own social, economic, cultural, and political institutions (ILO 1989).

multi-lateral agreements such as the *Convention on Biological Diversity*. Global society expects these governments to conserve their biological diversity, while upholding values of human rights and social justice, among other things. Expectations towards national park managers, as members of parastatal park agencies, should be no different.

This paper presents the empirical results from a systematic evaluation that asked: can national parks effectively protect ecological integrity and concurrently address key dimensions of social equity? A national park was considered to be successful at protecting ecological integrity if it achieved park management objectives in a manner that sustained biodiversity and ecosystem processes while abating threats (*sensu* Ervin 2003). As such, the effectiveness with which the parks addressed ecological integrity was determined by evaluating the following three criteria: conservation of biological diversity (in order to account for species viability); conservation of ecosystem processes (in order to assess the functionality of an ecosystem); and adaptation to and mitigation of stressors and threats (in order to monitor and reduce negative impacts).

Equity necessarily includes: prior informed consent, property and human rights, and the relationship between rights holders (Indigenous people) and duty bearers (park managers) (Blaustein 2007). In this study, a national park was considered to be equitable if it successfully addressed land tenure and access rights into the park (including unresolved historical loss of rights and those transgressed in the genesis of new parks), resolved conflicts stemming from loss or change in local livelihoods, and eased tensions and addressed concerns over local participation and decision-making authority in park governance. As such, the effectiveness with which the parks addressed equity was determined by evaluating the following three criteria: resolution of land tenure and ownership (in order to provide compensation for lost land rights); maintenance of livelihood opportunities (in order to mitigate further impacts on Indigenous peoples' livelihoods, to guarantee Indigenous people access to resources, and to provide employment); and Indigenous participation in park governance and decision-making (in order to enable Indigenous people to influence decisions that will affect them).

This paper is organized into five sections. The introduction provides a rationale for the study; this is followed by the case study context which explains the logic of the selection of case study national parks in Canada and South Africa. (A detailed description of the methods used to evaluate the effectiveness with which the case study parks addressed ecological integrity and equity can be found in Chapters 3 and 4, respectively).[11] The case study context is followed by the primary results of the ecological integrity and equity evaluations. These results are discussed in reference to the study's main research question and broader parks management best practices in general. The paper ends with a brief conclusion which reiterates the need to go beyond disciplinary approaches to national parks management.

5.3 Case Study Context

Canada and South Africa were purposively selected because both are renowned for their natural beauty and extensive national parks systems. Much of Canada's landscape remains Crown land, with large unfenced national parks and protected areas providing refuge for migratory wildlife from industrial and residential land uses. South African national parks have a different experience, with boundaries mainly fenced in order to prevent conflicts between neighbouring landowners and 'damage-causing animals' such as lions (*Panthera leo*), elephants (*Loxodonta africana*), and Cape buffalo (*Syncerus caffra*), among others. For one of the case study parks, Kruger, these animals originate from within the park and have no

[11] A preliminary list of criteria and indicators for ecological integrity and equity were developed through an extensive review of the literature on people, parks management, and conservation biology (Timko and Satterfield, in press). This list was refined through an analysis of the management plans from a purposive sample (Babbie and Benaquisto 2002) of 14 national and provincial parks in Canada, Australia and South Africa that exemplified many of the successes and challenges associated with designing ecological monitoring programs, and given their level of commitment to Indigenous co-management. Based on expert opinion and my knowledge of national parks in Canada and South Africa, along with time and budget constraints, purposive sampling was used to select this study's six IUCN Category II case study national parks from the parks assessed above. The sampling logic was a *theoretical replication* wherein the case studies were selected because they would provide contrasting results but for predictable reasons (Yin 2003). Investigation of the case study parks allowed the list of indicators generated inductively from the raw data to complement those generated deductively from the literature (Boyatzis 1998). Each of the case study parks had varying levels of Indigenous involvement in park governance, and exhibited many of the successes and challenges associated with designing ecological monitoring programs. Data sources for the evaluations included State of the Park Reports; park ecological monitoring data; archival data; and semi-structured interviews with park biologists, managers, and Indigenous members of park co-management boards. The evaluation of ecological integrity included status and trend assessments and effectiveness evaluations; the evaluation of park equitability included thematic coding of interview and archival data, and assignation of numerical ratings to this data.

natural populations in the border areas (Anthony 2007). In parts of both of these countries, and within several of the national parks in this study, functioning predator-prey systems still exist. Chapter 3 provides more detail about the ecological description and management issues facing the case study parks. Canada and South Africa also share a common legacy of land dispossession followed by the subsequent pursuit of land claims by disadvantaged groups seeking compensation for lost land rights. Chapter 4 provides further background information on the land claims process and Indigenous co-management in national parks in Canada and South Africa. While other countries and national parks around the world could have fulfilled the requirements for either the analysis of ecological integrity or equity in this study, only a few countries could satisfy both its ecological and social requirements.

Case study parks varied in size, regional ecosystem type, co-management strategy, and main management and conservation issues (Table 5.1). Specifically, the case study national parks and national park reserves included in this study were: Kluane, Gwaii Haanas and Pacific Rim National Park Reserves and Waterton Lakes National Park in Canada, and the Kruger and Kgalagadi National Parks in South Africa. For the sake of brevity throughout the paper, I refer to each park by its first name (e.g., Kluane for Kluane National Park Reserve). Kluane and Waterton Lakes were selected because they had very explicit management objectives identified in park management plans. Kluane's co-management board had a restricted level of authority over decision-making, while Waterton Lakes had no formal co-management arrangement with neighbouring Indigenous groups. Gwaii Haanas and the Kgalagadi were selected as they had less explicit management objectives in their management plans than Kluane and Waterton Lakes, although there was ecological monitoring taking place within the parks. Gwaii Haanas is a fully co-managed park, with the co-management board having the most authority over decision-making in the park as compared to the other case studies. The Kgalagadi and the Kruger have both settled land claims and established portions of the national park as 'contract parks' with the relevant Indigenous and tribal neighbours, who however also have restricted levels of decision authority in the park. The Kruger is unique in this study and was selected because it uses the *Thresholds of Potential Concern* (TPC) approach. TPCs, essentially the upper and lower limits along a continuum of change in selected environmental indicators, are a set of operational goals that together define the

Table 5.1. Distinguishing characteristics of six case study national parks in Canada and South Africa involved in the evaluation of ecological effectiveness. Features include park location, year of park establishment, size, regional description, and main management and conservation issues.

National Park/National Park Reserve, Country	Location	Year Established	Size (sq km)	Regional Description	Co-management Board (if applicable)	Main Management/ Conservation Issues
Waterton Lakes National Park; Canada	SW corner of Alberta, northern part of the Waterton-Glacier International Peace Park	1895	525	Crown of the Continent ecosystem, Rocky Mountains	None	Small size of park relative to large migratory wildlife using the park; external influences from increasing human populations; climate change
Kluane National Park & Reserve; Canada	SW corner of Yukon Territory	1976	21 980	Northern Coast Mountains Natural Region	Kluane Park Management Board	Climate change, predator/prey interactions; forest pests
Gwaii Haanas National Park Reserve and Haida Heritage Site; Canada	130km off northwest coast of British Columbia	1993	1470	Pacific Coast Mountains Natural Region	Archipelago Management Board	Spread of invasive and alien biota; seabird conservation
Pacific Rim National Park Reserve; Canada	West side of Vancouver Island, British Columbia	1970	499	Pacific Coast Mountains Natural Region	Qu'aas West Coast Trail Society for West Coast Trail unit of park only; full co-management board established once treaties settled	Narrowness of the Long Beach Unit, anthropogenic impacts on water quality, shoreline protection, large numbers of tourists
Kruger National Park; South Africa	South Africa, Eastern Mpumulanga and Limpopo Provinces	1898	19 485	South African Lowveld ecoregion	Contract park with Makuleke and seven park forums[a]	Alien biota; water quantity; fire management; ungulates; carnivores; heterogeneity; large population density on border of park

Kgalagadi National Park; South Africa	Northern tip of Northern Cape Province bordering Namibia and Botswana	1931	9 591	Southern Kalahari ecoregion	Contract park with Mier and ǂKhomani San Communities and one park forum[a]	Native vegetation, ungulate migration, predator/prey interactions

[a] Park forums are structures established by South African National Parks (SANParks) whereby communities are encouraged to participate in the management of their local park and raise issues affecting their lives and the environment. The scope of concern is extensive and ranges from HIV/AIDS through to employment and issues like the security of park fences; representatives elected by the community help to minimize friction between the park and its neighbours (SANParks 2007). People involved in the park forums have the ability to influence decision-making and management in the parks, but the forums are not themselves decision-making bodies.

spatiotemporal heterogeneity conditions for which the Kruger ecosystem is managed (Biggs and Rogers 2003). Pacific Rim had the least explicit management statement of all the parks, and operates in a 'post treaty' environment with some co-operative initiatives, although no formal park co-management exists as yet.

5.4 Results

The primary results of the ecological integrity and equity evaluations have been summarised and discussed in detail elsewhere (see Chapters 3 and 4, respectively). The most salient results are summarised here in order to address the main question of this research: can national parks effectively protect ecological integrity and concurrently address equity issues? All descriptors of satisfaction refer to the ordinal rating scale in Table 5.2. Parks were considered equitable and effective at maintaining ecological integrity if they received descriptions of 'very satisfactory' or 'satisfactory' ('green' ratings of '2' or '3', Table 5.2).

Table 5.2. Ordinal rating scale for determining protected area management effectiveness in which a rating of '2' or '3' denotes effectiveness (adapted from Arias and Valery 1999).

Rating	% of Optimum	Colour	Effectiveness Description
3	76-100	Dark Green	Very Satisfactory
2	52-75	Light Green	Satisfactory
1	26-51	Yellow	Dissatisfactory
0	0-25	Red	Very Dissatisfactory

In order to evaluate how effectively case study parks protected ecological integrity, the analysis combined the ratings for two indicator types. 'Data indicators' included, for instance, focal species distributions, water quality, and water quantity; these were assessed using either a *State of the Park Report*, status and trend assessment, effectiveness evaluations, or expert opinion. 'Dataless indicators' were classified as either 'in progress' if monitoring or management actions were being initiated or would be in the immediate future, and as 'no data' if monitoring or management actions were not going to be initiated in the immediate future. The 'data indicators' and 'dataless indicators' received different weights in

the ecological integrity effectiveness calculations. This enabled a better understanding of the effectiveness of the management policies because, in the 'dataless indicators' method (see Chapter 3), the overall score took into account any failure (for whatever reason) to collect the necessary information.

The results presented here stem from an analysis of both 'data indicators' and 'dataless indicators' (see Chapter 3). The number of indicators evaluated for each park varied from 17 for Waterton Lakes to 40 for Kruger in order for the differences between parks in terms of the focal species, specific threats, etc., to be accurately reflected. The overall effectiveness with which the parks addressed the criteria for ecological integrity differed, and only three of the parks (Kluane, Pacific Rim, and Kruger) were considered effective overall. Waterton Lakes and Gwaii Haanas received an overall rating of 'dissatisfactory', while the Kgalagadi was 'very dissatisfactory' (Table 5.3).

Table 5.3. Overall park effectiveness scores (indicated as a percentage and a numerical rating score) and individual criterion scores (indicated as percentages) for all ('data' and 'dataless') indicators for six national parks in Canada and South Africa. The hatching follows the colour system described in Table 5.2.

		Ecological Integrity Criterion			
		Conservation of Biological Diversity (%)	Conservation of Ecosystem Processes (%)	Adaptation to and Mitigation of Stressors & Threats (%)	Overall Effectiveness at Protecting Ecological Integrity (%=score)
	National Park				
Canada	Waterton Lakes	61	19	20	33=1
	Kluane	69	60	58	62=2
	Gwaii Haanas	47	48	53	49=1
	Pacific Rim	12	93	57	54=2
South Africa	Kruger	33	47	80	53
	Kgalagadi	43	0	18	20=0

Thirty-nine indicators were evaluated in order to determine how equitable each case study park was (see Chapter 4). Overall equity scores and individual criterion equity scores for

each park are listed in Table 5.4. Five of the six parks were considered equitable overall; only Waterton Lakes received an overall equity score of 'dissatisfactory' (Table 5.4). Gwaii Haanas and Pacific Rim received overall scores indicating their level of equitability was 'very satisfactory'.

Table 5.4. Overall park equity scores (indicated as a percentage and a numerical rating score) and individual criterion equity scores (indicated as percentages) for six national parks in Canada and South Africa. The hatching follows the colour system described in Table 5.2.

		Equity Criterion			
		Land Ownership & Tenure (%)	Livelihood Opportunities (%)	Participation in Park Governance (%)	Overall Effectiveness at Addressing Equity (%=score)
	National Park				
Canada	Waterton Lakes	14	48	17	25=1
	Kluane	29	83	77	63=2
	Gwaii Haanas	95	100	100	98=3
	Pacific Rim	86	95	97	93=3
South Africa	Kruger	48	71	90	70=2
	Kgalagadi	38	58	87	61=2

The overall scores from each park's ecological integrity and equity analyses are presented in Table 5.5. Only three parks (Kluane, Pacific Rim and the Kruger) were concurrently effective at protecting ecological integrity and addressing equity (Table 5.5). While Gwaii Haanas was considered 'very satisfactory' at addressing equity, it was 'dissatisfactory' at protecting ecological integrity. The remaining two parks (Waterton Lakes and the Kgalagadi) were 'dissatisfactory' overall. The Kgalagadi was 'very dissatisfactory' at protecting ecological integrity, however it was 'satisfactory' at addressing equity. Waterton Lakes was 'very dissatisfactory' at addressing equity and 'dissatisfactory' at protecting ecological integrity.

Table 5.5. Ecological integrity and social equity scores (displayed as a percentage) for six national parks in Canada and South Africa. The hatching follows the colour system described in Table 5.2. N=number of indicators assessed.

	National Park					
	Waterton Lakes	Kluane	Gwaii Haanas	Pacific Rim	Kruger	Kgalagadi
Ecological Integrity	33 (N=17)	62 (N=19)	49 (N=26)	54 (N=21)	53 (N=40)	20 (N=23)
Equity (N=39)	25	63	98	93	70	61

5.5 Discussion

The central purpose of this study was to ask: can national parks effectively protect ecological integrity and concurrently address social equity from an Indigenous perspective? For conservation to be effective and sustainable in national parks, they must be managed to do both of these well. Three of the parks in this study demonstrate that it is possible to be effective at addressing both ecological and equity issues as they achieved 'satisfactory' ratings for both ecological integrity and equity (Table 5.5). Kluane National Park Reserve was the most balanced park in terms of ecological integrity and equity with essentially the same aggregate scores for these two factors.

That said, there are opportunities for improvement in Kluane, as with all of the parks in this study. For example, the Kluane Park Management Board (KPMB) is restricted in its decision-making capacity as the board does not contribute to decisions about conservation actions within the park. In comparison, the co-management boards at Pacific Rim, the Kruger, and Gwaii Haanas in particular, were given more authority over decision-making. Five of the six national parks and national park reserves in this study were not established through negotiation with neighbouring Indigenous groups. This lack of negotiation, along with 'dissatisfactory' scores for compensation for park establishment, negotiated relocation (whether due to park establishment or other political drivers), and relocation compensation meant the parks in this study generally received 'dissatisfactory' scores on the resolution of land tenure and ownership criterion. As long as park land is contested space that continues to affect the lives and livelihoods of Indigenous groups, and suitable resolutions have yet to be reached, the parks will not be entirely equitable.

Waterton Lakes was the only park to address ecological integrity more effectively than equity (Table 5.5). This is not surprising given that this was the least co-managed park in the study with almost no access to resources granted for neighbouring Indigenous people. What is surprising is the park's 'dissatisfactory' ecological integrity score. At the outset of the study, I anticipated finding that parks with comprehensive management plans and explicit management targets would have more robust monitoring programs, better data sets, and would be the most ecologically effective overall. Waterton Lakes has a well organised monitoring program with explicit management targets. However, it is a very small park protecting important habitat and corridors for wide-ranging wildlife including carnivores and ungulates, and the park is also challenged by several threats including climate change, road development, non-native vegetation and forest disease.

While efforts have been made to improve the sustainability of national parks, these efforts often replicate and reinforce disciplinary lines. This is most evident in the results from Gwaii Haanas, Pacific Rim, Kgalagadi and the Kruger (Table 5.5). Gwaii Haanas was 'very satisfactory' at addressing equity however it was 'dissatisfactory' at protecting ecological integrity because, until recently, it "did not have a culture of science" in monitoring the park's ecological integrity (Norm Sloan, Marine Ecologist, Gwaii Haanas National Park Reserve, 27 July 2006, pers. comm.). Likewise, Pacific Rim was 'very satisfactory' at addressing equity, however indicators for monitoring the park's ecological integrity were only outlined in 2006 (Lee 2006), and the park managers do not expect to have the first formal State of the Park Report completed until October 2008 (John McIntosh, Terrestrial Ecologist, Pacific Rim National Park Reserve, 20 May 2007, pers. comm.).

Park managers need to ensure they are as effective as possible at achieving their ecological objectives. Yet national parks will be challenged to conserve the biological diversity within their borders if they continue to operate under difficult social and political conditions and are faced with unnecessarily poor relations with local Indigenous communities. In the past, in all but the most strictly community-controlled protected areas, Indigenous people had very little equity in decision-making, and the relationship of park agencies with local and Indigenous

communities was generally paternalistic and unidirectional (Stankey 1989). The need for genuine involvement of Indigenous and other local people in the governance of parks is evident when considering that many national parks face a diversity of threats, including inadequate management of resources, human encroachment, the collection of non-timber forest products, logging (mainly illegal), illegal harvesting (poaching), and adjacent land development (Hockings 2003; Lacerda 2004). Even in heavily fortified parks such as Kruger, the illegal harvesting of wildlife occurs on a regular basis.

Mascia et al. (2003: 649) suggest that a lack of conservation success in the face of detailed biological knowledge points to social factors being the primary determinants of success or failure. After all, success for nature does not necessarily mean success for people and vice versa (Brockington et al. 2006). This research has demonstrated that it is possible to empirically test how effectively protected areas address both ecological integrity and equity, with half of the parks in this study effectively addressing both of these concurrently. While there are efforts to balance the ecological and social realms in protected areas in general, and in the case study parks in particular, further efforts to integrate these two realms are imperative given the interconnectedness of 'complex socio-ecological systems' (King et al. 2007). Social scientists have often disagreed with biologists about what needs to be protected when both biodiversity and peoples' livelihoods are threatened (Blaustein 2007), however scientists and practitioners on both sides are equally responsible in defusing the polarization between the two sides, and in identifying the common ground where real-world solutions can be developed (Buscher and Wolmer 2007).

A variety of efforts have sought to overcome the "disciplinary gulf that exists between predominantly natural science-trained conservation planners and predominantly social science-trained critics of conservation" (Adams and Hutton 2007: 148). Successful efforts to overcome this disciplinary divide require processes that integrate horizontally (the cooperation of disciplines), and vertically (the cooperation of policymakers, practitioners and the public) (Klein 2004; Lele and Norgaard 2005). In many national parks and protected areas, a logical starting point would be to build upon those existing integrative processes already institutionalised: the co-management and integrated conservation and development

efforts. Co-management boards should go beyond the manager/scientist and local/Indigenous dichotomies to provide a venue for discussion and debate on both ecological and social issues. The space for dialogue and learning created by a co-management board could enable the Indigenous co-managers to better understand the science of ecology, while sharing their traditional ecological knowledge with scientists and managers. Further efforts could be aided by the inclusion of a social scientist (ideally one with a background or understanding of the natural sciences) on the board. A social scientist would bring a different perspective about the complexity of national parks, and in particular could examine 'conservation-induced displacement' of communities and its implications for local livelihoods (Rangarajan and Shahabuddin 2006). This is imperative given that many long-standing, land-based cultures have created 'ecologies of co-existence' and evictions carried out in Nature's name often ignore natural processes (Brockington and Igoe 2006).

Integrated conservation and development projects (ICDPs) and community-based natural resource management (CBNRM) efforts are both *integrating disciplines* that balance rural development with conservation biology and natural resource management, respectively (King et al. 2007). With the support of community organizations, local people could be engaged in protected area management activities such as participation in planning for benefit sharing, ecological monitoring, construction, tree planting, weed removal, and patrolling (Faizi 2006). Managers at the Kruger and the Kgalagadi have made several efforts in this regard, including the employment of local people in park construction, maintenance of the boundary fences, and weed removal. Local people could also be engaged in park-related community welfare activities such as alternative income generation and the documentation of traditional ecological knowledge for local use (Faizi 2006). Efforts in several of the case study parks have been made to address livelihood issues, such as managers in the Kruger are assisting one of the park forum groups to establish a traditional plant nursery to meet the demand for medicinal plants by traditional healers, the ǂKhomani San are permitted to hunt a Gemsbok (*Oryx gazella*) for ceremonial purposes in the Kgalagadi, local access to the Kruger is allowed for the collection of thatch grass while gathering plants for traditional food, medicinal or ceremonial purposes is permitted in Gwaii Haanas and Kluane, and local

communities are benefiting from lodges in the Makuleke region of Kruger and in the Kgalagadi (though there is still potential for growth and improvement (King et al. 2007).

Whilst pursuit of these types of integrated approaches is important and admirable, two cautionary notes much be made. First, the sustainability of local access to natural resources within a park should be tested by setting such use up as large-scale experiments. For example, hunting or the collection of thatch grass could be assessed in order to determine if it is causing an unacceptable level of ecosystem change, and to assess its intended social benefits and actual outcomes. Second, it is not feasible to expect park agencies to be equally successful at conserving biodiversity, providing livelihood opportunities and achieving poverty reduction. Conservation and poverty are quite different problems; managers cannot be help solely responsible for tackling the global human challenge of poverty (Adams and Hutton 2007), nor do they have the power to redress the distributive inequalities of development in their work (Sanderson and Redford 2003). Parks and protected areas must be seen as only one aspect of sustainable development (Brandon 1998). Scientists, society, managers and policy makers need to have realistic expectations of what protected areas can do, both for conservation in areas often surrounded by heavily developed lands, and for poverty reduction and sustainable livelihoods in rural populations. However, through there may be some 'growing pains' in establishing long-term community-based resource management processes, the outright abandonment of these initiatives is not the most prudent course of action. Reid et al (2004) advocate for building upon community-based initiatives rather than reverting to top-down protectionist approaches to conservation, and suggest calls to abandon them are premature in light of the fact that many of them are in their early days and full devolution rarely occurs.

5.6 Conclusion

Citizens of countries around the world expect their national governments to conserve their country's biological diversity, while upholding values of human rights and social justice. Expectations towards national park managers, as members of a parastatal park agency, should be no different. National parks and protected areas are amongst our best current options for maintaining and enhancing biodiversity if we manage them within the 'matrix' of

uses across a landscape and with consideration for shifting climatic conditions and atmospheric pollution (Noss 2001; Lindenmayer and Franklin 2002).

Park managers need to ensure that parks are as effective as possible at achieving their ecological objectives. Yet national parks will be challenged to conserve the biological diversity within their borders if they continue to operate under difficult social and political conditions and are faced with unnecessarily poor relations with local Indigenous communities. While pursuing ecological monitoring programs and evaluating ecological integrity on the one hand, park agencies should also be pursuing partnerships in order to tackle poverty and livelihood issues. Building upon those existing integrative processes already institutionalised in many parks, such as co-management and integrated conservation and development efforts, while learning from experiences elsewhere, seems like a logical starting point. Ultimately, what is appropriate at each site will depend on a variety of social and ecological factors, often highly specific to that region or population (Brandon et al. 1998). “Conservation and poverty alleviation are abstractions; the lives of the poor and of wildlife are lived in specific places and times” (Sanderson and Redford 2004: 146) and solutions must be equally as specific. In parks and protected areas with less critical wildlife, it could be possible to tilt the balance between biodiversity protection and local use/benefits towards use and benefits; in critically important areas, tools such as compensation for lost access and environmental education could be used to ameliorate the restrictions people must endure (Hackel 1999). Wherever parks and protected areas are situated, and if they are to seek solutions that are sustainable in a manner specific to the local context, managers need to use the most appropriate tools at their disposal (such as environmental education, capacity building programs, compensation, and alternative income generating activities) in the most appropriate ways and at the right times to build better relationships with local people.

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6 CONCLUSIONS AND SIGNIFICANCE OF THE RESULTS

6.1 Overview

This chapter serves as a conclusion to the dissertation. As such, it presents:

- a discussion of the relationship of the manuscript chapters to each other and to the field of study;
- the anticipated and actual outcomes of the research;
- the strengths and weaknesses of the dissertation research;
- new ideas related to the field of study;
- a discussion of the overall significance of the dissertation research to the field of study; and
- a discussion of any potential applications of the research findings.

6.1.1 The Relationship of the Manuscript Chapters to Each Other and to the Field of Study

This study asked: can national parks effectively protect ecological integrity and concurrently address social equity? For conservation to be effective and sustainable in national parks, they must be managed to do both of these well. Three of the parks in this study (Kluane, Pacific Rim, and Kruger) are effective at addressing both ecological and equity issues as they achieved 'satisfactory' ratings for both ecological integrity and equity (Chapter 5). Kluane National Park Reserve was the most balanced park in terms of ecological integrity and equity with virtually the same scores for these two factors.

The evaluation of ecological integrity (Chapter 3) produced one particularly valuable insight to parks planning and management. When the case study parks were analysed using only 'data indicators' (in which the concept of ecological integrity was assessed using the *State of the Park Report* (SoPR), status and trend assessment, effectiveness evaluations, or expert opinion), all six were considered effective at fulfilling this study's criteria for ecological integrity. However, the effectiveness ratings of all parks decreased when all indicators (both 'data' and 'dataless') were included in the analysis. This finding suggests that the parks had generally identified a greater number of priority indicators than they were actually able to

address (for whatever reason, including lack of budget or trained staff, managerial challenges) and monitoring data was not being collected on all of the indicators associated with these concerns. Given the indicators evaluated in this study, it is also important to question whether these are actually the managers' highest priorities. It seems that there are at least three types of indicators park managers can monitor:

- those that are the easiest to monitor but are not necessarily the most informative ecologically;
- those that are the most important to understanding park ecological integrity; and
- those that are monitored more because of the intended audience than for their ecological value as indicators (such as 'charismatic megafauna').

It is also acknowledged that not all of the ecological concerns identified by the case study parks can be managed directly. While some of the stressors and threats (e.g., climate change) facing the case studies are beyond local control, there could be ways to address the impacts. In this study, Kruger is the only park which focuses on the biodiversity impacts of atmospheric change. In all cases, without sound data on indicator trends, the effectiveness of any management actions will remain uncertain. Evaluating the full effectiveness of management requires moving beyond the collection of data on trends in specific indicators, to an understanding of the cause-effect relationships between the management actions and the indicator. In some cases, this can only be determined through a controlled experiment involving specific ecosystem manipulations. Such studies may be beyond the resources of some parks or contrary to the objectives of sustained protection or suspension of anthropogenic introductions whenever possible within a national park.

Not all of the parks considered effective at protecting ecological integrity were simultaneously effective at addressing social equity (Chapter 5). The evaluation of equity (Chapter 4) produced several important results. First, in terms of land ownership and tenure, five of the six national parks and national park reserves in this study did not originate through negotiations with neighbouring Indigenous groups. Gwaii Haanas is unique in having done so. This lack of negotiation, along with dissatisfactory compensation for park establishment, relocation compensation, and negotiated relocation (whether due to park establishment or

other political drivers) meant the parks in this study generally received 'dissatisfactory' scores on the *land tenure and ownership* criterion. While relocation from the park lands in this study may not have been related to conservation efforts per se (being mandated instead by, for example, Apartheid policies), these long standing issues must be adequately addressed by the national park managers as they belong to parastatal agencies managed (generally) by national governments. As long as park land is contested space that continues to affect the lives and livelihoods of Indigenous groups and suitable resolutions have yet to be reached, the parks cannot be considered equitable.

In terms of livelihood opportunities, four of the parks were considered to provide a 'satisfactory' level of access for hunting, fishing, or timber cutting and plant collection. The Canadian parks were considered to provide enough employment and received scores of 'satisfactory' and 'very satisfactory' for this indicator, while the South African parks were considered to provide a 'dissatisfactory' amount of employment. Finally, issues of governance were well addressed by the selected case study parks. Kruger, Gwaii Haanas and Pacific Rim were considered to be 'satisfactory' in terms of Indigenous people occupying upper-level management positions while the other three parks were considered 'dissatisfactory'. And five of the parks were considered 'very satisfactory' overall on their commitment to the participation of Indigenous people in decision-making on a fair and equitable basis. While most of the co-management boards in this study were restricted in their authority over decision-making, the Archipelago Management Board (AMB) at Gwaii Haanas had full decision-making authority over all aspects of the park.

An increased emphasis on the involvement of Indigenous people by park agencies and international organizations has resulted in the pursuit of co-management, the substantial sharing of (protected-area) management responsibilities and authority between local- and state-level systems (Berkes 1994; Brechin et al. 2001). Despite, or perhaps because of, these developments, there is still significant controversy over the appropriate role for Indigenous people in parks management and conservation strategies. Some argue that local human needs are co-opting the integrity of parks (Sanderson and Redford 2003; Terborgh 2004), while others see human issues as inalienable from discussions on parks (Brosius 2004). In Canada,

indications are that all future national parks in Canada will be negotiated via some form of co-management agreement given Parks Canada's policy shift towards these initiatives (Weitzner and Manseau 2001). However, co-management continues to be pursued despite evidence that these initiatives are functional, and given a dearth of data on best management practices surrounding co-management (Budke 1999). The results of this study demonstrate that it is possible to be effective at addressing both ecological and equity issues.

Finally, establishing parks and protected areas only makes sense if there is a good chance of maintaining and protecting at least the majority of their ecological and cultural features in perpetuity. Unfortunately, the establishment of a park or protected area does not necessarily guarantee these features will be protected. There is growing concern about the effectiveness of many parks in conserving biodiversity, and their long-term sustainability is increasingly being questioned (Bruner et al. 2001). One way by which the management of national parks can be improved is through the evaluation of the ecological status of parks and the effectiveness of management actions (Dudley et al. 1999; Salafsky et al. 2002; Parrish et al. 2003; Hockings et al. 2004; Hockings et al. 2006). There have been concerns that many evaluations tend to be anecdotal and not empirical, and few have been comprehensive enough to assess effects on biological resources, on ecosystem function, and on social welfare and equity (Saterson et al 2004). This research has demonstrated that it is possible to empirically test how effective national parks (and protected areas) are at concurrently addressing both ecological and equity issues.

6.1.2 Anticipated and Actual Outcomes of the Research

Three of the case study parks received 'satisfactory' scores for both the ecological and equity evaluations, demonstrating that national parks can be simultaneously effective at addressing both these realms.

From the evaluation of ecological integrity, I anticipated two results. First, I tentatively expected that national parks with comprehensive management plans and explicit management objectives would have more robust monitoring programs, better data sets, and thus would be the most ecologically effective overall. Logically, it seems that even the unsystematic collection of ecological data could enable park managers to identify desired

ecological goals and outcomes, leading to the design of coordinated monitoring programs and the collection of more field data of use in an ecological evaluation. This was not necessarily the case in the parks included in this study. Waterton Lakes, Kluane, and Kruger had comprehensive management plans with explicit management objectives and readily available data sets for the analyses required in this study. Kluane and Kruger were ecologically effective overall, yet Waterton Lakes was one of the most ecologically ineffective parks overall when all indicators were analysed. This was largely explained by the fact that eight of the park's 17 indicators were either addressed in a very dissatisfactory manner or were 'in progress'. Comparatively, the management plan for Gwaii Haanas did not have explicit management objectives, yet the park managers had completed a SOPR; this park also had readily available data sets, and was more ecologically effective than Waterton Lakes.

I also anticipated that parks would have higher effectiveness scores for the finer scale, species-specific indicators in the *Biological Diversity* criterion than for the indicators in the larger-scale *Ecosystem Processes* criterion. The logic of this assumption was that processes such as water quantity and fire cycles would be more difficult to monitor and manage than individual species. Three parks (Waterton Lakes, Kruger, Kgalagadi) met this expectation and had higher 'data indicator' scores for the *Biological Diversity* than the *Ecosystem Processes* criterion. However, this was not the case for Kluane, Gwaii Haanas, and Pacific Rim. In general, these three parks had high numerical scores for the (mostly water quality) 'data indicators' in the *Ecosystem Processes* criterion, yet each park had a 'very dissatisfactory' rating for at least one 'data indicator' in the *Biological Diversity* criterion, reducing each park's overall criterion score.

When first approaching the evaluation of equity, I anticipated three outcomes. First, I assumed that the settlement of a land claim would be the most important criterion in determining how equitable a park was in large part because the relationship between extant parks and unresolved land claims has been widely controversial in the parks and people literature. Thus, if a land claim had been settled, I anticipated that the park would perform very well on all other aspects, including access to resources and livelihood opportunities,

employment, and active roles in governance and decision-making. This hypothesis was not supported by the results. Gwaii Haanas was the most equitable park in the study, yet the Haida Nation was one of only two Indigenous groups in the study that had not settled a land claim. While the Maa-nulth land claim encompassing Pacific Rim and including several of the region's First Nations had not been formally settled at the time of research (the Final Agreement was accepted by the relevant First Nations in October 2007), this park also performed well on all other criteria and indicators and was evaluated as equitable in these findings. Comparatively, the Kainai and Piikani First Nations near Waterton Lakes had settled a numbered treaty in the late 1800s; yet the park received a 'very dissatisfactory' score for this criterion. This might be partially explained by the fact that many of the treaties of this [colonial-settler] era were largely imposed or coercively negotiated. Similarly, the Makuleke, and the Mier and Khomani San had settled their land claims near the Kruger and Kgalagadi, respectively; however both parks received 'dissatisfactory' scores on this criterion. Despite the lower scores for the land claims criteria, perhaps the fact the these land claims were relatively recent (1998 and 2002) in parks that had been established for generations resulted in 'satisfactory' and 'very satisfactory' scores for the other criteria for these parks (Chapter 3). Only Kluane performed in the way I had anticipated; the KFN and CA-FN deemed their land claim to be very satisfactory and the park also received 'satisfactory' scores on the *maintenance of livelihood opportunities* and *participation in governance* criteria.

Finally, I anticipated finding that parks with co-management typified by more support from neighbouring Indigenous groups would be more equitable than parks with lower levels of co-management. The results supported this hypothesis. Waterton Lakes was the only park without some formal co-management structure (such as a co-management board or a contract park), and had very little opportunity for neighbouring First Nations to access resources in the park or to influence park governance. Its overall equity score was 'dissatisfactory'. The other five case study parks either had co-management boards, co-management arrangements, contract parks or park forums as mechanisms for communicating with local Indigenous groups and for these groups to have some influence on park governance.

I also anticipated finding that some parks were co-managed in name only. By this I mean that while a co-management board may have existed, delegated decision-making to the board only occurred on a partial basis. This hypothesis was only supported by the results for three of the case study parks. The co-management boards between the neighbouring Indigenous groups at each of Kluane, Kruger and the Kgalagadi were all restricted in the kinds of decisions they could make. In particular, none of these boards made decisions about conservation actions within the park. The Kgalagadi co-management board was generally restricted to making decisions about infrastructure (e.g., roads, tourist lodges, new park gate and gate fees) in the park, while the Kruger co-management board made decisions about similar issues and also could determine who could hunt and collect resources, maintenance of the western boundary fence, how concessions for game drives are made and which roads are used for game drives. Only the AMB at Gwaii Haanas made decisions about all aspects of the park, including on issues of science and specific conservation management actions.

It is important to note here that Waterton Lakes appears to be an outlier when considering the results of its ecological and equity evaluations in relation to the other case studies. While it is difficult to use the results of this study to say with absolute certainty why this park may have performed poorly on the ecological evaluation, it is possible to surmise why this may have been the case. This park protects a portion of the Crown of the Continent ecosystem in the Rocky Mountains of southwestern Alberta, Canada, which provides important habitat for a large number of terrestrial species, including carnivores and ungulates. Yet this park is challenged by its extremely small size (525 kms2). While Waterton Lakes may have performed poorly on its ecological indicators for the 2007 SOPR, it does border the much larger Glacier National Park in Montana, USA, and is also part of the extensive 'Yellowstone to Yukon' initiative which protects habitat along the mountain ranges between these to regions. This unfenced park, located in this ecologically rich region, could provide critical habitat for species that are not full-time residents in the park, but which rely on the park's resources as they migrate along the Rocky Mountains. The results of the equity evaluation also demonstrate where issues of equity could be better addressed by Waterton Lakes' park managers. The park performed poorly on all indicators in the *Resolution of Land Tenure and Ownership* criterion. The 'land surrender' treaty with the region's Indigenous people was

settled in 1870. These treaties were interpreted narrowly and included provisions such as ammunition, guns for the Chiefs, teachers, cash payments, and livestock. The results for this criterion show that there is a lasting legacy of resentment and dissatisfaction with the treaty to date. In the *Maintenance of Livelihood Opportunities* criterion, Waterton Lakes received 'dissatisfactory' scores because the neighbouring Indigenous groups were required to pay regular access fees into the park unless it was for a cultural purpose (unlike the rest of the case study parks where entrance fees were not required), and received a 'very dissatisfactory' score because the access rights for the Kainai and Piikani First Nations were not negotiated but were decided upon by Parks Canada.

6.1.3 Strengths and Weaknesses of the Dissertation Research

A particular strength of this research is that it directly addressed concerns that many evaluations have been anecdotal and not empirical, and that few have assessed effects on biological resources, on ecosystem function, and on social welfare and equity (Saterson et al 2004). This research has demonstrated that it is possible to empirically test how effectively national parks (and protected areas) are concurrently addressing both ecological and equity issues. It has done so using a systematic analysis that is tractable, replicable, and using (some) sub-optimal data sets. Throughout the research, I ensured that results were determined as objectively as possible. For instance, ecological monitoring data obtained from two parks (Kluane and Gwaii Haanas) were originally used to complete status and trend assessments for those parks, and these results were compared to the park's SoPR results obtained at a later date. The results for both analyses were the same, confirming that I was calculating status and trend correctly, so for the parks where a SoPR was not completed, I knew I was accurately performing the calculations. Likewise, for the equity evaluations, respondents were given a copy of the rating scale to aid their responses, however they were not required to provide their answers using the scale (Chapter 4). This assisted me in reducing the subjectivity associated with the assignation of ratings. The value of this research was partially reflected in the ease with which I was given research permission from both park's agencies and Indigenous co-managers alike.

As with any study, there are limitations to this research and a number of ways that I could potentially have influenced the results. First, it was my discretion under which criterion

several of the indicators were categorised. I could have had a moderate influence over the final scores depending on the criterion to which I attributed these indicators. For example, in the evaluation of equity I elected to categorise the indicator 'extent of satisfaction with co-management agreement/contract park agreement' in the 'land claims' criterion rather than under the 'governance' criterion because these agreements were directly linked to the settlement of formal land claims. If this indicator had been placed under the 'governance' criterion, the park's overall equity score and those for the individual criteria would have changed. Likewise, in the evaluation of ecological integrity, I located the 'climate change' indicator in the *Stressors and Threats* criterion because it is a threat to both biological diversity and ecosystem processes in many parks. However, it could be argued that climate is an important ecosystem process, and given this, the indicator could have been located in the *Ecosystem Processes* criterion. If these or other indicators had been assigned to different criteria, the scores for overall park effectiveness and those for the individual criteria would have changed.

Second, the rating scale amended for this research seems logical and is reasonably straightforward to use (Salafsky and Wollenberg 2000). However, there is always a risk associated with the use of interview and expert opinion data given the different perceptions and experiences of the respondents, and several methodological issues may need to be addressed. My attribution of scores to individual indicators, based upon the qualitative data, was often deductive and depended upon the nature of the topic at hand. Thus, there is a risk of a circular argument in looking for patterns in my data set as observed patterns may be a result of biases in the rankings (Salafsky and Wollenberg 2000). To overcome this, I followed a logical approach which was applied consistently across each park. For the parks where expert opinion was used in the ecological evaluation, overall effectiveness scores could have been higher than those found in this study because respondents were asked to err on the side of caution when providing their opinion on status and trend designations. For the evaluations of equity involving semi-structured interview data, what one respondent deemed 'satisfactory' may have been deemed 'dissatisfactory' by another. While interview respondents often indicated their direct level of satisfaction (e.g., 75% satisfied) or gave a clear answer to which a score could easily be assigned, often times I had to attribute a score

based upon my assessment of their response. Furthermore, several indicators (particularly in the 'land claims' criterion) were based on documented fact rather than personal experience by the respondents. For instance, the indicator dealing with the extent to which local Indigenous people were dispossessed of land or relocated by Park was based on documented history or oral history, but did not solicit the respondent's *satisfaction* with that process. In order to deal with these cases, I examined responses to the same indicator across all the parks and scored each park according to what would have been an ideal situation.

Third, I assumed that each criterion was equally important and attributed an equal weight to each. While this is logical for a first effort, it might also be defensible to find that certain criteria do in fact trump others or are so consequential for equity or ecological integrity that they should be given greater overall weight. Thus, further research into the relative importance of each of these and other criteria to the ecological integrity and equity of national parks could inform this weighting. Similarly, I completed the evaluations as though each indicator was equally important within a given criterion. It is possible that certain indicators in some parks may be given a higher priority than others. One of the biologists at Kruger had indicated that some of their indicators could be considered a higher priority than others (Stefanie Freitag-Ronaldson, Conservation Biologist, 8 August 2007, pers. comm.)

Fourth, I had some influence over the selection of interview respondents or, more accurately, was confined to those I was able to contact and engage in an interview. This is partially the nature of qualitative research where sampling is driven by many factors and purely random or perfectly representative samples are often pragmatically impossible. Ideally, I would have liked to interview not one but all of the representatives from the ǂKhomani San co-management board. Yet my inability to contact the other three representatives despite repeated attempts simply made this impossible (it is common for phone lines to be inoperative (apparently due to the theft of copper cables) in this part of South Africa). Likewise, I interviewed three of the seven park forum chairmen from Kruger. Had a more robust sample been achieved, this could have affected the results.

The use of management plans as a central data source for this study is also worth noting. On the one hand, the need for secondary data sources that were common across parks was crucial to my ability to conduct this study. Thus, all the national parks included in this study necessarily had management plans, and had identified issues of concern that they were attempting to manage. In so doing, I eliminated from the study those parks that did not or could not actively manage their areas for key ecological and social objectives. However, information was not being collected on all of the indicators associated with these concerns. Some of the concerns were also well beyond local control (e.g., climate change), although there could be ways to manage some of the current and potential impacts. Moreover, assessing the full effectiveness of any management action requires moving beyond the collection of data on trends in specific indicators, as it requires an understanding of the cause-effect relationships between the management actions and the indicator. In some cases, this can only be determined through controlled experiments, often involving ecosystem manipulations.

Moreover, park managers themselves are always facing difficult tradeoffs between that which is optimal and that which is doable as well as pressure for political reasons to attend to some measures over and above others. It thus seems appropriate to question whether the indicators identified in this study are the highest priority or 'quality' indicators for each park as there are at least three logics for choosing indicators that park managers can monitor:

- those that are the easiest to monitor but are not necessarily the most informative ecologically;
- those that are the most important to knowledge of ecological integrity; and
- those indicators that might be glossed as 'politically astute' indicators to monitor (such as 'charismatic megafauna').

Finally, the case study parks all varied in size, primary ecosystem type, co-management strategy, and type and degree of threats. While I believe this adds depth and breadth to the results found and conclusion made, it is possible that these (necessarily few) case study parks were all anomalous and do not accurately portray how effectively national parks protect ecological integrity or address equity issues.

6.1.4 New Ideas Related to the Field of Study

While there are efforts to integrate the ecological and social realms in national parks in general, and in the case study parks in particular, further integration of these two is possible. This will require processes that integrate horizontally (the cooperation of disciplines), and vertically (the cooperation of policymakers, practitioners and the public) (Klein 2004; Lele and Norgaard 2005). A logical starting point would be to build upon those existing integrative processes already institutionalised in the parks: the co-management and integrated conservation and development efforts.

When given full authority over decision-making and park governance, co-management boards are one of the most obvious ways to integrate ecological concerns and social equity needs. As cited earlier in this dissertation, co-management is ideally the sharing of management responsibilities and authority between local- and state-level systems (Berkes 1994; Brechin et al. 2001). Co-management boards should go beyond the manager/scientist and local/Indigenous dichotomies to provide a venue for discussion and debate on both ecological and social issues. The space for dialogue and learning created by a co-management board could enable the Indigenous co-managers to better understand the science of ecology, while sharing their traditional ecological knowledge. Further efforts could be aided by the inclusion of a social scientist (ideally one with a background or understanding of the natural sciences) on the board. A social scientist would bring a different perspective about the complexity of national parks, and in particular could examine "the conservation-induced displacement of communities and the resultant impoverishment of cultures and livelihoods" (Rangarajan and Shahabuddin 2006: 360). This is imperative given that many long-standing, land-based cultures have created "ecologies of co-existence" and that evictions carried out in Nature's name are often also in surprising ignorance of Nature's processes (Brockington and Igoe 2006).

Integrated conservation and development projects (ICDPs) and community-based natural resource management (CBNRM) efforts are both integrating disciplines, balancing rural development with conservation biology and natural resource management, respectively (King et al. 2007). Several of the parks in this study have attempted to address livelihood issues

through ICDPs, such as allowing access to the park for the collection of thatch grass (Kruger), ceremonial hunting of Gemsbok (*Oryx gazella*) (for the ǂKhomani San in the Kgalagadi), and gathering of plants for traditional food, medicinal or ceremonial purposes (Gwaii Haanas and Kluane). Kruger is also assisting one of the park forums to establish a traditional plant nursery to meet the demand for medicinal plants by traditional healers. Likewise, local communities are benefiting from lodges in the Makuleke region of Kruger and in the Kgalagadi, but there is still potential for growth and improvement (King et al. 2007). Continued efforts on this front could lead to the successful integration of ecological and social realms.

6.1.5 Overall Significance of the Dissertation Research to the Field of Study

There are two main reasons why this research is timely and relevant to national parks management, both within Canada and in an international context. First, this research identified a set of indicators for evaluating equity in protected areas (Chapter 4). This list could contribute to a standardised list of indicators for further examinations of equity in other natural resources management regimes (such as fisheries, community forestry, etc).

Most importantly, this study provides strong evidence that park managers can effectively address both the social and ecological realms simultaneously. Chapter 5 provides more detail on how several case study parks specifically address livelihood and poverty issues, whilst also managing for ecological integrity. In the past, in all but the most strictly community-controlled protected areas, Indigenous people had very little control over decision-making, and the relationship of park agencies with local and Indigenous communities was generally paternalistic and unidirectional (Stankey 1989). More recently, the co-management of parks has become increasingly common; productive and effective working relationships between governments, park personnel and Indigenous and local people are needed to ensure that local livelihood needs are met and critical biodiversity and ecosystem processes are maintained (see Chapter 5). The need for genuine involvement of Indigenous and other local people in the governance of parks is evident when considering that many national parks face a diversity of threats, including inadequate management of resources, human encroachment, the collection of non-timber forest products, logging (mainly illegal), illegal harvesting

(poaching), and adjacent land development (Hockings 2003; Lacerda 2004). It was noted that "this is an extremely valuable area to study because nothing has monitored the effectiveness of co-management…especially as it relates to ecological values" (Chris Hamilton, BC Parks, personal communication, 7 April 2004). While it is acknowledged that success for nature does not necessarily mean success for people and vice versa (Brockington et al, 2006), this study's comparative case study approach has demonstrated that it is possible to effectively address both the ecological and social realms.

6.1.6 Potential Applications of the Research Findings

By publishing the methods and results of this study in peer-reviewed journals, managers at parks and protected areas around the world will be able to incorporate the relevant aspects of this study into their park's planning and management context. Copies of the dissertation will also be sent to the park co-management boards of each of the study parks in order to share the key attributes gleaned from each cases study's ecological and equity evaluations. Most notably, this research provides national park managers with an evaluation of their park's progress on ecological integrity and equity criteria.

For the Canadian parks in this study, the greater contribution will be the equity results, however Parks Canada will benefit from the comparative analysis in this research by being exposed to Kruger National Park's highly regarded *Thresholds of Potential Concern* (TPC) approach. In fact, one of the ecologists at Gwaii Haanas has requested more information from me about Kruger's invasive alien species TPC program. For the South African parks, I expect that managers will benefit from both the ecological and equity results as they will be able to examine how planning and management takes place in their park, and be better able to determine what factors contribute to, or detract from, the level of effectiveness they achieved. All the national parks included in this study had management plans with identified issues of concern they were attempting to manage. However, not all parks were collecting monitoring data on all of the indicators associated with these concerns. This study explicitly lists the ecological indicators that park managers are concerned about. 'Dataless indicators' were weighted less than 'data indicators' (see Chapter 3) and thus tended to reduce the overall scores of the other parks. The Kgalagadi in particular had a large number of indicators identified in its management plan for which the park did not have monitoring data. Managers

at Kruger, Waterton Lakes, and Kluane have developed strong ecological monitoring programs. The management plans for Waterton Lakes and Kluane both consist of well-defined ecological monitoring programs specifying indicators, targets, status and actions for the park's key ecological integrity features. Kruger in particular is unique in this study as it has developed, among others, TPCs for fire, invasive alien biota, landscape heterogeneity, and river flow and quality.

Not all of the ecological concerns identified by the case study parks can be managed directly. While some of the stressors and threats (e.g., climate change) facing the case studies are beyond local control, there could be ways to manage the impacts. In this study, Kruger is the only park which focuses on the biodiversity impacts of atmospheric change. Kruger has an objectives hierarchy in which four highest-level objectives address the park's mission, and within the *Biodiversity and Ecosystem Objectives*, atmospheric effects such as climate and rainfall and their influences on biodiversity are accounted for (SANParks 2006). In all cases, without sound data on indicator trends, the effectiveness of any management actions will remain uncertain. However, evaluating the full effectiveness of management requires moving beyond the collection of data on trends in specific indicators, to an understanding of the cause-effect relationships between the management actions and the indicator. In some cases, this can only be determined through a controlled experiment involving specific ecosystem manipulations. Such studies may be beyond the resources of some parks or contrary to the objectives of sustained protection or suspension of anthropogenic introductions whenever possible within a national park.

The Indigenous co-managers at all of the parks will be exposed to the level of co-management and access to natural resources in other parks; hopefully this will help them to seek more equitable relationship with their respective parks. SANParks could benefit from the comparative approach of this research by being exposed to the equity results of national parks that have more extensive experience with Indigenous co-management and access to natural resources for Indigenous communities, such as those in Canada. The use of *issue forms*, used by managers at Gwaii Haanas, is highly recommended to the managers and co-management boards at the other case study parks. The *issue forms* are essentially a "shortcut

key to help [the AMB] make decisions" (Captain Gold, AMB member, Gwaii Haanas National Park Reserve, 19 July 2006, Pers. Comm). Managers and scientists use the *issue forms* to present the scientific background and their professional recommendations to the AMB, enabling the AMB co-managers in their decision-making authority over all aspects of the park. The forms contain a background section, proposed actions, changes, approvals or further action requested by the AMB. All *issue forms* are given a tracking number and date of when they are tabled to the AMB, and a date when they are reviewed to enable the AMB and park managers to revisit and understand how decisions were made.

The Kruger and Kgalagadi park forum is another positive example of involving Indigenous peoples in managing protected areas that has to some extent been replicated in a few of the Canadian parks. While these structures are not direct decision-making bodies, they do enable local people to voice their concerns which are then filtered back into park policy. Forums contain an executive committee consisting of the field ranger for that region, a local chairperson for the forum, a secretary, a SANParks representative, and a SANParks social ecologist. In the Kruger, all communities within 20 kilometres of the western border are involved in the park forums, resulting in a staggering 187 villages involved in the forums.

The methodology developed in this study could be applied to national parks elsewhere. The list of 39 equity indicators was developed both deductively from the literature and inductively from the data, and was held constant across the case study parks. While the experience of Indigenous and local communities with national parks may vary around the world, many of these equity indicators would likely apply. For instance, in Uganda's Bwindi Impenetrable National Park, the park's non-Indigenous neighbours (mostly subsistence farmers) would likely provide favourable reviews on indicators of access to park resources, employment, and alternative income generating activities as the park has addressed many of the livelihood needs of these people. However, the Indigenous Batwa Pygmy population cannot be said to have benefited in the same way, as they have little or no tenure over their land and were forcibly displaced when the park was gazetted. Neither of these groups would likely provide high scores on the *Participation in Park Governance* criterion as this is not a co-managed park. Comparatively, substantial numbers of Viet Nam's Viet Kinh majority

occupy land within many of the countries national parks (such as Cat Ba and Cuc Phuong). These rural villagers have tenure over their land, continue to access the park's forests for both floral and faunal resources, yet have no participation in governance. Again, many of the equity indicators developed in this study would apply to their context as well.

Finally, by looking across the case studies at differences in the indicator scores, it seems appropriate to conclude this dissertation with some concrete recommendations for the case study park managers to consider in their efforts to address ecological integrity and social equity.

- Establishment=five of the six case study parks were considered 'very dissatisfactory' in their establishment as they were not a negotiated establishment with prior and informed consent and little or no compensation had been offered. Managers and national governments should consider appropriate types of compensation to ease the hardship created by the non-negotiated establishment of these parks.

- Legacy of forced displacement=existed in four of the six case study parks and resulted in lower scores on these indicators. Park managers should redress the legacy of forced displacement and provide appropriate compensation to those whose land was confiscated or livelihoods were affected.

- Access fees= required by two of the six case study parks; one of these parks (Kgalagadi) required Indigenous co-managers of the park to pay access fees for the land they co-manage. Park managers should reconsider the use of access fees and explicitly encourage local visitation. This is imperative in order to build more open and trusting relationships with Indigenous and local neighbours, and is particularly crucial in South Africa where the contract parks are established for 99 years, with an initial establishment of only 25-30 years after which the Indigenous communities can remove the land from conservation protection if they feel like their needs have not been met.

- Employment=satisfactory in Canadian parks but less so in the South African case study parks. Employment and alternative income generating activities are critical, particularly in South Africa.

- Damage-causing animals (DCAs) + compensation=a very important and timely issue in South African parks, less so in the Canadian parks. SANParks refuses to offer compensation for neighbours whose crops or livelihoods are damaged/destroyed by DCAs (e.g., elephants, lions, buffalo, etc.) that escape from the park. Compensation for damages caused by DCAs is critical in South Africa.

- Genuine devolution of decision-making authority=occurred only in one park (Gwaii Haanas); four parks are partially co-managed with only a partial devolution of decision-making authority to the co-management boards and in relation to the written final agreements

- Monitoring (action) may be more important than planning for conservation=while it is important to have a management plan, it appears that robust data sets and a well-defined monitoring program can exist without the existence of an explicit management plan (for example. Gwaii Haanas has a management plan with broad objectives, but has collected data and produced its own SOPR for 2008).

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7 Appendix I-Ecological Data Sheets

Data spreadsheets presenting the numerical values and calculations of overall ecological integrity using ‘data indicators’ and all (‘data’ and ‘dataless’) indicators for each case study. The numerical scores and hatching follows the colour system described in Table 3.6 and the legend below.

Legend	
Indicator Type	**Rating**
Data	**Green**
	Yellow
	Red
Dataless	**In progress**
	No data

	NATIONAL PARK					
	Waterton	Kluane	Gwaii Haanas	Pacific Rim	Kruger	Kgalagadi
CRITERIA						
BIOLOGICAL DIVERSITY	Songbird Diversity Overall=11 ___	Mice and Voles =12	Steller Sea Lion Haulouts =12	Black Oystercatcher =10	African Wild Dog (number of packs) =12	Kori Bustard =12
	Bolander's Quillwort =11	Bearberry =12	Black Oystercatcher =11	Seaside Centipede Lichen =5	African Wild Dog (pack size) =12	Ostrich =12
	Trumpeter Swan =9	Mountain Goats =11	Peale's Peregrine Falcon =11	Pink Sand Verbena =5	African Lion 33% Popl'n deviation =9	Gemsbok =12
	Ungulate Monitoring =9	Snowshoe Hare =11	Colony-nesting Seabirds =11	Northern Abalone =1	African Lion 16% Popl'n deviation =9	Eland =11
	Bull Trout =9	Red Squirrel =11	Spawning Salmon =7	Steller Sea Lions	Black Rhinoceros	Red Hartebeest =11
	Amphibians =7	Mushrooms =11	Marbled Murrelet-Population =5	Marbled Murrelet	*Adenium swazicum*	Blue Wildebeest =10
	Sharp-tailed Grouse =6	Grizzly Bear =6	Spawning Pacific Herring =3	Forest Biodiversity Plots	*Siphonichilus aethiopicus*	Secretary Bird =10
	Grizzly Bear Monitoring	Arcitc Ground Squirrel =6	Rare Vascular Plants =2	Rockfish spp.	Fish Assemblages TPC	Springbok =10
		Birds =6	Western Toad	Eelgrass Beds		Steenbok =10
		Dall's Sheep =6	Great Blue Heron	Forest Songbirds		Martial Eagle =7
		Moose =6				African Lion =6
		Kokanee Salmon =2				Cheetah
						African Wild Cat
						Spotted Hyena
						Leopard
						Brown Hyena
No. indicators identified	8	12	10	10	8	16
No. data indicators	7	12	8	4	4	11
No.indicators in progress	1	0	2	6	4	2
No.indicators no data	0	0	0	0	0	3
Total score for data indicators	62	100	62	21	42	111
Total potential score for data indicators	84	144	96	48	48	132
Total potential score for all (data and dataless) indicators	96	144	120	120	96	192
Total score/ Total potential score for data indicators (EI score for data indicators only)	0.74	0.69	0.65	0.44	0.88	0.84
Weight of all indicators	0.94	1	0.9	0.70	0.75	0.75
Weighted evaluation	58.28	100	55.8	14.70	31.5	83.25
Weighted evaluation/Total potential score for all indicators (EI score for all indicators)	0.61	0.69	0.47	0.12	0.33	0.43

ECOSYSTEM PROCESSES	Water Quantity =10	Kathleen Lake Aquatic System =11	Coastal Health Assessment Program =11	Water Quality-Sewage Lagoon =12	Fire Intensity-TPC 1a-Intensity Classes =2	Fire Cycles
	Long-term Average Fire Cycles =2	Sockeye Creek =11	Water Quality =9	Water Quality-Esowista = 12	Fire Intensity-TPC 1b-Long Term Dominance =6	
	Disturbance Type	Dezadeash River-water quality =11	Coastal Erosion =6	Water Quality-Landfill Creek =12	Fire Intensity-TPC 1c-Short Term Dominance =6	
	Hydrology/Water Quantity	Primary Productivity	Forest Productivity	Water Quality-Golf Course =10	Fire Pattern-TPCs 2-Spatial heterogeneity =6	
				Water Quality-Airport = 10	IFR-Mhinga-Luvuvhu River =9	
					IFR-Olifants River =5	
					IFR-Letaba River =5	
					IFR-Sabie River =2	
					IFR-Crocodile River =2	
					Water Quality-Crocodile River =9	
					Water Quality-Olifants River =9	
					Water Quality-Letaba River =9	
					Water Quality-Shingwedzi River =9	
					Water Quality-Luvuvhu River =9	
					Water Quality--Sabie River =5	
					Heterogeneity/ Homogenization	
No. indicators identified	4	4	4	5	16	1
No. data indicators	2	3	3	5	15	0
No.indicators in progress	2	1	1	0	1	1
No.indicators no data	0	0	0	0	0	0
Total score for data indicators	12	33	26	56	93	0
Total potential score for data indicators	24	36	36	60	180	0
Total potential score for all (data and dataless) indicators	48	48	48	60	192	12
Total score/ Total potential score for data indicators (EI score for data indicators only)	0.5	0.92	0.72	0.93	0.52	0
Weight of all indicators	0.75	0.875	0.88	1	0.97	0.5
Weighted evaluation	9	28.875	22.88	56	90.21	0
Weighted evaluation/Total potential score for all indicators (EI score for all indicators)	0.19	0.60	0.48	0.93	0.47	0

THREATS & STRESSORS	Wildlife Mortality =11	Recreational Use =12	Deer Culls =12	Scotch Broom-LB =12	*Bryophyllum delagoense* =12	*Rhigozum trichotomum* - =11
	Non-Native Vegetation =2	Climate Change =6	Raccoons on Seabird Islands (+culls) =11	English Ivy-WCT =8	*Opuntia stricta* =12	*Argemone ochroleuca* =8
	White-Pine Blister Rust =2	Spruce Bark Beetle =3	Rat Culls =11	American Dunegrass-LB =8	*Harrisia martini* =12	*Prosopis glandulosa*
	Road Development		Post-Establishment Footprint =11	Varnish Clam =6	*Parthenium hysterophorus* =12	*Schinus molle*
	Climate Change		Non-Native Amphibians =10	Japanese Oyster =6	*Pistia stratiotes* =12	*Salsola kali*
			Forest Insects and Disease =9	Northern Abalone poaching =1	*Salvinia molesta* =12	*Galinia africana*
			Non-Native Vegetation (shorelines) =7		*Australocylindropuntia cylindrical* =12	
			Non-native Vegetation (forests) =5		*Eichhornia crassipes* =12	
			Non-native Mammals = 2		*Thelechitonia trilobata* =12	
			Introduced Deer (non-forested) =1		*Opuntia imbricata* = 12	
			Introduced Deer (forests) =1		Anthrax =12	
			Extent of Alpine Zone		*Tarebia granifera* =8	
					Rabies =8	
					Arundo donax =8	
					Acacia decurrens =3	
					TB in lions	
No. indicators identified	5	3	12	6	16	6
No. data indicators	3	3	11	6	15	2
No.indicators in progress	2	0	1	0	1	4
No.indicators no data	0	0	0	0	0	0
Total score for data indicators	15	21	80	41	159	19
Total potential score for data indicators	36	36	132	72	180	24
Total potential score for all (data and dataless) indicators	60	36	144	72	192	72
Total score/ Total potential score for data indicators (EI score for data indicators only)	0.42	0.58	0.61	0.57	0.88	0.79
Weight of all indicators	0.8	1	0.96	1	0.96875	0.6666
Weighted evaluation	12	21	76.8	41	154.03125	12.6654
Weighted evaluation/Total potential score for all indicators (EI score for all indicators)	0.20	0.58	0.53	0.57	0.80	0.18

8 Appendix II- BREB Certificate of Approval

The University of British Columbia
Office of Research Services
Behavioural Research Ethics Board
Suite 102, 6190 Agronomy Road, Vancouver, B.C. V6T 1Z3

CERTIFICATE OF APPROVAL- MINIMAL RISK RENEWAL

PRINCIPAL INVESTIGATOR:	DEPARTMENT:	UBC BREB NUMBER:
John L. Innes	UBC/Forestry/Forest Resources Mgt	H05-80896

INSTITUTION(S) WHERE RESEARCH WILL BE CARRIED OUT:

Institution	Site
UBC	Point Grey Site

Other locations where the research will be conducted:
N/A

CO-INVESTIGATOR(S):
Joleen A. Timko

SPONSORING AGENCIES:
N/A

PROJECT TITLE:
Evaluating the Ecological and Socio-Cultural Effectiveness of National Parks

EXPIRY DATE OF THIS APPROVAL: March 7, 2008

APPROVAL DATE: March 7, 2007

The Annual Renewal for Study have been reviewed and the procedures were found to be acceptable on ethical grounds for research involving human subjects.

Approval is issued on behalf of the Behavioural Research Ethics Board and signed electronically by one of the following:

Dr. Peter Suedfeld, Chair
Dr. Jim Rupert, Associate Chair
Dr. Arminee Kazanjian, Associate Chair
Dr. M. Judith Lynam, Associate Chair

9 Appendix III- Interview Questions

Indigenous People's Participation in Park's Decision-Making

1. Could you explain what your role in the park's co-management board/advisory committee was?
2. How did your involvement in this position come about?
3. Does the co-management board/advisory committee have authority over decision-making in the park? What is the style of decision-making (consensus, etc)?
4. Were you satisfied with your involvement in the management board/advisory committee? Why or why not?
5. What did/do you like about your experience?
6. What did/do you dislike about your experience?
7. Do you believe the management board/advisory committee was an effective way to manage the park? Why or why not? Give examples.
8. If applicable, how would you have changed the structure or processes followed by the management board/advisory committee? What should have been done differently?

Indigenous People's Property and Access Rights

1. Could you explain who owns the land that the park is established on? (i.e.: state ownership; indigenous ownership via treaty with leaseback to State).
2. How did this type of ownership come about?
3. Has your family always been in this location? If not, how did your family come to be here? Was your family relocated from land that is currently within the national park? If relocated, begin with Question 4 below. If not relocated, proceed to next section.

If relocated:

4. Did your family have a choice to move outside the national park?
5. Did your family want to move outside of the national park? Why or why not?
6. Did your family receive some form of compensation for moving outside of the national park? Can you tell me about it?
7. Was your family satisfied with the type or compensation received from the national park? Why or why not?

8. What else would your family have wanted to receive from the national park?

Access, Livelihood Opportunities and Local Employment

1. Do you work in the park? If so, what type of work do you do?
2. Are there other people from this community who work in the park? If so, how many? What type of work do they do?
3. Does your family ever use land or access resources within the national park's boundaries? For what purposes? All year or only at certain times?
    a. Does the park know that your family uses land or accesses resources within the park? How does this work?
    b. Are these uses permitted by the national park? Why or why not?
        i. If not permitted, how does this work?
        ii. If permitted, do you need a permit to use these resources?
    c. How well does this arrangement meet your needs? What would you change?
    d. Can you access these same resources outside of the park? Why or why not?
4. If at all, in what way has your use of the land in this area changed over the last 5 years? 10 years? 20 years? Are these positive or negative changes?
    a. What types of resources did you used to use that you don't use anymore? Why has this changed?
    b. What types of resources do you now use that you didn't used to use? Why has this happened?
    c. How have these changes affected you?
5. What do you think about conservation in general?
6. Do you want to be involved in conservation planning and management? What types of opportunities are there for you to be involved in conservation planning and management in the park?
7. What is your level of satisfaction with these opportunities/park forum?

10 Appendix IV- Social Equity Data Sheets

Data spreadsheets presenting the social equity indicators and calculations of overall park equity for each case study. The hatching follows the colour system described in the legend below.

Legend		
Rating	**Colour**	**Effectiveness Description**
3	**Dark Green**	**Very Satisfactory**
2	**Light Green**	**Satisfactory**
1	**Yellow**	**Dissatisfactory**
0	**Red**	**Very Dissatisfactory**

	NATIONAL PARK					
	Waterton	**Kluane**	**Pacific Rim**	**Gwaii Haanas**	**Kruger**	**Kgalagadi**
CRITERIA & INDICATORS						
Land Tenure and Ownership						
Extent to which there is satisfaction with land claim	1	3	3	2	3	3
Extent to which local Indigenous people were not dispossessed of land or relocated by Park	1	0	3	3	0	0
Extent to which there was relocation or land dispossession compensation	0	0	3	3	1	1
Extent to which relocation was negotiated with local Aboriginal/ tribal people	1	0	3	3	0	0
Extent to which the Park's establishment was negotiated with local Indigenous people	0	0	0	3	0	0
Extent of satisfaction with co-m agreement/ contract park agreement	0	1	3	3	3	1
Extent to which there is an opportunity to review a co-m agreement	0	2	3	3	3	3
Total Score	**3**	**6**	**18**	**20**	**10**	**8**
Total Score Possible (7 indicators x 3)	**21**	**21**	**21**	**21**	**21**	**21**
Proportion of Total Score Possible	**0.14**	**0.29**	**0.86**	**0.95**	**0.48**	**0.38**
Access & Livelihoods						
Extent to which damage-causing animals (DCAs) are being addressed	3	3	3	3	1	1
Extent to which there is compensation for DCAs	3	3	3	3	1	1
Extent to which there is satisfaction with DCAs compensation	3	3	3	3	0	0
Extent to which local Indigenous people do not have to pay access fees for the park	1	3	3	3	2	0
Extent to which access rights are specified	2	3	3	3	3	3
Extent to which access has been negotiated	0	3	3	3	3	3
Extent to which access permits are not required by local Indignous people (incl. guides)	0	3	3	3	3	1
Extent to which there is access for hunting/fishing	1	3	3	3	3	1
Extent to which there is access for medicinal/food plants	1	3	3	3	2	3
Extent to which there is access for timber/trees	2	3	3	3	3	3
Extent to which there is access for cultural/ceremonial purposes	2	3	3	3	3	2
Extent to which there is satisfaction with access	1	3	3	3	0	1
Extent to which there are commercial access opportunities for local Indigenous people (e.g., Aboriginal tours and guiding, trophy hunting)	3	2	3	3	3	3
Extent to which the local Indigenous communities indicate support for conservation in general	3	3	3	3	3	3
Extent to which there is an ability for local Indigenous people to maintain their cultures and livelihoods	1	3	3	3	2	2
Extent to which there are enough local employment opportunities and local recruitment for Indigenous people in skilled (vs. unskilled) positions	2	2	2	3	1	1

Extent to which there are capacity building and training opporunities provided by the park	1	2	3	3	3	1
Extent to which local Indigenous people are employed at upper level management levels (vs. junior staff levels)	1	1	2	3	2	1
Extent to which the park has an employment policy for employing local Indigenous people	0	3	3	3	0	0
Extent to which the employees in the park are representative of the regional population	0	3	3	3	3	3
Extent to which employment opporunities are permanent (vs. seasonal/temporary)	2	0	2	3	3	3
Extent to which there is extra-project funding (provided by park) for local initiatives (e.g., SMEEs, BOTs)	0	0	3	3	3	2
Total Score	**32**	**55**	**63**	**66**	**47**	**38**
Total Score Possible (22 indicators x 3)	**66**	**66**	**66**	**66**	**66**	**66**
Proportion of Total Score Possible	**0.48**	**0.83**	**0.95**	**1**	**0.71**	**0.58**
Participation in Governance						
Extent to which the legal framework of the park clarifies opportunities for participation in decision-making and park governance	0	3	3	3	3	3
Extent to which the joint management board (JMB) or co-management board has genuine authority over decision-making	0	1	2	3	2	1
Extent to which the Board is representative of the region (Indigenous majority preferable)	0	3	3	3	3	3
Extent to which there are no or few conflicts between the co-management board members	0	2	3	3	3	3
Extent to which the co-management members are satisfied with their co-management experience	0	2	3	3	3	2
Extent to which the o-management board has the capacity to do the work they are tasked with	0	2	3	3	3	3
Extent to which decisions are reached by consensus (vs. majority rule)	0	3	3	3	3	3
Extent to which the o-management board is compensated for their work on the board (e.g., not necessarily pay but expenses for travel covered)	0	3	3	3	3	3
Extent to which there is a respectful relationship between the local Indigenous community and the park	2	2	3	3	2	3
Extent to which there are other opportunities for public involvement in decision-making (e.g., park forum, presentations, meetings, etc)	3	2	3	3	2	2
Total Score	**5**	**23**	**29**	**30**	**27**	**26**
Total Score Possible (10 indicators x 3)	**30**	**30**	**30**	**30**	**30**	**30**
Proportion of Total Score Possible	**0.17**	**0.77**	**0.97**	**1**	**0.90**	**0.87**