FINAL REPORT

Monitoring and evaluating the KNP/SANParks livestock damage compensation scheme against set objectives within a strategic adaptive management framework

Brandon P. Anthony
Environmental Sciences & Policy Department, Central European University,
Nádor utca 9, Budapest 1051, Hungary
T: +36(1)327-3021, +27 (0)71-065-6029, E: anthonyb@ceu.hu

FOREWORD

This report was prepared on behalf of South African National Parks (SANParks), Kruger National Park (KNP) and its surrounding communities, and forms part of an approved SANParks research project (Ref: ANTB 1108) to explore the human dimensions of human-wildlife conflict in and around the KNP. This report is meant to provide information and guidance to both KNP/SANParks and neighboring communities concerning the Monitoring and Evaluation of the 'KNP Protocol: Compensation for Livestock Deaths Resulting from Human-Wildlife Conflict' [ver. 12b, December 2013, Section 8]:

> *In accordance with the principles of a strategic adaptive management approach, an objective driven Monitoring and Evaluation (M&E) programme with appropriate indicators will be developed. The aim of the M&E programme is to systematically monitor and evaluate the impact of the implementation of this protocol as well as of the broader human wildlife conflict management and mitigation programme. Outcomes and lessons learnt from the M&E programme will continually inform implementation specifically when adaptation in strategy is required for more effective outcomes.*

ACKNOWLEDGEMENTS

This study was made possible through a Central European University RSS Type-1 grant (Ref: OTHERENS0411). I wish to thank KNP/SANParks for in-kind support for this study, as well as Dr. Tony Swemmer of the SAEON office in Phalaborwa. In particular, I am grateful for the generous assistance of KNP/SANParks personnel including Louise Swemmer, Livingstone Maluleke, Stephen Midzi, Dr. Stefanie Freitag-Ronaldson, Helen Mmethi, Alexis Symonds, Patience Mdungazi, Witness Mmatho, and Lucia Mashego. I am equally grateful to Gilbert N'Waila, Rismati Thomas Shibambu, and other members of the Livestock Farmer's DCA Task Team, as well as staff from the Limpopo Department of Economic Development, Environment and Tourism (LEDET), Mpumalanga Tourism and Parks Agency (MTPA), Office of the Public Protector (Polokwane), and South African National Defence Force (SANDF) for their willingness to share valuable insights. Additionally, I extend my heartfelt appreciation to the members of the Hlanganani, Phalaborwa, and Lubambiswano Community Forums for allowing me to sit in on their meetings, and the many Traditional Authorities and community members who shared their time and experiences with me during interviews and village meetings. Finally, I wish to thank Chantelle Mashele (Phalaborwa), David Mapophe (Hlanganani), Edward Siphuga (Makuya), and Elmon Mthombothi (Lubambiswano) for their linguistic expertise whilst translating at the community workshops.

This report is to be cited as:

Anthony, Brandon P. 2014. *Final report: Monitoring and evaluating the KNP/SANParks livestock damage compensation scheme against set objectives within a strategic adaptive management framework*. Prepared for SANParks/Kruger National Park and its Neighboring Communities. Budapest, Hungary, Central European University.

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

The long history of damage-causing animals (DCAs) which exit the Kruger National Park (KNP), inflicting damage on persons and property, increasing probability of disease transfer between wildlife and livestock, and seriously undermining the livelihoods of local communities, remains a contentious issue. Conflicts of this nature that are not adequately resolved assure the maintenance of a tense relationship between the park and communities. Responses to the DCA problem at KNP have been multi-faceted including increased efforts in maintaining and upgrading the fence along sections of the western boundary of the park, investigating an increasing elephant population, and partnering with provincial departments to improve DCA control outside the park. As a further response, the park and its larger governing body, SANParks, has negotiated a wildlife damage compensation scheme with local communities, which entails financial retribution given to affected farmers who have previously lost livestock to DCAs originating from the park. A corollary scheme will see compensation paid to valid claims commencing from 2014.

This report presents findings of a study undertaken to identify potential indicators of an objective-based Monitoring and Evaluation (M&E) program for the KNP/SANParks Livestock Damage Compensation scheme. Particularly within the feedback loops inherent in strategic adaptive management frameworks, it is acknowledged that sound and robust M&E programs should recognize, and embrace, the perspectives and continuous involvement of relevant stakeholders in their design and implementation. Based on an extensive literature review, document analysis, interviews, and focus groups with KNP/SANParks staff and livestock farmers, a wide array of goals and objectives were articulated for the compensation scheme. In addition, 88 indicators were generated as potential measures to monitor change as a result of the scheme. This suite of indicators is both qualitative and quantitative in nature and, if adopted in whole or in part, would enlist the involvement of a broad range of stakeholders. The first step at consolidating these indicators are presented here, and are based on information sources, methodological tools, and institutions responsible for monitoring.

This study is the first of a number of steps necessary to develop a strong inclusive and participatory M&E program. What is required at this stage, is collectively navigating the way forward to develop such a program. This will entail an ample measure of goodwill and foresight, the continuous building (and in some cases, mending) of relationships within and across institutions, adequate allocation of necessary resources, and effective self-mobilization and engagement between stakeholders.

2. INTRODUCTION: KRUGER NATIONAL PARK AND DAMAGE-CAUSING ANIMALS (DCAS)

Conflicts between humans and wildlife are the product of socio-economic and political landscapes and the institutional architecture designed to manage these conflicts, and are controversial because the resources concerned have economic value and the species involved are often high profile and legally protected (Treves & Karanth 2003; McGregor 2005). While humans and wildlife have a long history of co-existence, the frequency of conflicts involving damage-causing animals (DCAs) has grown in recent decades, mainly because of (i) the exponential increase in human populations and consequential expansion of human activities (Woodroffe 2000; Woodroffe et al. 2005), (ii) expansion of some wildlife distributions (Breitenmoser 1998; Zedrosser et al. 2001; Bisi & Kurki 2005), as well as (iii) a frequent inability of institutions that are meant to mediate such conflicts to respond effectively (Anthony et al. 2010).

The investigation of DCAs and their control is important for a number of reasons. First, attitudes towards protected areas (PAs) are often influenced by perceived or real damage caused by wildlife (Els 1995; de Boer & Baquete 1998; Hill 2004; Anthony 2007). Second, wildlife damage represents a very real and tangible threat to livelihoods in terms of personal injury, crop and livestock losses, and property damage (Happold 1995; Emerton 2001; Choudhury 2004; Dublin & Hoare 2004; Graham *et al.* 2005). Third, active persecution by humans based on wild predator threats to livestock has been identified as an important factor in observed carnivore declines and retaliatory killing (Mishra 1997; Woodroffe 2001; Hazzah *et al.* 2009; Kahler *et al.* 2012; St John *et al*. 2012). Finally, DCA conflicts are potentially socially corrosive, creating and reflecting larger conflicts of value and class and other interests (McGregor 2005; Anthony *et al*. 2010). Especially in poorer countries and countries in transition, such conflicts have the potential to undermine human security and further weaken the effectiveness and legitimacy of state institutions. Understanding these conflicts contextually can help us to develop more nuanced strategies to alleviate conflicts, bringing about more positive outcomes for protected areas, wildlife, and neighboring communities.

The above-mentioned factors all come into play within the long history of DCAs which have exited the Kruger National Park (KNP), inflicted damage on persons and property, increasing probability of disease transfer between wildlife and livestock (Jori *et al*. 2011; Brahmbhatt *et al*. 2012), and seriously undermining the livelihoods of communities living adjacent to the park (Chaminuka *et al*. 2012). The historical background of these communities is characterized by a general dissatisfaction with park authorities (Els 1994), in part due to damage to crops, livestock and property caused by wildlife (Cock & Fig 2000; Freitag-Ronaldson & Foxcroft 2003; Groothoff 2004; Anthony 2007). More recently, Anthony *et al*. (2010) detailed the institutional roles and effectiveness of policies and

practices of controlling DCAs at KNP and Limpopo Province along KNP's western border. Their findings showed that:

- most DCAs originate from the park, significantly affecting its long-term legitimacy among local communities;
- between 2002 and 2004, over 12% of households within 15 km of the park in their study area experienced DCA damage, with incidents positively correlated with proximity to KNP and higher numbers of mammalian livestock;
- the 'worst' DCAs, as perceived by communities, are lion (42%), followed by elephant (18%), hyena (16%), buffalo (14%), and leopard (4%);
- DCA incidents are affecting opinions concerning KNP, as those who experienced damage were less likely to believe that the park would ever help their household economically; and
- DCA procedures are highly flawed due to ambiguity concerning species and movement of DCAs, poor reporting, inadequate response times, overlapping responsibilities, and corruption (exacerbated by weak and, in some cases, competing institutions).

In addition to the need for improved DCA control, compensation for damage caused by DCAs continues to be a controversial and sensitive topic (Anthony *et al*. 2010). The issue of compensation is grossly confused at all levels, and across the relevant institutions. This confusion concerns unmet promises, differing expectations, and the lack of clear and coherent policy. Examples of KNP social ecologists promising compensation, and later the Limpopo province, to affected livestock farmers that never materialized have had serious repercussions, escalating negative attitudes towards the park and triggering village withdrawals from community fora which liaise with it (Anthony 2006). Concomitant with institutional improvements, Anthony *et al.* (2010) also recommended that a functioning compensation scheme for damage caused by wild animals be established (Nyhus *et al.* 2003, 2005; Schwerdtner & Gruber 2007; Ogra & Badola 2008; Linnell *et al*. 2012). Although compensation schemes are generally not a good long-term solution as they may create continuing financial burdens and increase expectations (Crawshaw Jr. 2004; Graham *et al.* 2005), and be counter-productive to conservation by stimulating agricultural expansion (Bulte & Rondeau 2005, 2007), the legitimacy of institutions may be enhanced where following through on long-standing promises are made. It is, in part, upon this recommendation that KNP/SANParks is currently implementing a damage compensation scheme for affected livestock farmers adjacent to the KNP (see section 4).

Human wildlife conflicts that are not adequately resolved assure the maintenance of a tense relationship between the park and communities, which has undesirable social consequences and, because of its perception as environmental injustice, poses risks for the park and its resources in the longer-term (see Cheldelin *et al*. 2003). Developing an adequate response to the problem of DCAs is a high priority for park authorities and other governmental bodies (Madden 2004).

3. Strategic Adaptive Management (SAM)

La vutisaka ndlela, a nga lahleki. /
'The one who asks his way will not get lost'

As this local Tsonga proverb highlights, managing should be an iterative process by which regular feedback loops increase learning, allowing for more proactive (rather than reactionary) thinking and decision-making (Curtin 2002; Biggs & Rogers 2003). Holling (1978) in his historic work *Adaptive Environmental Assessment and Management* described adaptive management as an integrated, multidisciplinary and systematic approach to improving management and accommodating change by learning from the outcomes of management policies and practices. Rooted in domains of experimental science and systems theory, but applied as a resource-management paradigm, adaptive management addresses the uncertainty of socio-ecological systems through conceptually mapping the knowledge gaps and the spots of uncertainty within the system through structured decision-making (Figure 1).

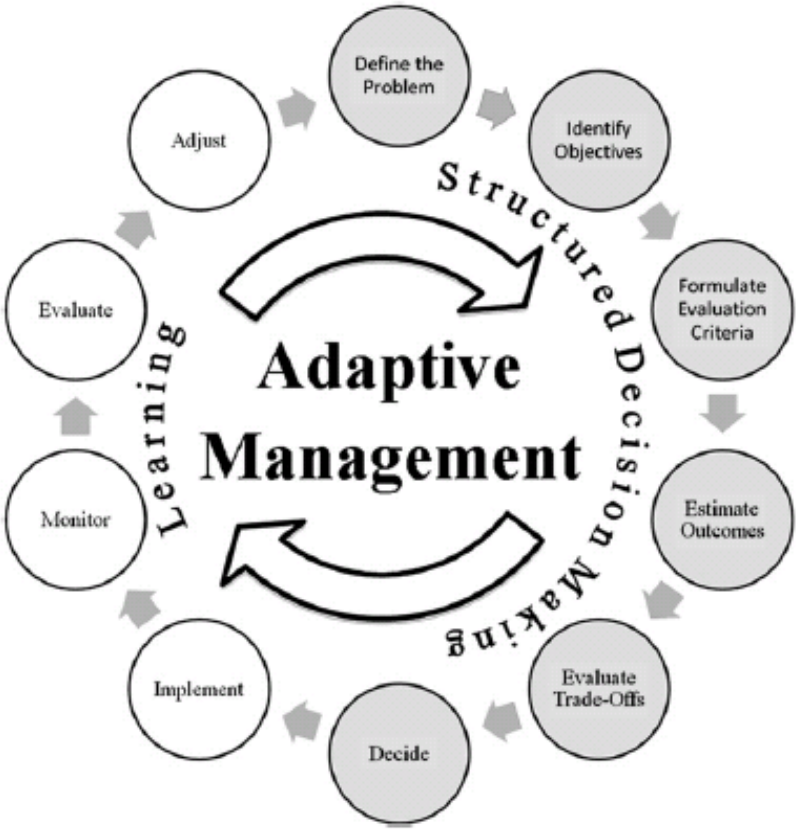

Figure 1. Adaptive management cycle (Allen et al. 2011)

Strategic adaptive management (SAM) has become a core part of the planning and decision-making within South African National Parks (SANParks), and was conceived by recognizing the social-ecological complexity and existence of multiple and diverse stakeholders within which its parks are embedded (Holland 2006; Venter et al 2008; Roux & Foxcroft 2011). Within SANParks, the majority of

application and experimentation with SAM have featured more heavily with the biophysical realm of social-ecological systems, i.e. on biodiversity monitoring and the development of *thresholds of potential concern* (TPCs), essentially minimum and maximum limits along a gradient of change in selected environmental variables. Where SAM has been attempted on more recognizable *social*-ecological systems, e.g. sustainable resource use by local communities (e.g. SANParks Extractive Natural Resource Use Programme), again ecological indicators and TPCs have predominated, with almost no emphasis on developing appropriate indicators of socio-economic factors from which to assess management actions; a recognized deficiency within SANParks (Pollard *et al*. 2003; Gaylard & Ferreira 2011; Scheepers *et al*. 2011; Swemmer & Taljaard 2011). Not surprisingly, social and economic monitoring and evaluation within these frameworks can be difficult, particularly as it often entails qualitative data and social science research methods and frameworks, both of which are relatively new and unexplored domains within SANParks in general, and KNP in particular. Moreover, it has been recognized that although monitoring and evaluation of such frameworks, and the projects which they constitute are activities which can be time-consuming as they necessitate broad-based participation by relevant stakeholders, they are both pragmatic and empowering in addressing multi-stakeholder needs (Stringer et al. 2006; Rist et al. 2013).

3.1. KNP/SANParks Objectives

SANParks has developed a strategic plan and conceptual framework, with associated objectives, for meeting its overall mission, i.e. "*To develop, manage and promote a system of national parks that represents biodiversity and heritage assets by applying best practice, environmental justice, benefit-sharing and sustainable use*." (SANParks 2012). It is within this framework that SAM operates. Both 'biodiversity' and 'people' objectives are integral to SANParks fulfilling its mission, with both 'benefit sharing' and 'constituency building' being core 'people' sub-objectives. Further, these sub-objectives have been sub-divided into more discrete sub-objectives, outlined in Figure 2. The scheme to compensate affected livestock farmers who have lost livestock to damage causing animals exiting KNP (see section 4) seeks to contribute to the 'Constituency building objective' (2), more specifically sub-objectives 2.3 (Community relationship objective) and 2.4 (Ameliorate negative effects objective).

To date, no attempt has been made to offer a suitable set of indicators for these objectives. Moreover, as this compensation scheme is now being implemented and embedded within a SAM framework, it is vital that research be conducted that will evaluate how the planning, implementation, and monitoring of this compensation scheme will contribute to SANParks' overall objectives and those of neighboring communities (see Inskip & Zimmermann 2009; Maclennan *et al*. 2009; Pechacek *et al*. 2012).

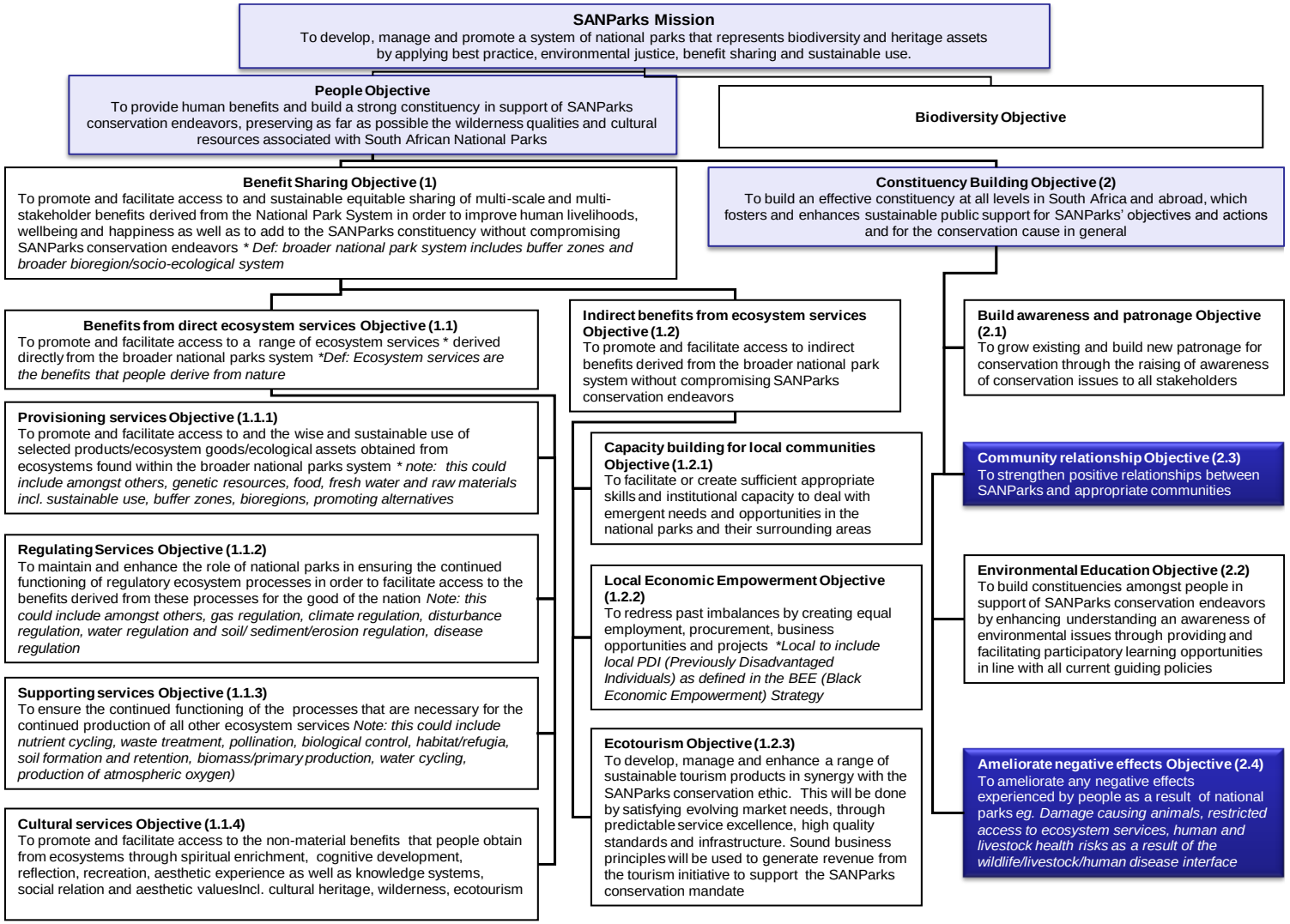

Figure 2. Diagrammatic representation of high level management objectives for the people component of SANParks mandate (adapted from Swemmer & Taljaard 2011)

3.2. Response to DCA Problem

As exemplified by this local Tsonga proverb, the acute problem of DCAs, their control, and the need for compensation demands a solution in order to improve relationships between communities and management institutions, and to arrive at better outcomes for communities and conservation alike. Fostering communication and trust, demonstrating effort and a willingness to address the issue, and following through can lead to improved governance (Lockwood 2010) and have a positive effect on the attitudes and actions of people in conflict with wildlife (Madden 2004; Anthony & Wasambo 2009), particularly if inherent trade-offs in decision-making are articulated well in advance (Anthony & Szabo 2011). However, with such a complex issue, one cannot rely on any one solution alone but is more likely to succeed by employing a battery of flexible instruments and policies. To this end, the responses to the DCA problem at KNP have indeed been multi-faceted. They have included increased efforts in maintaining and upgrading the fence along sections of the western boundary of the park. The fence is viewed by communities as essential in protecting their interests by keeping both disease carrying and/or damage causing species in the park and away from livestock, people, and property (Ferguson & Hanks 2010). It is also important for KNP to reduce damage caused by an increasing elephant population. This is currently being pursued within the Department of Environmental Affairs and Tourism and SANParks, and has direct relevance to the park's relationship with its neighbours. The initial steps to understanding this issue and exploring options involved stakeholder forums in 2004-2005 and the production of a scientific assessment for elephant management in South Africa (Scholes & Mennell 2008).

> ***Mhaka a yi bori. / A case does not rot.***
> ***(meaning: 'When a matter has been raised, it won't vanish until it has been properly settled')***

As a further response to the DCA issue at KNP, the park and its larger governing body, SANParks, has negotiated a wildlife damage compensation scheme with local communities, which entails financial retribution given to affected farmers who have previously lost livestock to DCAs originating from the park. A corollary scheme will see compensation paid to valid claims commencing from 2014. This process is meant to be inclusive and facilitative, i.e. it seeks to "*…build a sense of common purpose amongst all relevant stakeholders and to develop a collective roadmap for getting from a current (usually undesirable) reality to a more desirable social-ecological system*." (Roux & Foxcroft 2011, p. 2). The rationale for this scheme is twofold: constituency building and redressing environmental injustice (Louise Swemmer, pers. comm.).

4. MONITORING & EVALUATION

Within the adaptive management cycle, Monitoring and Evaluation (M&E) are instrumental stages in understanding the effects of management decisions, and informing where and how adjustments are needed for improvement. The evaluative criteria for M&E can originate from theory, analyses of cases, or direct stakeholder elucidation (Chase et al 2004). There are a number of challenges associated with implementing M&E to assess the impacts of protected areas and their programs on local communities. One of these is *attribution*, i.e. how to determine whether observed impacts are related to the protected area as an institution, the ecosystem being managed or other factors unrelated to the protected areas. A second challenge concerns assessing relatively *intangibe* impacts, including changes in attitudes and practices, which may be just as important as more tangible impacts in determining the perceived success of a program. A third challenge lies in ensuring that the impacts on *different multiple stakeholder groups* are being captured (Schreckenberg et al 2010).

To meaningfully assess the merits of any wildlife damage compensation program, one must disentangle the multiple goals of compensation (Decker et al 2002; Agarwala et al, 2010; Boitani et al. 2010). This necessitates the inclusion of relevant stakeholders, whereby broadening involvement in identifying and analyzing change is a priority to enrich the data available to underpin all stages of the management decision process, including impacts, interventions, system responses, stakeholder engagement and public attitudes and preferences (Baruch-Mordo et al 2009; White & Ward 2010). Yet, despite the obvious importance and sensitivity of compensation for wildlife damage, few compensation schemes have been rigorously analyzed, particularly on their effectiveness in reducing local efforts to eradicate problematic wildlife, reducing perceived risk from human-wildlife conflict, or on building support for conservation agencies and/or their mandates (Montag 2003; Nyhus et al 2005; Dickman 2010; Pechacek et al 2013; Redpath et al 2013). Moreover, there are few, if any, published cases where compensation schemes have articulated, embraced and incorporated 'external' stakeholder goals, objectives and indicators into the scheme's design, implementation, and M&E, despite the identified need to do so (Messmer 2000; Decker et al 2002; Muruthi 2005; Boitani 2010).

Although many agencies claim to be having a positive impact as a result of interventions, these claims are rarely substantiated with rigorous evidence based data, and the 'gap between the rhetoric of agencies and what they actually achieve is increasingly met with skepticism and doubt amongst donors and other stakeholders' (Roche 1999,2). Conventionally, evidence to identify and analyze change has largely been based on information from agencies' self-reporting M&E systems, anecdotes from project monitoring reports, and seldom involving external stakeholders (Fabricius & Cundhill 2014). Despite the (limited) value of self-monitoring of project activities such systems rarely tell us much about the wider impact of a project on the lives of participating communities or other relevant

stakeholders. In this study's context, a broader recognition (and appreciation) of multiple stakeholder goals is absolutely essential if one desires to have a deeper understanding of the social-ecological system within which SANParks' activities are embedded (Biggs et al 2011).

Participatory monitoring and evaluation (PM&E) is an alternative approach which involves local people, conservation agencies, and policy makers deciding *together* how progress should be defined, measured, and results acted upon (Guijt & Gaventa 1998). PM&E emerged due to a recognition of the limitations of the conventional approach, and is increasingly drawing interest from many agencies, since it offers new ways of assessing and learning from change that are more inclusive, and more aligned with the views and aspirations of those most directly affected. This shift in thinking has been prompted by (Guijt & Gaventa 1998):

- the growing interest in participatory appraisal and planning, which stress the importance of incorporating local people's perspectives;
- increased pressure for greater accountability, particularly with dwindling resources;
- the shift within organizations towards reflecting more on their own experiences, and learning from them (cf. Biggs & Rogers 2003; Roux & Foxcroft 2011); and
- the increased appreciation that communities have their own priorities for improving their lives, and their own ways of identifying impact indicators and measuring change which may be equally, if not more, legitimate than those imposed by external actors (Jeffery et al 2006; Catley et al 2007).

Where project participants are included in the impact assessment process, this can create an opportunity to develop a learning partnership involving both the implementing partner (in this case, KNP/SANParks), and the intended target groups (first, affected livestock farmers and, second, KNP's neighboring communities). The assessment process can create space for dialogue, and the increased pool of knowledge can provide a broader basis for discussions on how to improve programming and where best to allocate future resources (Emerson et al 2009; Rist et al 2013). Based primarily on public health and development programs, several positive outcomes have been associated with effective stakeholder engagement in developing M&E systems (Guijt & Gaventa 1998; Thompson et al 2005; Jeffery et al 2006; Catley et al 2007; Treves et al 2009; Lund 2014):

1. it can provide otherwise unavailable or irretrievable information;
2. if designed correctly, it can be economically more efficient;
3. it can reveal valuable lessons and improve accountability;
4. conflict is better understood and dealt with very early in a change process (decreasing potential costs of failure, implementation, and enforcement and leading to a stronger sense of local ownership and support);
5. local information is understood and plans that are generated are more likely to accommodate local needs and be more culturally appropriate, particularly in cross-cultural contexts;

6. participants can develop an appreciation for complexities of assumptions, problems, and issues, and for diverse perspectives on those issues;
7. participating agencies can be viewed as partners and positive relations can be developed with various groups;
8. perceptions of agency staff can be improved because interaction between the public and agency staff (i) showcases staff expertise and (ii) demonstrates receptivity to stakeholder concerns;
9. participants can gain skills in negotiation, democracy, and coalition building;
10. community stakeholders can use (analyze, interpret, act upon) the information that is gathered;
11. it can result in more rapid management interventions; and
12. it allows all stakeholders to celebrate successes, and learn from failures.

Despite the substantially growing recognition of the benefits of more inclusive M&E systems, it is also being demonstrated that such systems can be challenging to design, implement, and integrate into an adaptive management framework. These include:

- increased expenditures in terms of time, financial and other resources (Rist et al 2013; Fabricius & Cundhill 2014);
- it encourages people to examine their assumptions about what constitutes progress, and to face up to the contradictions and conflicts that can emerge. For example, rather than unilaterally implementing and evaluating programs to meet only agency goals, PM&E is focused on the impacts that matter most to *all* stakeholders (Guijt & Gaventa 1998; Richie et al 2012);
- in bringing together people's various ways of looking at the world, it challenges established notions of what constitutes rigorous data collection and analysis. Conventional concepts of validity and reliability of data are being questioned as methods are combined in new ways and 'experts' interact more with local people. Consequently, adopting PM&E requires the acceptance of new, less rigid, standards of credibility of information, and an appreciation of when information is 'good enough' for the task at hand - rather than being perfect (Guijt & Gaventa 1998); and
- it recognizes that the *process* by which decisions are reached in M&E plays a critical role in shaping impressions of, and compliance with, those decisions. A satisfactory decision reached by an unsatisfactory process will leave many stakeholders unhappy. A satisfactory process, on the other hand, can increase the acceptability of a basically good decision (Decker et al 2002).

It is within this dynamic and emerging context, with (largely unknown) associated benefits and costs, whereby KNP/SANParks is embarking on a new, and more inclusive and participatory process to monitor and evaluate its 'people' objectives in general, and more specifically its wildlife damage compensation scheme. In doing so, it hopes to gain a deeper understanding of the socio-ecological system within which KNP is embedded, including how this compensation scheme can be critically evaluated to meet the park's own objectives *and* those of its intended target group(s).

5. RESEARCH QUESTIONS

One of the main purposes of strategic adaptive management is to purposefully learn and strategically adapt over time. This learning, however, needs to take place throughout both the planning and implementation stages of a management cycle, and involve regular feedback loops. Learning is backed by the continuous monitoring and evaluation of relationships of management actions and system responses (Linkov *et al*. 2006). Evaluation and reporting of the results contributes to the reassessment of the problem, compares the actual outcomes to forecasts and interpreting the reasons underlying any differences, and revisits the policy before adapting it to the new cycle (Clark et al 1996; Maris & Béchet 2010). Within this framework, and using the compensation scheme as a case, the following research questions served as the primary avenues of investigation for this study:

1) Under the current draft SANParks hierarchy of constituency building objectives (see Figure 2), is there a need for further elaboration of the objectives within which the compensation scheme contributes? If so, what are these sub-objectives, and what indicators might be used to measure them?
2) What are the goals and objectives of various livestock farmer groups outside the KNP for the compensation scheme? According to these stakeholders, what indicators would be appropriate to measure these identified objectives?

6. METHODS

In order to understand the historical and current complexity of the DCA issue, and to derive suitable indicators to inform strategic adaptive management, I utilized a multi-method approach including analysis of archival records, participant observation, informal and semi-structured interviews, and focus groups. These took place from May 2013 through May 2014.

6.1 Archival research

A wide review of human-wildlife conflict and compensation programs was conducted from published literature. In addition, analysis of relevant records pertaining to the DCA problem at KNP was carried out. These documents include the following:

- Legal and policy documents of relevant provincial and federal bodies, as well as KNP and SANParks, concerning DCAs
- LEDET Annual Report 2012/2013
- MTPA Annual Reports 2010/2011 to 2012/2013
- SANParks Annual Reports (2007/2008 to 2012/2013)
- SANParks Strategic Plan for 2012/2013-2016/2017
- SANParks Guidelines for Stakeholder Participation (2010)
- SANParks Stakeholder Participation in Developing Park Management Plans (2011)
- KNP Management Plan (2008), and Stakeholder Comment Register (2006?)
- EXCO Meeting Minutes (17 March 2011 - 22 October 2013)
- Community fora meeting minutes, particularly as they pertain to DCA issues and/or compensation
- Meeting minutes and reports of compensation scheme negotiations (e.g. DCA Task Team)
- Relevant papers/reports of compensation schemes (and their evaluations) in similar contexts elsewhere (both in southern Africa, and worldwide)

6.2 Participant Observation

I participated in meetings of various entities, including the DCA Task Team (representing mostly livestock farmers), community fora that liaise with the KNP (Hlanganani, Phalaborwa, Lubambiswano), and the Special Meeting called by KNP/SANParks to publicly announce the new DCA Compensation Scheme (Skukuza; 27 November 2013).

6.3 Interviews

Over 100 informal and semi-structured interviews were conducted with key informants including KNP/SANParks staff, LEDET, MTPA, community leaders, Traditional Authorities, community fora representatives, and livestock farmers adjacent to the park. These took place in both individual and group settings.

6.4 Focus Groups

As recommended by Jeffery et al (2006), focus groups were selected to identify both KNP and community-based goals, objectives and indicators for the compensation scheme. These were conducted in March-April 2014, including 1 with KNP staff, and 4 with livestock farmers from surrounding villages. These utilized a 'logic model' framework (see W.K. Kellogg Foundation 2004) to identify goals, objectives, and potential indicators[1] for the compensation scheme within the various groups represented. Logic models:

- are tools used to describe and understand the overall structure and function of a program/service;
- describe how a program should ideally function, based on program theory and goals;
- depict relationships between the main activities or components of a program and its associated goals, objectives, outcomes and resources;
- are a useful communication tool to describe a program to stakeholders, funders or program staff;
- can be used in program planning and evaluation by (i) illustrating links between activities and outcomes; (ii) identifying differences between how the program should work and how it presently does; and (iii) contrasting different stakeholders' perceptions on program function and design; and
- when well articulated, are *plausible* (makes sense), *feasible* (realistic), and *testable* (have strong, measurable indicators).

In order to gain a broad perspective of livestock farmers from around the KNP, the 4 'community' workshops consisted of:

- 4 community forum areas [Makuya (Venda), Hlanganani (XiTsonga), Phalaborwa (XiTsonga, Pedi), Lubambiswano (SiSwati)]
- 2 provinces (Limpopo, Mpumalanga)
- 45 participants [9-13/workshop; 36 male (80%); 9 female (20%)]
- mean age=48.6; min=25; max=89
- 34 villages represented (Makuya=4, Hlanganani=12, Phalaborwa=8, Lubambiswano=10)
- 43 livestock farmers + 2 non-farmers

[1] Attributes of a good indicator are that it is a *direct* and unambiguous measure of change; is *relevant* (measures objectives of the program); *varies* across time, space, groups, and is *sensitive* to change in programs, policy, or projects; is *transparent* and cannot be manipulated to show achievement where none exists; and is *cost-effective* to track (Schreckenberg et al 2010).

The KNP workshop was attended by staff (4) from both the 'Scientific Services' and 'Management' branches of the organization, and followed the same logic model framework as the community workshops. However, revision of the workshop results for the KNP group (plus an additional staff member) was granted to allow for refining various components of the model, particularly the articulation of potential indicators.

All workshop participants were briefed on the ethics of the research (see section 6.5), and an introduction to the purposes of the workshop. Community workshop participants were provided with lunch, and compensated for travel costs. In addition, translators were remunerated for their assistance during the workshops.

6.5 Ethics Protocol

An ethic of research involving human subjects should include two essential components: (1) the selection and achievement of morally acceptable ends, and (2) the morally acceptable means to those ends (Ritchie and Lewis 2003; Marvasti 2004). The first component is directed at identifying acceptable ends in terms of research benefits for participants and relevant groups, and for the advancement of knowledge. The second component is directed at ethically appropriate means of conducting research. Thus, the moral imperative of respect for human dignity translates into a number of important principles in research ethics, which were adhered to in this research's protocol and were approved by both the Central European University, and SANParks. These included respect for free and informed consent, and respect for privacy and confidentiality.

7. RESULTS

7.1 KNP/SANParks Goals, Objectives & Indicators

Goal:

During the course of the KNP Workshop (see Appendix I), only one overarching goal was identified by the participants for the compensation scheme, namely:

Ameliorate negative tangible and intangible effects incurred as a result of human-wildlife conflict.

It was agreed during the workshop discussion that the articulated goal and objectives (below) are KNP-centric, and there was unanimous acknowledgement that some sectors of society bear more negative effects/costs from KNP than others. It was also noted that embedded within this goal was a recognition that part and parcel of 'ameliorating negative effects' is indeed 'building societal support' (and hence, it was not listed as a separate goal), and that the wildlife damage compensation scheme was only one of a number of measures needed to address human-wildlife conflict.

Objectives & Indicators:

The KNP participants identified 6 objectives and 14 associated indicators as necessary in meeting the goal identified above (Table 1). Where relevant, literature sources or interview results which corroborate these objectives are given. Notations as to whether the indicator is primarily a *quantitative* measure (Qn), as opposed to a *qualitative* measure (Ql) are also provided. In cases where both quantitative and qualitative measures would apply, both notations are used (Qn,Ql).

Table 1: Identified Objectives and Indicators by KNP Workshop Participants (Note: Qn = *quantitative* measure; Ql= *qualitative* measure)

Objective	**Indicator(s)**	**Source(s)**
1. Understanding by livestock farmers of process required to lodge successful claim	· assessing knowledge of claim verification and process (Qn,Ql) · ratio of correctly completed claim forms: total forms submitted (Qn)	Hewitt & Messmer 1997; Wagner et al 1997; Nyhus et al 2003; WWF 2005; Ogra & Badola 2008; Rodriguez 2008; Lamarque et al 2009; Morrison et al 2009; Vynne 2009; Karanth et al 2013; interviews
2. Efficient and effective damage verification process	· % of completed HWC Incident Reports (Qn) · % of successfully compensated cases compared to number submitted (Qn)	Hewitt & Messmer 1997; Mishra 1997; Fourli 1999; Rao et al 2002; Madhusudan 2003; Nyhus et al 2003; Ogra & Badola 2008; Hazzah et al 2009; Lamarque et al 2009; Morrison et al 2009; Anthony et al 2010; Václaviková et al 2011; Karanth et al 2013; Pechacek et al 2013
3. Roles and responsibilities of relevant stakeholders are clearly defined, understood, and implemented.	· stakeholder roles and responsibilities clearly defined in documentation (Ql) · number of communication efforts to communicate roles and responsibilities / protocol (Qn) · accuracy of knowledge regarding roles and responsibilities by stakeholders (Ql) · number of incidents when roles and/or responsibilities contravened (Qn)	Hewitt & Messmer 1997; Wagner et al 1997; Nyhus et al 2003; interviews
4. Determination of compensation rates will be fairly reviewed by the appropriate party (Compensation Committee)	· review of Compensation Committee meeting minutes (Qn,Ql) · claimants' satisfaction with rates of compensation (Ql)	Matiru 2000; Nyhus et al 2003; Ogra & Badola 2008; Vynne 2009; Václaviková et al 2011; Redpath et al 2013
5. Ensure viability of sufficient resources (e.g. financial, time, human resource) to implement scheme	· % of attended DCA incidents to reported incidents (Qn) · adequate budget allocation for Compensation Fund (Qn) · allocation of appropriate resources for scheme to run smoothly (Ql)	Wagner et al 1997; Nemtzov 2003; Nyhus et al 2003; Westgate et al 2013
6. Ensure no net decrease of societal support for conservation as a result of the compensation scheme	· attitudes towards KNP and conservation, due to knowledge of and/or participation in compensation scheme (Qn,Ql)	Zinn et al 2000; Jackson & Wangchuk 2004; Manfredo & Dayer 2004; Browne-Nunez & Jonker 2008; Inskip & Zimmermann 2009; McCleery 2009; Anthony et al 2010; Majic & Bath 2010; Chaminuka et al 2011; Merkle et al 2011; Baruch-Mordo et al 2013

7.2 Livestock Farmer Goals, Objectives & Indicators

To identify the goals, objectives and indicators elucidated from the four community workshops, the results shown here were based on their frequency and prioritization in each of the workshops, and then consolidated for reporting purposes. For a more detailed description of results for each individual workshop, please see Appendices II - V.

Goals:

The community workshops participants identified a total of five goals (prioritized below), which they believed to be directly or indirectly linked to the payment of compensation for wildlife damage:

1. *All DCA damage fairly compensated in culturally-relevant fashion.*
2. *Continual and effective minimization of DCA problem.*
3. *Apply community-based measures to mitigate human-wildlife conflict.*
4. *Improve relationships between stakeholders.*
5. *Eliminate human injury as a result of human-wildlife conflict.*

A number of observations surfaced within the community workshops that are noteworthy here. First, it was made emphatically clear at all four workshops that compensation for damage caused by DCAs should not be restricted to livestock losses only, nor only apply to DCAs that originate from KNP alone, but rather that compensation be extended to include DCAs from other areas (e.g. private reserves, provincial reserves) and to cover crop loss, property damage, and even human injury/death. Second, as in the KNP workshop, it was believed by most participants that compensation is worthwhile and necessary in this context, based on the history of the relationship between KNP and its neighboring communities, and that *'apology without compensation is just lip service*'. At the same time it was evident that, whilst important, simply paying compensation for livestock losses is insufficient in and of itself to reduce conflict and meet community goals in this regard. What emerged as of equal importance were culturally-relevant norms of conflict resolution, including that payment amounts should be determined by mutual understanding, and the payment itself accompanied by an admission of responsibility/guilt. Third, in order to '*maintain harmony between KNP and communities*', a genuine effort needs to be made to minimize DCA incidents in the future. As one participant stated, *'acting responsibly is more important than the compensation*' and that *'if nothing is done to keep animals in KNP, even compensation with an apology will begin to lose its sincerity*'. It was observed on a number of occasions that even if compensation continued to be paid, failing to make a genuine effort to reduce the DCAs from exiting the KNP would be met with retaliatory action, i.e. killing the DCA. Finally, the majority of workshop participants acknowledged their own responsibility in mitigating human-

wildlife conflict, both in terms of crop/animal husbandry practices, reducing illegal practices, and in maintaining the fence. Each of these aspects is further reflected in the objectives and indicators articulated by the groups.

Objectives & Indicators:

Due to the number of community workshops conducted and the overlapping nature of many goals and objectives, the results shown here have been consolidated from each of the workshops. In total, 11 objectives with 55 associated indicators were identified by the workshop participants (Table 2). Similar to the KNP Workshop results, the objectives are shown with associated indicators, supporting references (including interview results), and a notation as to whether the indicator is quantitative, qualitative, or both.

Table 2: Identified Objectives and Indicators by Community Workshop Participants (Note: Qn = *quantitative* measure; Ql= *qualitative* measure)

Objective	**Indicator(s)**	**Source(s)**
1. Improve understanding and communication between and within stakeholder groups concerning HWC	· no. of responses from KNP to come to village when invited (Qn,Ql) · roles/responsibilities clearly defined & executed (Ql) · number of meetings where all stakeholders attend (Qn) · number of households who received info (Qn) · number of persons injured/killed by DCAs (Qn)	Matiru 2000; Montag 2003; WWF 2005; Stringer et al 2006; Young et al 2010; Redpath et al 2013; Boisserie et al 2014
2. Negotiate, establish and revise compensation rates in fair, culturally- and institutionally-relevant manner	· elected person(s) confirm negotiated rates (Qn,Ql) · all parties sign MoU that has been thoroughly unpacked/scrutinized (Ql) · awareness level of fair market value (Qn) · availability of 3rd party to decide price (Qn) · regular publishing of rates by e.g. abattoirs (Qn)	Matiru 2000; Nyhus et al 2003; Ogra & Badola 2008; Vynne 2009; Václaviková et al 2011; Redpath et al 2013; interviews
3. Compensation to be accompanied with sincere apology and/or admission of responsibility	· % of tangible compensation claims delivered in person (Qn) · ratio of claims compensated to those submitted (Qn) · letter of apology/remorse accompanies response for both valid and invalid claims (Qn,Ql) · no. of potentially affected parties who have been informed at program onset of what to expect if DCA damage occurs (Qn)	Madden 2004
4. Claims process should be adequately communicated and understood	· % of farmers who know whom to contact if DCAs damage occurs (Qn) · availability of contact person (Qn,Ql) · number of DCA incidents reported to correct party (Qn) · % of correctly completed forms (Qn) · % of community members who know of claim process (Qn)	Hewitt & Messmer 1997; Wagner et al 1997; Nyhus et al 2003; WWF 2005; Ogra & Badola 2008; Rodriguez 2008; Lamarque et al 2009; Morrison et al 2009; Vynne 2009; Karanth et al 2013
5. Verification and claims process should be timely, effective, and efficient	· evidence protected & collected within 24 hours (Qn,Ql) · qualified investigators cooperate with herders (Ql) · number of cases reported to those that occurred (Qn) · time taken between report and investigation (Qn) · tracking, shooting, capturing ability of investigator (Qn,Ql) · quality of HWC reports by LEDET (Qn,Ql) · qualified provincial or KNP ranger(s) respond (Ql) · time taken between claim submission and payment (Qn)	Hewitt & Messmer 1997; Mishra 1997; Fourli 1999; Rao et al 2002; Madhusudan 2003; Nyhus et al 2003; Ogra & Badola 2008; Hazzah et al 2009; Lamarque et al 2009; Morrison et al 2009; Anthony et al 2010; Václaviková et al 2011; Karanth et al 2013; Pechacek et al 2013
6. Control of DCAs outside KNP should be timely and effective	· time of report to time of control (Qn) · % of DCA outbreaks that result in damage (Qn)	Hewitt & Messmer 1997; Anthony et al 2010; interviews

Table 2: Identified Objectives and Indicators by the Community Workshop Participants (…*cont'd*)
(Note: Qn = *quantitative* measure; Ql= *qualitative* measure)

Objective	Indicator(s)	Source(s)
7. Improve community-based practices to minimize HWC	· no. of DCA outbreaks/time (Qn) · % of cattle in kraals at night (e.g. dung counts) (Qn) · education/awareness of farmers on benefits of good practices (by responsible party) (Qn,Ql) · no. of grazing camps fenced (Qn) · proximity of cattle & buffalo (Qn) · no. of municipalities with by-laws for kraaling (Qn) · no. of offences/time for not kraaling (Qn) · proximity of KNP fence to community (Qn)	Blanco 2003; Bulte & Rondeau 2005; Okello 2005; Linnell et al 2012; interviews
8. KNP border fence should be adequately upgraded and maintained by responsible personnel	· no. of DCA incidents (Qn) · budget for fence upgrade/maintenance (Qn) · number of DCA outbreaks (Qn) · adequate KNP fencing (%, km) (Qn) · % of employed fence workers that are local (Qn) · number of skilled fence workers/village (Qn) · causes of fence damage (Qn,Ql) · no. of patrollers (Qn) · time spent patrolling (Qn) · no. of field rangers employed (Qn)	Hoare 2003; Treves & Karanth 2003; Dublin & Hoare 2004; Anthony 2007; Ferguson et al 2009; Anthony et al 2010; Jori et al 2011; Brahmbhatt et al 2012; Chaminuka et al 2012; interviews
9. Illegal activities should be eliminated	· number of fence vandalism events (Qn) · number of poachers/poaching incidents (Qn)	Anthony 2006; Chardonnet et al 2010; Holmes 2013; interviews
10. Land use planning improved to mitigate HWC	· number of cases of corridor disease (Qn) · number of DCA outbreaks (Qn) · kilometers of buffer created (Qn) · amount of good land for grazing (Qn,Ql)	WWF 2008; Linnell et al 2012
11. Improve medical care for humans injured as a result of HWC	· time taken to respond (Qn) · injuries leading to death, where death could have been prevented (Qn,Ql)	

7.3 Other Factors

In addition to the host of internally-derived indicators from the five workshops, relevant literature and interviews revealed a number of others that may be potentially useful (Table 3). These should be thoughtfully considered for inclusion/exclusion in any M&E program by both KNP/SANParks and neighboring communities, in order to identify and analyze change resulting from compensation.

Table 3: Potential Indicators Identified in Literature and/or through Interviews
(Note: Qn = *quantitative* measure; Ql= *qualitative* measure)

Indicator	**Source(s)**
Socio-demographic	
· religious affiliation (Qn)	Manfredo & Dayer 2004; Hazzah et al 2009; Dickman 2010
· ethnicity & cultural beliefs (Qn,Ql)	Naughton-Treves et al 2003; Skogen 2003; Manfredo & Dayer 2004; Mattson 2004; McGregor 2005; Treves et al 2009; Anthony et al 2010; Chardonnet et al 2010; Dickman 2010; Goldman et al 2010; Lindsey et al 2013; Hazzah et al 2014; **interviews**
· social group (Qn,Ql)	Naughton-Treves et al 2003; Manfredo & Dayer 2004; Romanach et al 2007; Ogra & Badola 2008; Rigg & Sillero 2010; Thorn et al 2012; Boisserie et al 2014; Treves & Bruskotter 2014; **interviews**
· household income (Qn)	Ogra & Badola 2008; Dickman et al 2011
· gender (Qn)	Kaltenborn et al 2006; Ogra & Badola 2008; DeMotts & Hoon 2012
· age (Qn)	Lindsey et al 2005,2013; Rigg & Sillero 2010
· level of education (Qn)	Morrison et al 2009; Agarwal et al 2010; Dickman 2010
Livelihood	
· agricultural expansion (Qn)	Bulte & Rondeau 2005,2007
· choice to own livestock (Ql)	Jackson & Wangchuk 2004; Anthony et al 2010; **interviews**
· purpose for keeping livestock (Ql)	Linnell & Brøseth 2003; Hazzah 2006; Hazzah et al 2009
· coping mechanisms (Ql)	Hill 2004; Treves et al 2006; Catley et al 2007
Experiential	
· personal experience with DCAs (Ql)	Naughton-Treves et al 2003; McGregor 2005; Anthony 2007; Dar et al 2009; Hazzah et al 2009; McCleery 2009; Anthony et al 2010; Rigg & Sillero 2010; Barua et al 2013; Lindsey et al 2013; Kansky et al 2014; **interviews**
· perceived risk of DCAs (Ql)	Mishra 1997; Decker et al 2002; Bath & Enck 2003; Hill 2004; Kaltenborn et al 2006; Hazzah et al 2009; Chardonnet et al 2010; Dickman 2010
Behavioural	
· level of retaliatory killing/habitat destruction (Qn,Ql)	Hussain 2003; Mishra et al 2003; Naughton-Treves et al 2003; Ogada et al 2003; Jackson & Wangchuk 2004; Anthony 2006; Boitani et al 2010; Chardonnet et al 2010; Kahler et al 2012; **interviews**
· reporting of illegal activity (Qn,Ql)	Anthony 2006; **interviews**
· resistance to conservation (e.g. rhino campaign) (Ql)	Holmes 2013; **interviews**
Institutional	
· level of internal strife/conflict as a result of decisions regarding compensation scheme (Ql)	**interviews**
· improved interaction between stakeholders and institutions (Ql)	**interviews**
· improved social learning (Ql)	Stringer et al 2006; **interviews**

7.4 Indicator consolidation

In total, 88 indicators were identified in this research (Appendix VI). In cases where duplicates were discovered (even if intended to measure different objectives), these were consolidated, resulting in a final total of 76. These consist of 43 *quantitative* measures, 15 *qualitative* measures, and 18 *mixed* measures. These indicators may be further consolidated, at the discretion of the relevant partners, into groupings for multiple purposes, including:

1. *to target particular sources of information*: e.g., indicators 2,4,9,26,27,34,37,39,40, and 41 could all be measured when reviewing correspondence between claimants and the DCA Compensation Committee (e.g. Claim Forms, response letters to claimants)
2. *when considering methodological tools*: e.g., indicators 1,10,14,18,28-30,33,36,45-47,67,70-76,78,79,81, and 82 would be worthwhile variables to consider based on the administration of a face-to-face community survey in participating villages.
3. *by focusing on institutions responsible for monitoring*: e.g., indicators 44,53-55,58-60,62 and 65 were all identified as primarily involving the Department of Veterinary Services.

Indicator consolidation will need to be further explored and negotiated by KNP/SANParks and relevant partners, depending on what direction this process takes.

A host of actors were also identified by workshop participants to be best suited to participate in any proposed M&E activities concerning human-wildlife conflict, and particularly the damage compensation scheme (see also Appendices I- V). The list includes:

- Traditional/Tribal Authorities
- LEDET, MTPA
- KNP/SANParks
- Department of Agriculture
- Department of Veterinary Services
- Local municipalities
- Community Fora which liaise with KNP
- DCA Compensation Committee
- Livestock Farmer Associations/Forums
- Livestock farmers/owners
- Community Medical Care Scheme
- independent researchers/'watchdogs'

8. THE WAY FORWARD

As I write this section, I am reminded that research itself can be politicized because the things one measures, how one frames questions, and how one interprets the results, may favor one stakeholder over another. Doolittle (2003) extends this idea to highlight that some stakeholders will often use 'outsiders' to legitimize their claims over contested resources. This can become a serious problem if the resulting information is misused or misleading (Lund 2014). This became evident during this current research, as some community research participants were at first hesitant in sharing information with me, claiming that although I was trusted personally, I had no assurance that KNP would not use my findings 'just for their own purposes'. Thus, I continue to attempt to remain impartial as an honest broker of information and willingly 'relinquish control over the outcome of negotiations between stakeholders' (Treves et al 2006). A second cautionary note concerns the idea of an 'audit culture', in which outwardly fine M&E practices may become impartial with institutional 'self-checking' of performance, leading to social consequences for governance and power (Strathern 2000; Wahlén 2014). It is my hope that *with genuine good will and foresight, this research and its findings will be utilized by the relevant parties for positive and complementary, rather than competitive, purposes*.

As articulated in section 4, conventionally, monitoring and evaluation was conducted by outside experts using quantitative indicators with little involvement of local stakeholders. In more inclusionary approaches, such as PM&E, local stakeholders can not only define the methodology, but also contribute to the actual monitoring using their own internally-derived indicators, adapted for their particular area and purpose. Theoretically, this approach should work well, especially in the long-term, but requires more research, a relatively high level of input from experts in the preliminary stages, and a clear definition of how the M&E system is to evolve (Niemela et al 2005). For example, local people do not always understand the concept of monitoring and evaluation, and by extension, the benefits they could receive. The same can be said of various people and departments within the same organization (Wahlén 2014). Thus, developing a comprehensive framework of long-term participatory monitoring, ensuring local interest, and offering incentives are key issues to be addressed. This research is one of the first steps towards that end, but parties would be wise to note that *substantial and sustained resources and capacity building will be required to design, launch and implement a PM&E system within KNP's strategic adaptive management framework*. During the course of the research, a number of challenges to implementing such an inclusionary approach were identified including cost, institutional barriers, different institutional logics towards M&E, capacity and differing priorities of stakeholders (cf. Scheepers et al 2011; Rist et al 2013; Wahlén 2014). Exacerbating these challenges, in some cases, was a moderate level of distrust between individuals within and across various institutions, including the concern that KNP would even involve community members in such an M&E program. As one community workshop participant highlighted, *'if it* [the

monitoring scheme] *is taken seriously by KNP, this will be a huge benefit for the communities*'. Working diligently to confront these challenges, and mending these relationships, should be a priority.

Overcoming these challenges necessitates *effective self-mobilization and engagement between the KNP/SANParks and its neighboring communities*. Emerson et al (2009) demonstrated that such engagement is vital to not only reaching agreement, but also is a major contributor to the quality of agreement, and improved working relationships among parties. In this case, broadening engagement beyond e.g. the DCA Compensation Committee and recognized Community Fora which liaise with the KNP should be sought, particularly livestock farmer associations and Traditional/Tribal Authorities, which were identified in the community workshops as major role players in the human-wildlife conflict issue. By effectively engaging with these, and other relevant actors, the first step towards a successful PM&E process will have been realized (Figure 3).

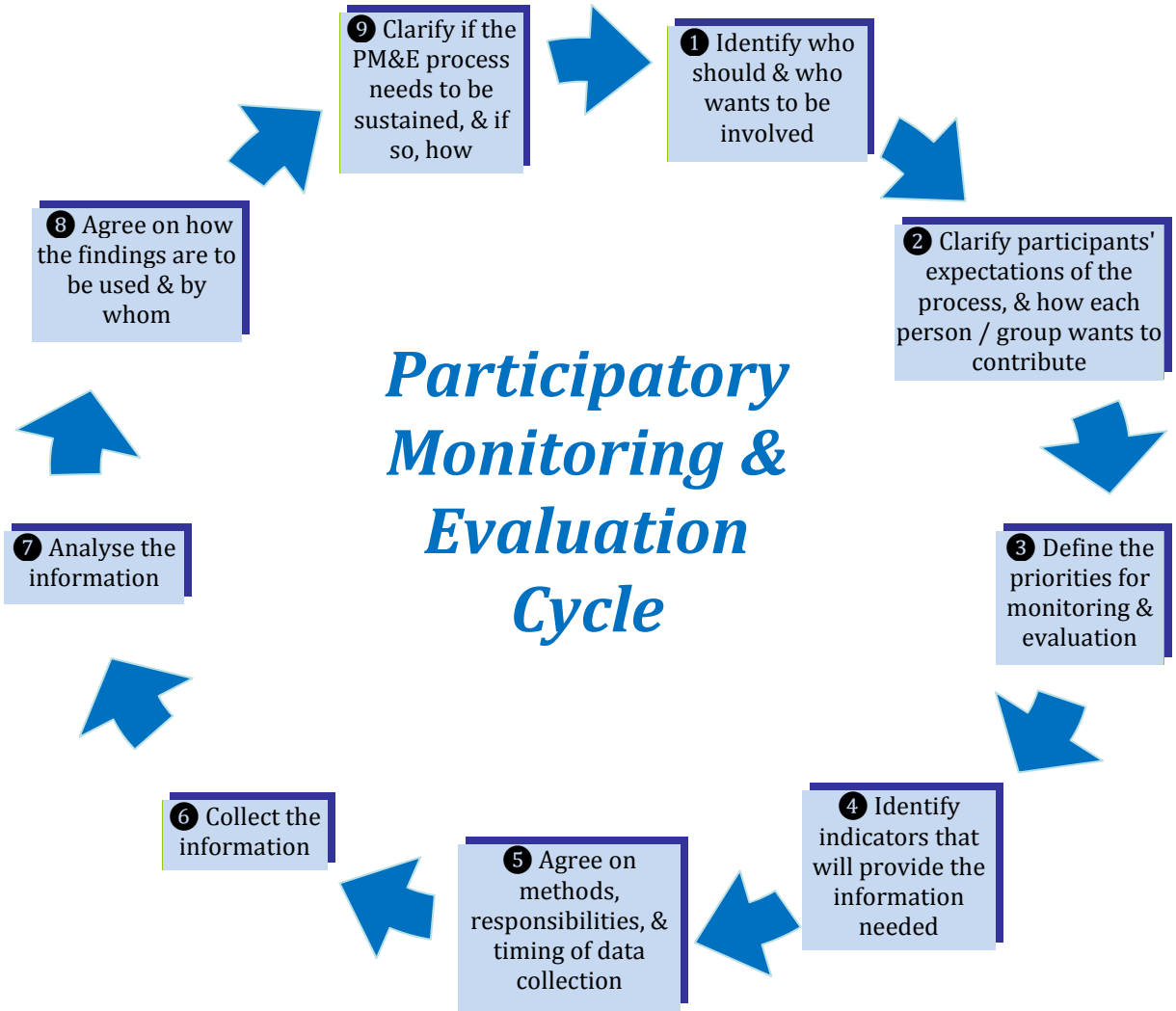

Figure 3: The Participatory Monitoring & Evaluation Cycle (adapted from Guijt & Gaventa 1998)

Using a framework, such as the one presented in Figure 3, can help to guide the PM&E process, which is based on four broad principles (Guijt & Gaventa 1998):

1. **Participation** - this means continuing to solicit the perspectives of those most directly affected (e.g. livestock farmers) to the design of the process and agreeing to analyze data together. This also requires an agreed definition of the problem which, as this study has uncovered, is multi-faceted. Problem definitions that fail to appreciate the historical, and socio-economic, organizational, and political contexts can lead to faltering M&E programs because they are inadequate to clarify goals, generate practical alternatives, and to justify the goals and the selected alternative to the broader public and to decision and policy makers. To be useful, therefore, the problem definition must go beyond simply describing an undesirable state (or 'envelope of acceptable variability'; see Biggs et al 2011), or even a more desirable alternative. It must also outline the steps necessary to achieve the desired state, and indicate if the problem is even worth solving (Clark et al 1996).
2. The inclusiveness of PM&E also requires a good deal of **negotiation** to reach agreement about (i) what is the goal of the monitoring to be undertaken, (ii) what will be monitored or evaluated, (iii) how and when data will be collected and analyzed (e.g. by initiating the development of 'participatory statistics'; see Holland 2013), (iv) what the data actually means, (v) how findings will be communicated to managers, decision makers and the public, and (vi) what action will be taken (Boisserie et al 2014). Furthermore, stakeholders' view on success may depend on whether they consider the participatory activity as an end in itself or as a means to an end.
3. The two previous steps should lead to **learning** which becomes the basis for subsequent improvement and corrective action.
4. Lastly, since the number, role, and skills of stakeholders, the external environment, and other factors change over time, **flexibility** is essential for sustaining such PM&E systems. For example, to build both continuity and capacity for community-level monitoring, opportunities to enlist and involve the Expanded Public Works Program's (EPWP) *Environmental Monitors* should be explored (http://www.epwp.gov.za/ ; cf. Kolowski & Holekamp 2006; Hazzah et al 2014). This EPWP has been successfully utilizing community-based Environmental Monitors throughout the K2C region and elsewhere, and may prove instrumental in ensuring (more) sustainable resources to any M & E implemented.

The next steps necessary to develop such a PM&E program are in the hands of the multiple stakeholders concerned with the DCA issue, primarily KNP/SANParks and affected livestock farmers and other community members adjacent to the park. It is my hope that they will co-operatively chart the way forward to meet their own (and each other's) objectives for this compensation scheme, and for alleviating conflict.

REFERENCES

Agarwala, M., Kumar, S., Treves, A. and L. Naughton-Treves. 2010. Paying for wolves in Solapur, India and Wisconsin, USA: Comparing compensation rules and practice to understand the goals and politics of wolf conservation. *Biological Conservation* 143 (12):2945-2955.

Allen, C.R., Fontaine, J.J., Pope, K.L. and A.S. Garmestani. 2011. Adaptive management for a turbulent future. *Journal of Environmental Management* 92:1339-1345.

Anthony, B.P. 2006. A view from the other side of the fence: Tsonga communities and the Kruger National Park, South Africa. Ph.D. thesis. Central European University, Budapest, Hungary.

Anthony, B.P. 2007. The dual nature of parks: Attitudes of neighbouring communities towards Kruger National Park, South Africa. *Environmental Conservation* 34(3):236-245.

Anthony, B.P. and J. Wasambo. 2009. *Human-wildlife conflict study report: Vwaza Marsh Wildlife Reserve, Malawi*. Prepared for Malawi Department of National Parks and Wildlife. Budapest, Hungary, Central European University.

Anthony, B.P., Scott, P. and A. Antypas. 2010. Sitting on the fence? Policies and practices in managing human-wildlife conflict in Limpopo Province, South Africa. *Conservation & Society* 8(3):225-240.

Anthony, B.P., and A. Szabo. 2011. Protected areas: Conservation cornerstones or paradoxes? Insights from human-wildlife conflicts in Africa and Southeastern Europe. In *The Importance of Biological Interactions in the Study of Biodiversity.* (ed. López-Pujol, J.), pp 255-282, Rijeka, Croatia: InTech Publishers.

Barua, M., Bhagwat, S.A. and J. Sushrut. 2013. The hidden dimensions of human-wildlife conflict: Health impacts, opportunity and transaction costs. *Biological Conservation* 157:309-316.

Baruch-Mordo, S., Breck, S.W., Wilson, K.R. and J, Broderick. 2009. A Tool Box Half Full: How Social Science can Help Solve Human-Wildlife Conflict. *Human Dimensions of Wildlife* 14 (3):219-223.

Bath, A.J. and J.W. Enck. 2003. Wildlife-human interactions in national parks in Canada and the USA. *NPS Social Science Research Review* 4(1):1-32.

Biggs, H.C. and K.H. Rogers. 2003. An adaptive system to link science, monitoring and management in practice. In *The Kruger experience: Ecology and management of savanna heterogeneity* (eds. du Toit, J.T., K.H. Rogers, and H.C. Biggs), pp 59-80, Washington, DC: Island Press.

Biggs, H., Ferreira, S., Freitag-Ronaldson, S. and R. Grant-Biggs. 2011. Taking stock after a decade: Does the 'thresholds of potential concern' concept need a socio-ecological revamp? *Koedoe* 53(2):Art. #1002, 9 pages. doi:10.4102/koedoe.v53i2.1002.

Bisi, J. and S. Kurki. 2005. *The wolf discourse in Finland: Provincial and national expectations and objectives for the management of the Finnish wolf population*. Ruralia Institute, University of Helsinki (in Finnish with English abstract).

Blanco, J.C. 2003. Wolf Damage Compensation Schemes in Spain. *Carnivore Damage Prevention News* 6:7-9.

Boissiere, M., Bastide, F., Basuki, I., Pfund, J.L. and A. Boucard. 2014. Can we make participatory NTFP monitoring work? Lessons learnt from the development of a multi-stakeholder system in Northern Laos. *Biodiversity and Conservation* 23(1):149-170.

Boitani, L., Ciucci, P. and E. Raganella-Pelliccioni. 2010. Ex-post compensation payments for wolf predation on livestock in Italy: a tool for conservation? *Wildlife Research* 37(8):722-730.

Brahmbhatt, D.P., Fosgate, G.T., Dyason, E., Budke, C.M., Gummow, B., Jori, F., Ward, M.P. and R. Srinivasan. 2012. Contacts between domestic livestock and wildlife at the Kruger National Park interface of the Republic of South Africa. *Preventive Veterinary Medicine* 103(1):16-21.

Breitenmoser, U. 1998. Large predators in the Alps: The fall and rise of man's competitors. *Biological Conservation* 83(3):279-289.

Browne-Nunez, C. and S.A. Jonker. 2008. Attitudes toward wildlife and conservation across Africa: a review of survey research. *Human Dimensions of Wildlife* 13(1):47-70.

Bulte, E.H. and D. Rondeau. 2005. Why compensating wildlife damages may be bad for conservation. *Journal of Wildlife Management* 69(1):14-19.

Bulte, E. and D. Rondeau. 2007. Compensation for wildlife damages: Habitat conversion, species preservation and local welfare. *Journal of Environmental Economics and Management* 54:311-322.

Catley, A., Burns, J., Abebe, D. and O. Suji. 2007. *Participatory Impact Assessment: A Guide for Practitioners*. Medford, MA: Feinstein International Center, Tufts University.

Chaminuka, P., McCrindle, C.M.E. and H.M.J. Udo. 2012. Cattle farming at the wildlife/livestock interface: assessment of costs and benefits adjacent to Kruger National Park, South Africa. *Society & Natural Resources* 25(3):235-250.

Chardonnet, P., Soto, B., Fritz, H., Crosmary, W., Drouet-Hoguet, N., Mesochina, P., Pellerin, M., Mallon, D., Bakker, L., Boulet, H. and F. Lamarque. 2010. *Managing the conflicts between people and lion: review and insights from the literature and field experience*. Wildlife Management Working Paper 13. Rome: Food and Agriculture Organization of the United Nations.

Chase, L.C., Decker, D.J. and T.B. Lauber. 2004. Public Participation in Wildlife Management: What Do Stakeholders Want? *Society & Natural Resources* 17(7):629-639.

Cheldelin, S., Druckman, D. and L. Fast (eds). 2003. *Conflict: from analysis to intervention*. London: Continuum.

Choudhury, A. 2004. Human-elephant conflicts in northeast India. *Human Dimensions of Wildlife* 9(4):261-270.

Clark, T.W., Curlee, A.P. and R.P. Reading. 1996. Crafting effective solutions to the large carnivore conservation problem. *Conservation Biology* 10(4):940-948.

Cock, J. and D. Fig. 2000. From colonial to community based conservation: Environmental justice and the national parks in South Africa. *Society in Transition* 31(1):22-35.

Crawshaw, P.G. Jr. 2004. Depredation of domestic animals by large cats in Brazil. *Human Dimensions of Wildlife* 9(4):329-330.

Curtin, C.G. 2002. Integration of science and community-based conservation in the Mexico-U.S. borderland. *Conservation Biology* 16(4):880-886.

Dar, N.I., Minhas, R.A., Zaman, Q. and M. Linkie. 2009. Predicting the patterns, perceptions and causes of human-carnivore conflict in and around Machiara National Park, Pakistan. *Biological Conservation* 142(10):2076-2082.

de Boer, W.F. and D.S. Baquete. 1998. Natural resource use, crop damage and attitudes of rural people in the vicinity of the Maputo Elephant Reserve, Mozambique. *Environmental Conservation* 25(3):208-218.

Decker, D.J., Lauber, T.B. and W.F. Siemer. 2002. *Human-wildlife conflict management*. Ithaca, NY: Northeast Wildlife Damage Management Research and Outreach Cooperative.

DeMotts, R. and P.Hoon. 2012. Whose elephants? Conserving, compensating, and competing in northern Botswana. *Society & Natural Resources* 25(9):837-851.

Dickman, A.J. 2010. Complexities of conflict: the importance of considering social factors for effectively resolving human–wildlife conflict. *Animal Conservation* 13(5):458-466.

Dickman, A.J., Macdonald, E.A. and D.W. Macdonald. 2011. A review of financial instruments to pay for predator conservation and encourage human-carnivore coexistence. *Proceedings of the National Academy of Sciences* 108(34):13937-13944.

Doolittle, A. 2003. Finding a new direction during a participatory community mapping project. *Tropical Resources* 22:74–78.

Dublin, H.T. and R.E. Hoare. 2004. Searching for solutions: the evolution of an integrated approach to understanding and mitigating human-elephant conflict in Africa. *Human Dimensions of Wildlife* 9(4):271-278.

Els, H. 1994. Werknermers van die Nasionale Krugerwildtuin se waarde-oordele oor aspekte van die natuur en natuurbewaring (Value judgements of personnel of the Kruger National Park on aspects of nature and nature conservation). *South African Journal of Ethnology* 17(4):109-120.

Els, H. 1995. Value and function of the Kruger National Park - value judgements of rest camp personnel. *South African Journal of Ethnology* 18(1):12-21.

Emerson, K., Orr, P.J., Keyes, D.L. and K.M. McKnight. 2009. Environmental conflict resolution: Evaluating performance outcomes and contributing factors. *Conflict Resolution Quarterly* 27(1):27-64.

Emerton, L. 2001. The nature of benefits and the benefits of nature: Why wildlife conservation has not economically benefited communities in Africa. In: *African wildlife & livelihoods: The promise & performance of community conservation* (eds. Hulme, D. and M. Murphree), pp 208-226. Cape Town: David Philip Publishers.

Fabricius, C. and G. Cundill. 2014. Learning in Adaptive Management: Insights from Published Practice. *Ecology and Society* 19 (1 C7-29)

Ferguson, K., Adam, L. and F. Jori. 2009. An Adaptive Monitoring Programme for Studying Impacts Along the Western Boundary Fence of Kruger National Park, South Africa. In *Fencing for Conservation: Restriction of Evolutionary Potential or a Riposte to Threatening Processes?* ed. Somers, M.J. and Hayward, M.W., pp 105-123. New York: Springer.

Ferguson, K. and J. Hanks. (eds). 2010. *Fencing Impacts: A review of the environmental, social and economic impacts of game and veterinary fencing in Africa with particular reference to the Great Limpopo and Kavango-Zambezi Transfrontier Conservation Areas*. Pretoria: Mammal Research Institute, University of Pretoria.

Fourli, M. 1999. *Compensation for damage caused by bears and wolves in the European Union*. Luxembourg, Office for Official Publications of the European Communities.

Freitag-Ronaldson, S. and L.C. Foxcroft. 2003. Anthropogenic influences at the ecosystem level. In: *The Kruger experience: Ecology and management of savanna heterogeneity* (eds. du Toit, J.T., K.H. Rogers and H.C. Biggs). pp. 391-421. Washington: Island Press.

Gaylard, A. and S. Ferreira. 2011. Advances and challenges in the implementation of strategic adaptive management beyond the Kruger National Park – Making linkages between science and biodiversity management. *Koedoe* 53(2):Art. #1005, doi:10.4102/koedoe. v53i2.1005.

Goldman, M.J., Roque De Pinho, J. and J. Perry. 2010. Maintaining Complex Relations with Large Cats: Maasai and Lions in Kenya and Tanzania. *Human Dimensions of Wildlife: An International Journal* 15(5):332-346.

Graham, K., Beckerman, A.P. and S. Thirgood. 2005. Human–predator–prey conflicts: ecological correlates, prey losses and patterns of management. *Biological Conservation* 122:159-171.

Groothoff, D. 2004. Animals and animosities: a Tsonga community wildlife project in the Limpopo Province of South Africa. MA thesis, Faculty of Social Sciences, Department of Culture, Organization and Management, Vrije Universiteit, Amsterdam.

Guijt, I. and J. Gaventa. 1998. *Participatory Monitoring & Evaluation: Learning from Change*. No. 12. Brighton, UK: Institute for Development Studies.

Happold, D.C.D. 1995. The interaction between humans and mammals in Africa in relation to conservation: A review. *Biodiversity and Conservation* 4(4):395-414.

Hazzah, L. 2006. Living among lions (*Panthera leo*): coexistence or killing? Community attitudes towards conservation initiatives and the motivations behind lion killing in Kenyan Maasailand. In: *Conservation Biology and Sustainable Development*. University of Wisconsin-Madison, Madison, p. 140.

Hazzah, L., Borgerhoff Mulder, M. and L. Frank. 2009. Lions and warriors: Social factors underlying declining African lion populations and the effect of incentive-based management in Kenya. *Biological Conservation* 142:2428-2437.

Hazzah, L., Dolrenry, S., Naughton, L., Edwards, C.T.T., Mwebi, O., Kearney, F. and L. Frank. 2014. Efficacy of Two Lion Conservation Programs in Maasailand, Kenya. *Conservation Biology* 28(3):851-860.

Hewitt, D.G. and T.A. Messmer. 1997. Responsiveness of agencies and organizations to wildlife damage: policy process implications. *Wildlife Society Bulletin* 25(2):418-423.

Hill, C.M. 2004. Farmers' perspectives of conflict at the wildlife-agriculture boundary: some lessons learned from African subsistence farmers. *Human Dimensions of Wildlife* 9(4):279-286.

Holland, J.H. 2006. Studying complex adaptive systems. *Journal of Systems Science and Complexity* 19(1):1-8.

Holland, J. (ed). 2013. *Who Counts? The Power of Participatory Statistics*. Rugby, UK: Practical Action Publishing.

Holling, C.S. 1978. *Adaptive environmental assessment and management*. Vienna: IIASA.

Holmes, G. 2013. Exploring the Relationship Between Local Support and the Success of Protected Areas. *Conservation & Society* 11(1):72-82.

Hussain, S. 2003. Snow Leopards and Local Livelihoods: Managing the Emerging Conflicts through an Insurance Scheme. *Carnivore Damage Prevention News* 6:9-11.

Inskip, C. and A. Zimmermann. 2009. Human-felid conflict: a review of patterns and priorities worldwide. *Oryx* 43(1):18-34.

Jackson, R.M. and R. Wangchuk. 2004. A community-based approach to mitigating livestock depredation by snow leopards. *Human Dimensions of Wildlife* 9(4):307-316.

Jeffery, B., Abonyi, S., Labonte, R. and K. Duncan. 2006. Engaging Numbers: Developing Health Indicators that Matter for First Nations and Inuit People. *Journal of Aboriginal Health* 3(1):44-52.

Jori, F., Brahmbhatt, D., Fosgate, G.T., Thompson, P.N., Budke, C., Ward, M.P., Ferguson, K. and B. Gummow. 2011. A questionnaire-based evaluation of the veterinary cordon fence separating wildlife and livestock along the boundary of the Kruger National Park, South Africa. *Preventive Veterinary Medicine* 100(3-4):210-220.

Kahler, J.S., Roloff, G.J. and M.L. Gore. 2012. Poaching risks in community-based natural resource management. *Conservation Biology* 27(1):177-186.

Kaltenborn, B.P., Bjerke, T. and J. Nyahongo. 2006. Living with Problem Animals: Self-Reported Fear of Potentially Dangerous Species in the Serengeti Region, Tanzania. *Human Dimensions of Wildlife* 11(6):397-409.

Kansky, R., Kidd, M. and A.T. Knight. 2014. Meta-Analysis of Attitudes toward Damage-Causing Mammalian Wildlife. *Conservation Biology*: Early View, DOI: 10.1111/cobi.12275

Karanth, K.K., Gopalaswamy, A.M., Prasad, P.K. and S. Dasgupta. 2013. Patterns of human-wildlife conflicts and compensation: Insights from Western Ghats protected areas. *Biological Conservation* 166:175-185.

Kolowski, J.M. and K.E Holekamp. 2006. Spatial, temporal, and physical characteristics of livestock depredations by large carnivores along a Kenyan reserve border. *Biological Conservation* 128:529-541.

Lamarque, F., Anderson, J., Fergusson, R., Lagrange, M., Osei-Owusu, Y. and L. Bakker. 2009. *Human-wildlife conflict in Africa: causes, consequences and management strategies*. FAO Forestry Paper 157. Rome: Food and Agriculture Organization of the United Nations.

Lindsey, P.A., Alexander, A., du Toit, J.T. and M.G.L. Mills. 2005. The cost efficiency of wild dog conservation in South Africa. *Conservation Biology* 19:1205–1214.

Lindsey, P.A., Havemann, C.P., Lines, R., Palazy, L., Price, A.E., Retief, T.A., Rhebergen, T. and C. Van der Waal. 2013. Determinants of Persistence and Tolerance of Carnivores on Namibian Ranches: Implications for Conservation on Southern African Private Lands. *PLoS ONE* 8(1):e52458.

Linkov, I., Satterstrom, F.K., Kiker, G., Batchelor, C., Bridges, T. and E. Ferguson. 2006. From comparative risk assessment to multi-criteria decision analysis and adaptive management: Recent developments and applications. *Environment International* 32(8):1072-1093.

Linnell, J.D.C. and H. Brøseth. 2003. Compensation for Large Carnivore Depredation of Domestic Sheep 1994-2001. *Carnivore Damage Prevention News* 6:11-13.

Linnell, J., Odden, J. and A. Mertens. 2012. Mitigation methods for conflicts associated with carnivore depredation on livestock. In *Carnivore ecology and conservation: A handbook of techniques*, (eds. Boitani, L. and R.A. Powell), pp. 314-332, Oxford: Oxford University Press.

Lockwood, M. 2010. Good governance for terrestrial protected areas: A framework, principles and performance outcomes. *Journal of Environmental Management* 91:754-766.

Lund, J.F. 2014. Towards a more balanced view on the potentials of locally-based monitoring. *Biodiversity and Conservation* 23(1):237-239.

Maclennan, S.D., Groom, R.J., Macdonald, D.W. and L.G. Frank. 2009. Evaluation of a compensation scheme to bring about pastoralist tolerance of lions. *Biological Conservation* 142:2419-2427.

Madden, F. 2004. Creating coexistence between humans and wildlife: Global perspectives on local efforts to address human-wildlife conflict. *Human Dimensions of Wildlife* 9(4):247-258.

Madhusudan, M.D. 2003. Living Amidst Large Wildlife: Livestock and Crop Depredation by Large Mammals in the Interior Villages of Bhadra Tiger Reserve, South India. *Environmental Management* 31(4):0466-0475.

Majic, A. and A. Bath. 2010. Changes in attitudes toward wolves in Croatia. *Biological Conservation* 143:255-260.

Manfredo, M.J. and A.A. Dayer. 2004. Concepts for Exploring the Social Aspects of Human-Wildlife Conflict in a Global Context. *Human Dimensions of Wildlife* 9(4):17-328.

Maris, V. and A. Béchet. 2010. From adaptive management to adjustive management: A pragmatic account of biodiversity values. *Conservation Biology* 24(4):966-973.

Marvasti, A.B. 2004. *Qualitative Research in Sociology: an Introduction*. London: SAGE Publications.

Matiru, V. 2000. *Conflict and natural resource management*. Rome: Food and Agriculture Organization of the United Nations.

Mattson, D.J. 2004. Living with Fierce Creatures? An Overview and Models of Mammalian Carnivore Conservation. In *People and Predators: From Conflict to Coexistence.* ed. Fascione, Nina, Delach, Aimee and Smith, Martin E., pp 151-176. Washington: Island Press.

McCleery, R.A. 2009. Improving attitudinal frameworks to predict behaviors in human-wildlife conflicts. *Society & Natural Resources* 22:353-368.

McGregor, J. 2005. Crocodile crimes: People versus wildlife and the politics of postcolonial conservation on Lake Kariba, Zimbabwe. *Geoforum* 36(3):353-369.

Merkle, J.A., Krausman, P.R. and M.M. Booth. 2011. Behavioral and attitudinal change of residents exposed to human-bear interactions. *Ursus* 22(1):74-83.

Messmer, T.A. 2000. The emergence of human-wildlife conflict management: turning challenges into opportunities. *International Biodeterioration and Biodegradation* 45:97-102.

Mishra, C. 1997. Livestock depredation by large carnivores in the Indian trans-Himalaya: conflict perceptions and conservation prospects. *Environmental Conservation* 24(4):338-343.

Mishra, C., Allen, P., McCarthy, T., Madhusudan, M. D., Bayarjargal, A. and H.H.T. Prins. 2003. The role of incentive programs in conserving the snow leopard. *Conservation Biology* 17(6):1512–1520.

Montag, J. 2003. Compensation and Predator Conservation: Limitations of Compensation. *Carnivore Damage Prevention News* 6:2-6.

Morrison, K., Victurine, R. and C. Mishra. 2009. *Lessons Learned, Opportunities and Innovations in Human Wildlife Conflict Compensation and Insurance Schemes*. Bronx, NY: WCS TransLinks Program.

Naughton-Treves, L., Grossberg, R. and A. Treves. 2003. Paying for Tolerance: Rural Citizens' Attitudes toward Wolf Depredation and Compensation. *Conservation Biology* 17(6):1500-1511.

Nemtzov, S.C. 2003. A short-lived wolf depredation compensation program in Israel. *Carnivore Damage Prevention News* 6:16-17.

Niemela, J., Young, J., Alard, D., Askasibar, M., Henle, K., Johnson, R., Kurttila, M., Larsson, T-B., Matouch, S., Nowicki, P., Paiva, R., Portoghesi, L., Smulders, R., Stevenson, A., Tartes, U. and A. Watt. 2005. Identifying, managing and monitoring conflicts between forest biodiversity conservation and other human interests in Europe. *Forest Policy and Economics* 7(6):877-890.

Nyhus, P., Fischer, H., Madden, F. and S. Osofsky. 2003. Taking the bite out of wildlife damage. *Conservation in Practice* 4(2):37-40

Nyhus, P.J., Osofsky, S.A., Ferraro, P., Madden, F. and H. Fischer. 2005. Bearing the costs of human-wildlife conflict: the challenges of compensation schemes. In *People and wildlife: Conflict or coexistence?* (eds. Woodroffe, R., S. Thirgood, and A. Rabinowitz). pp 107-121. Cambridge: Cambridge University Press.

Ogada, M.O., Woodroffe, R., Oguge, N.O. and L.G. Frank. 2003. Limiting depredation by African carnivores: the role of livestock husbandry. *Conservation Biology* 17(6):1521-1530.

Ogra, M. and R. Badola. 2008. Compensating human-wildlife conflict in protected area communities: Ground-level perspectives from Uttarakhand, India. *Human Ecology* 36(5):717-729.

Okello, M.M. 2005. Land use changes and human-wildlife conflicts in the Amboseli area, Kenya. *Human Dimensions of Wildlife* 10(1):19-28.

Pechacek, P., Li, G., Li, J., Wang, W., Wu, X. and J. Xu. 2012. Compensation payments for downsides generated by protected areas. *Ambio* 42(1):90-99.

Pollard, S., Shackleton, C. and J. Carruthers. 2003. Beyond the fence: People and the lowveld landscape. In: *The Kruger experience: Ecology and management of savanna heterogeneity* (eds. du Toit, J.T., K.H. Rogers and H.C. Biggs). pp. 422-446. Washington: Island Press.

Rao, K.S., Maikhuri, R.K., Nautiyal, S. and K.G. Saxena. 2002. Crop damage and livestock depredation by wildlife: a case study from Nanda Devi Biosphere Reserve, India. *Journal of Environmental Management* 66:317-327.

Redpath, S.M., Young, J., Evely, A., Adams, W.M., Sutherland, W.J., Whitehouse, A., Amar, A., Lambert, R.A., Linnell, J.D.C., Watt, A. and R.J. Gutiérrez. 2013. Understanding and managing conservation conflicts. *Trends in Ecology & Evolution* 28(2):100-109.

Richie, L., Oppenheimer, J.D. and S.G. Clark. 2012. Social process in grizzly bear management: lessons for collaborative governance and natural resource policy. *Policy Sciences* 45(3):265-291.

Rigg, R. and C. Sillero. 2010. *Georgian Carnivore Conservation Project Component: Mitigating human-carnivore conflict in East Georgia: Phase 2: Developing an HCC mitigation toolbox*. FFI & NACRES.

Rist, L., Campbell, B.M. and P. Frost. 2013. Adaptive management: where are we now? *Environmental Conservation* 40(1):5-18.

Ritchie, J. and J. Lewis (eds.). 2003. *Qualitative Research Practice: a Guide for Social Science Students and Researchers*. London: SAGE Publications.

Roche, C. 1999. *Impact Assessment for Development Agencies - Learning to Value Change*. Oxford: Oxfam, Novib.

Rodriguez, S.L. 2008. Perceptions and Attitudes of a Maasai Community Regarding Wildlife-Damage Compensation, Conservation, and the Predators that Prey on Their Livestock. *Human Dimensions of Wildlife* 13(3):205-206.

Romanach, S.S., Lindsey, P.A. and R. Woodroffe. 2007. Determinants of attitudes towards predators in central Kenya and suggestions for increasing tolerance in livestock dominated landscapes. *Oryx* 41(2):185-195.

Roux, D.J. and L.C. Foxcroft. 2011. The development and application of strategic adaptive management within South African National Parks. *Koedoe* 53(2): 5 pp. doi:10.4102/koedoe.v53i2.1049.

SANParks. 2012. *South African National Parks Strategic Plan for 2012/13 – 2016/17*. Available at http://www.sanparks.org/assets/docs/about/5_year_strategic_plan_2012-2013_to_2016-2017.pdf

Scheepers, K., Swemmer, L. and W.J. Vermeulen. 2011. Applying adaptive management in resource use in South African National Parks: A case study approach. *Koedoe* 53(2): 14 pp. doi:10.4102/koedoe.v53i2.999.

Scholes, R.J. and K.G. Mennell (eds.). 2008. *Elephant management: A scientific assessment for South Africa*. Johannesburg: Wits University Press.

Schreckenberg, K., Camarago, I., Withnall, K., Corrigan, C., Franks, P., Roe, D., Scherl, L.M. and V. Richardson. 2010. *Social assessment of conservation initiatives: A review of rapid methodologies*. London: International Institute for Environment and Development.

Schwerdtner, K. and B. Gruber. 2007. A conceptual framework for damage compensation schemes. *Biological Conservation* 134(3):354-360.

Skogen, K. 2003. Adapting Adaptive Management to a Cultural Understanding of Land Use Conflicts. *Society & Natural Resources* 16:435-450.

St. John, F.A.V., Keane, A.M., Edwards-Jones, G., Jones, L., Yarnell, R.W. and J.P.G. Jones. 2012. Identifying indicators of illegal behaviour: carnivore killing in human-managed landscapes. *Proceedings of the Royal Society B: Biological Sciences* 279:804-812.

Strathern, M. (ed.). 2000. *Audit cultures: anthropological studies in accountability, ethics and the academy.* New York, NY: Routledge.

Stringer, L.C., Dougill, A.J., Fraser, E., Hubacek, K., Prell, C. and M.S. Reed. 2006. Unpacking 'Participation' in the Adaptive Management of Social-ecological Systems: a Critical Review. *Ecology and Society* 11(2):C7-39.

Swemmer, L.K. and S. Taljaard. 2011. SANParks, people and adaptive management: Understanding a diverse field of practice during changing times. *Koedoe* 53(2): 7 pp. doi:10.4102/koedoe.v53i2.1017.

Thompson, J.R., Elmendorf, W.F., McDonough, M.H. and L.L. Burban. 2005. Participation and Conflict: Lessons Learned From Community Forestry. *Journal of Forestry* 103(4):174-178.

Thorn, M., Green, M., Dalerum, F., Bateman, P.W. and D.M. Scott. 2012. What drives human-carnivore conflict in the North West Province of South Africa? *Biological Conservation* 150(1):23-32.

Treves, A. and J. Bruskotter. 2014. Tolerance for Predatory Wildlife. *Science* 344(6183):476-477.

Treves, A. and K.U. Karanth. 2003. Introduction: Special section: Human-carnivore conflict: Local solutions with global applications. *Conservation Biology* 17(6):1489-1490.

Treves, A., Wallace, R.B., Naughton-Treves, L. and A. Morales. 2006. Co-Managing Human-Wildlife Conflicts: A Review. *Human Dimensions of Wildlife* 11(6):383-396.

Treves, A., Wallace, R.B. and S. White. 2009. Participatory Planning of Interventions to Mitigate Human–Wildlife Conflicts. *Conservation Biology* 23(6):1577-1587.

Václaviková, M., Václavik, T. and V. Kostkan. 2011. Otters vs. fishermen: Stakeholders' perceptions of otter predation and damage compensation in the Czech Republic. *Journal for Nature Conservation* 19(2):95-102.

Venter, F.J., Naiman, R.J., Biggs, H.C. and D.J. Pienaar. 2008. The Evolution of Conservation Management Philosophy: Science, Environmental Change and Social Adjustments in Kruger National Park. *Ecosystems* 11(2):173-192.

Vynne, S.J. 2009. Livestock Compensation for the Mexican Gray Wolf: Improving Tolerance or Increasing Tension? *Human Dimensions of Wildlife* 14(6):456-457.

Wagner, K.K., Schmidt, R.H. and M.R. Conover. 1997. Compensation Programs for Wildlife Damage in North America. *Wildlife Society Bulletin* 25(2):312-319.

Wahlén, C.B. 2014. Constructing Conservation Impact: Understanding Monitoring and Evaluation in Conservation NGOs. *Conservation & Society* 12(1):77-88.

Westgate, M.J., Likens, G.E. and D.B. Lindenmayer. 2013. Adaptive management of biological systems: A review. *Biological Conservation* 158:128-139.

White, P.C.L. and A.I. Ward. 2010. Interdisciplinary approaches for the management of existing and emerging human-wildlife conflicts. *Wildlife Research* 37(8):623-629.

W.K. Kellogg Foundation. 2004. *Logic Model Development Guide: Using Logic Models to Bring Together Planning, Evaluation, and Action*. Battle Creek, Michigan: W.K. Kellogg Foundation.

Woodroffe, R. 2000. Predators and people: Using human densities to interpret declines of large carnivores. *Animal Conservation* 3:165-173.

Woodroffe, R. 2001. Strategies for carnivore conservation: Lessons from contemporary extinctions. In: *Carnivore conservation* (eds. Gittleman, J.L., S.M. Funk, D.W. Macdonald and R.K. Wayne). pp 61-92. Cambridge: Cambridge University Press.

Woodroffe, R., Thirgood, S. and A. Rabinowitz (eds.). 2005. *People and wildlife, conflict or co-existence?* Cambridge: Cambridge University Press, Conservation Biology, No 9.

WWF. 2005. *Human Wildlife Conflict Manual*. Gland, Switzerland: WWF.

WWF. 2008. *Common Ground: Solutions for reducing the human, economic and conservation costs of human wildlife conflict*. Gland, Switzerland: WWF.

Young, J.C., Marzano, M., White, R.M., McCracken, D.I., Redpath, S.M., Carss, D.N., Quine, C.P. and A.D. Watt. 2010. The emergence of biodiversity conflicts from biodiversity impacts: characteristics and management strategies. *Biodiversity and Conservation* 19(14):3973-3990.

Zedrosser, A., Dahle, B., Swenson, J.E. and N. Gerstl. 2001. Status and management of the brown bear in Europe. *Ursus* 12:9-20.

Zinn, H.C., Manfredo, M.J. and J.J. Vaske. 2000. Social psychological bases for Stakeholder Acceptance Capacity. *Human Dimensions of Wildlife: An International Journal* 5(3):20-33.

APPENDIX I. KNP WORKSHOP RESULTS

Goal(s)	Process/Objective(s)	Indicator(s)	Monitoring & Evaluation		
			Who?	**How?**	**When?**
Ameliorate negative tangible and intangible effects incurred as a result of human-wildlife conflict.[1,2]	Understanding by livestock farmers of process required to lodge successful claim	assessing knowledge of claim verification and process	Livestock farmers and KNP	Survey at multiple levels – community forums, livestock farmers Meetings, dipping tanks or at households	At start of compensation process, and then annually
		ratio of correctly completed claim forms: total forms submitted	DCA Manager KNP	Comparing figures	Monthly/Annually
	Efficient and effective damage verification process	% of completed HWC Incident Reports	DCA Manager KNP	Comparing figures	Monthly/Annually
		% of successfully compensated cases compared to number submitted	DCA Manager KNP	Comparing figures	Monthly/Annually
	Roles and responsibilities of relevant stakeholders are clearly defined, understood, and implemented.	stakeholder roles and responsibilities clearly defined in documentation	DCA Task team,(Incl. manager and provinces)	Assessing document	Once off, then with each revision of document
		number of communication efforts to communicate roles and responsibilities / protocol	DCA Manager KNP	Assessing minutes of meetings	Once off, then with each revision of document
		accuracy of knowledge regarding roles and responsibilities by stakeholders	Stakeholders, KNP	Survey to assess knowledge at stakeholder level (within and between groups)	Once off, then with each revision of document, or as required
		number of incidents when roles and/or responsibilities contravened	DCA Manager KNP/Social Scientist	Comparing figures	Monthly/Annually
	Determination of compensation rates will be fairly reviewed by the appropriate party (Compensation Committee)	review of Compensation Committee meeting minutes	DCA Manager KNP/Social Scientist	Reading minutes	Monthly/Annually
		claimants' satisfaction with rates of compensation	DCA Manager KNP/Social Scientist/KNP DCA team	Surveys post-compensation, forum meetings, compensation committee meetings	Monthly/Annually
	Ensure viability of sufficient resources (e.g. financial, time, human resource) to implement scheme	% of attended DCA incidents to reported incidents	Conservation officers, DCA manager	Comparison of data	Monthly/Annually
		adequate budget allocation for Compensation Fund	HOD P and C, DCA Manager	Budget management and application	Monthly/Annually
		allocation of appropriate resources for scheme to run smoothly	Compensation committee, Social Scientist (research)	Management meetings, compensation committee meetings	Standing point on Compensation Committee agenda
	Ensure no net decrease of societal support for conservation as a result of the compensation scheme	attitudes towards KNP and conservation, due to knowledge of and/or participation in compensation scheme	Social Scientist, DCA Manager, P&C and Conservation staff	surveys, focus groups, informal discussions, community fora meeting minutes review	more frequent in Year 1 / at least annually thereafter

Notes:
[1] goal & objectives are KNP-centric
[2] understanding within goal is that there are some sectors of society which bear more negative effects/costs from KNP than others

APPENDIX II. MAKUYA WORKSHOP RESULTS

Goal (prioritized)	Process/Objective(s)	Indicator(s)	Monitoring & Evaluation		
			Who?	**How?**	**When?**
1) Compensation must reflect market price ***plus*** invested / potential value of crop/livestock	Improve understanding of nature of relationship between offending and offended parties	no. of responses from KNP to come to village when invited	TAs	observation	quarterly
	Compensation rates negotiated & established	elected person(s) confirm negotiated rates	LF rep / CC	report	monthly
2) Improve relationship between communities, KNP, LEDET, and Makuya Reserve rangers	Regular meetings between stakeholders	number of meetings	LF rep	report	monthly
	Timeous response to damage and payment	time taken between report & response	claimant / TAs	from HWC reports	as needed
		time taken to receive payment	claimant / TAs	survey	as needed
	Improved employment recruitment from local communities (rangers, maintenance, etc.)	number of people employed per village	TAs	statistics	as needed
	Reduced poaching by local communities	number of poachers/poaching incidents	communities/TAs KNP/LEDET	observation; statistics	quarterly
3) Maintain / improve crop- and livestock-based livelihoods	increased community-based fence maintenance	number of DCA outbreaks	DVS/KNP/Makuya	observation; statistics	monthly
		causes of fence damage	DVS/KNP/Makuya	observation; statistics	monthly
	rapid response to control DCAs	time to respond to report	LEDET / reporter	observation; statistics	as needed
	qualified investigation / verification process (incl. community input and/or professional hunters)	qualified LEDET ranger(s) respond	TA/LFA/claimant	report	as needed
	kraaling livestock at night	% of livestock in kraals at night	community / TA / KNP	observation	daily monitoring, report every 2 weeks at community meeting
		proximity of KNP fence to community	community / TA / KNP	observation	as needed
4) Eliminate human injury / death resulting from DCAs	Community awareness re when to avoid KNP border (marula season, night, etc.)	number of households who received info	TAs / KNP	survey	annually
		number of persons injured/killed by DCAs	TAs / KNP	statistics	annually
	Fast & quality medical care	time taken to respond	community Medical Care Scheme	reports	as needed
		injuries leading to death, where death could have been prevented	community Medical Care Scheme	reports	as needed

Note: CC=Compensation Committee; DVS=Dept. of Veterinary Services; KNP=Kruger National Park; LEDET=Limpopo Dept. of Economic Development, Environment and Tourism; LF=livestock farmer; LFA=Livestock Farmers Association; TA=Traditional/Tribal Authority

APPENDIX III. HLANGANANI WORKSHOP RESULTS

Goal (prioritized)	Process/Objective(s)	Indicator(s)	Monitoring & Evaluation		
			Who?	How?	When?
1) Fair value for all damage should be given to affected owner hand-in-hand with sincere apology	Compensation should be accompanied by a face-to-face apology by DCA owner	% of tangible compensation claims in person	independent watchdog	survey claimants	monthly
	Husbandry practices must be applied by all to ensure sincerity	no. of DCA outbreaks/time	KNP, LEDET, TAs	observation	monthly
		% of farmers using kraals	TAs, Dept. of Agric.	observation	monthly
	Fair value of flat rate should be mutually negotiated in open, fair and just way	all parties sign MoU that has been thoroughly unpacked/scrutinised	selected representatives	observation	as needed
2) Improved husbandry of crops, livestock and wild animals	Fencing of grazing land where needed	no. of grazing camps fenced	stock forum	observation	daily monitoring / weekly reports
		proximity of cattle & buffalo	KNP/nduna	??	daily monitoring / weekly reports
	By-laws instituted to punish offenders	no. of municipalities with by-laws	TAs, livestock owners	statistics	monthly
		no. of offences/time	TAs, livestock owners	statistics	monthly
	Increased patrolling of fences	no. of patrollers	KNP/DVS, communities	statistics	monthly
		time spent patrolling	KNP/DVS, communities	statistics, observation	monthly
	Better land-use planning (allotment of grazing land, residences, etc.)	amount of good land for grazing	TAs >> municipalities	statistics, observation	quarterly
	Good verification process of damage	quality of HWC reports by LEDET	KNP, LEDET, livestock owner	observation	monthly at Forum meetings
		time from report to investigation	KNP, LEDET, livestock owner	statistics (& comparing claimant vs. investigator values)	monthly at Forum meetings
	Proper and frequent KNP fence upgrading and maintenance	adequate KNP fencing (%, km)	KNP/DVS	observation, statistics	daily monitoring, monthly reporting
	Better control of DCA when out of KNP	time of report to time of control	livestock owners, LEDET, KNP	statistics (& comparing claimant vs. investigator values)	monthly at Forum meetings
		% of DCA outbreaks that result in damage	livestock owners, LEDET, KNP	statistics	monthly at Forum meetings

Note: DVS=Dept. of Veterinary Services; KNP=Kruger National Park; LEDET=Limpopo Dept. of Economic Development, Environment and Tourism; TA=Traditional/Tribal Authority

APPENDIX IV. PHALABORWA WORKSHOP RESULTS

Goal (prioritized)	Process/Objective(s)	Indicator(s)	Monitoring & Evaluation		
			Who?	**How?**	**When?**
1) All damage compensated for all DCAs	good reporting structure	% of farmers who know whom to contact if DCAs damage crops/livestock	LFA/F village reps	LFA/F meetings	frequently in yr. 1; annually thereafter
		availability of contact person			
	good cooperation between KNP, private & provincial reserves, and farmers	semi-annual meetings of all stakeholders	all stakeholders	open discussion	semi-annually
		roles/responsibilities clearly defined & executed			
	efficient verification process (crops, livestock, etc.)	evidence protected & collected within 24 hours	complainant & investigator	- time measured - incident report	semi-annually
		qualified investigators cooperate with herders			
	adequate negotiation for fair market values for damaged crops/lost livestock	awareness level of fair market value	LFA/F & Dept. of Agriculture	Dept. of Agriculture statistics	seasonally
		availability of 3rd party to decide price			
2) DCA problem minimised	adequate fence upgrade/maintenance	no. of animals escaping from KNP	DVS, KNP, LEDET	exists(?)	ongoing
		no. of DCA incidents			
		% of fence in good condition			
		budget for fence upgrade/maintenance	DVS, KNP		
	adequate field rangers in KNP	no. of field rangers employed	KNP Human Resources	employment statistics	annually
	immediate response to DCA reports outside KNP	time it takes for investigator to arrive	complainant & investigator	- time measured - incident report	semi-annually
		tracking, shooting, capturing ability of investigator			
	good crop protection & animal husbandry practices	% of cattle in kraals at night (e.g. dung counts)	Stock Forum	- direct observation - report to LFA/F	as needed
		education/awareness of farmers on benefits of good practices (by responsible party)			annually
3) Owner of DCA admits responsibility & apologizes	Compensation must accompany apology to be genuine	ratio of claims compensated to those submitted	CC	statistics	annually
		letter of apology/remorse accompanies response for both valid and invalid claims	Independent researchers	survey of claimants	1-2 years
	Proactive approach by DCA owner to go to those affected (even by 3rd party)	No. of potentially affected parties who have been informed at program onset of what to expect if DCA damage occurs	Stock Forum	- direct observation - report to LFA/F	annually

Note: CC=Compensation Committee; DVS=Dept. of Veterinary Services; KNP=Kruger National Park; LEDET=Limpopo Dept. of Economic Development, Environment and Tourism; LFA/F=Livestock Farmers Association and/or Forum

APPENDIX V. LUBAMBISWANO WORKSHOP RESULTS

Goal (prioritized)	Process/Objective(s)	Indicator(s)	Monitoring & Evaluation		
			Who?	How?	When?
1) DCAs no longer exit KNP	Construction of adequate fencing	number of DCA outbreaks	MTPA/KNP/LubF/TAs	observation; statistics	monthly
	Local people employed to construct/maintain fence	% of employed fence workers that are local	LubF/TAs	statistics, HR reports	quarterly
		number of skilled fence workers/village	LubF/TAs	statistics	quarterly
	Improved communication between KNP, MTPA, Dept. of Agric, TAs, Lubambiswano Forum, and communities	number of meetings where all stakeholders attend	LubF/TAs	meeting minutes reviews	every 2 months
	Fence vandalism stopped	number of fence vandalism events	MTPA/KNP/LubF/TAs	observation; statistics	every 2 months
	Buffer area created between KNP and communal grazing area (e.g. 2nd fence)	number of cases of corridor disease	Dept. of Agric.	official reports	seasonal
		number of DCA outbreaks	MTPA/KNP/LubF/TAs	observation; statistics	monthly
		kilometres of buffer created	KNP/LubF/TAs/Dept. of Agric.	official reports	annual
2) All damage (crops, livestock, disease-related, infrastructure) compensated at fair market value	Good reporting structure in place and carried out	number of DCA incidents reported to correct party	LubF/TAs	survey	every 2 months
	Fast and proper assessment of any damage (crops, livestock, infrastructure)	number of cases reported to those that occurred	LubF/TAs	review of CC and TA/LubF reports	every 2 months
		time taken between report and investigation	owner/LubF/MTPA/ KNP	review of reports	every 2 months
	Evidence is captured (e.g. photos) with witness and protected	review of HWC Incident Reports submitted	CC / 3rd party	review of reports	every 2 months
	Knowledge of compensation claim process (incl. forms)	% of correctly completed forms	LubF/TAs	review of reports	quarterly
		% of community members who know of claim process	LubF/TAs	survey; community meetings	quarterly
	Access to existing independent committee(s) which can provide fair market values	regular publishing of rates by e.g. abattoirs	CC	random checks	monthly
	Payment is made timeously	time taken between claim submission and payment	LubF/3rd party	review of reports and KNP Finance records	quarterly

Note: CC=Compensation Committee; KNP=Kruger National Park; LubF=Lubambiswano Forum; MTPA=Mpumalanga Tourism and Parks Agency; TA=Traditional/Tribal Authority

APPENDIX VI. INDICATORS IDENTIFIED IN STUDY

No.	Indicator	Measure	Duplicate(s)
	KNP Workshop		
1	assessing knowledge of claim verification and process	Qn,Ql	18,28,33
2	ratio of correctly completed claim forms: total forms submitted	Qn	26
3	% of completed HWC Incident Reports	Qn	32
4	% of successfully compensated cases compared to number submitted	Qn	
5	stakeholder roles and responsibilities clearly defined in documentation	Ql	16
6	number of communication efforts to communicate roles and responsibilities / protocol	Qn	
7	accuracy of knowledge regarding roles and responsibilities by stakeholders	Ql	
8	number of incidents when roles and/or responsibilities contravened	Qn	
9	review of Compensation Committee meeting minutes	Qn,Ql	
10	claimants' satisfaction with rates of compensation	Ql	
11	% of attended DCA incidents to reported incidents	Qn	
12	adequate budget allocation for Compensation Fund	Qn	
13	allocation of appropriate resources for scheme to run smoothly	Ql	
14	attitudes towards KNP and conservation, due to knowledge of and/or participation in compensation scheme	Qn,Ql	
	Community Workshops		
15	no. of responses from KNP to come to village when invited	Qn,Ql	
16	roles/responsibilities clearly defined & executed	Ql	5
17	number of meetings where all stakeholders attend	Qn	
18	number of households who received info	Qn	1,28,33
19	number of persons injured/killed by DCAs	Qn	
20	elected person(s) confirm negotiated rates	Qn,Ql	
21	all parties sign MoU that has been thoroughly unpacked/scrutinized	Ql	
22	awareness level of fair market value	Qn	
23	availability of 3rd party to decide price	Qn	
24	regular publishing of rates by e.g. abattoirs	Qn	
25	% of tangible compensation claims delivered in person	Qn	
26	ratio of claims compensated to those submitted	Qn	2
27	letter of apology/remorse accompanies response for both valid and invalid claims	Qn,Ql	
28	no. of potentially affected parties who have been informed at program onset of what to expect if DCA damage occurs	Qn	1,18,33
29	% of farmers who know whom to contact if DCAs damage occurs	Qn	
30	availability of contact person	Qn,Ql	
31	number of DCA incidents reported to correct party	Qn	52
32	% of correctly completed forms	Qn	3
33	% of community members who know of claim process	Qn	1,18,28

34	evidence protected & collected within 24 hours	Qn,Ql	
35	qualified investigators cooperate with herders	Ql	40
36	number of cases reported to those that occurred	Qn	
37	time taken between report and investigation	Qn	42,68
38	tracking, shooting, capturing ability of investigator	Qn,Ql	
39	quality of HWC reports by LEDET	Qn,Ql	
40	qualified provincial or KNP ranger(s) respond	Ql	35
41	time taken between claim submission and payment	Qn	
42	time of report to time of control	Qn	37,68
43	% of DCA outbreaks that result in damage	Qn	
44	no. of DCA outbreaks/time	Qn	54,65
45	% of cattle in kraals at night (e.g. dung counts)	Qn	
46	education/awareness of farmers on benefits of good practices (by responsible party)	Qn,Ql	
47	no. of grazing camps fenced	Qn	
48	proximity of cattle & buffalo	Qn	
49	no. of municipalities with by-laws for kraaling	Qn	
50	no. of offences/time for not kraaling	Qn	
51	proximity of KNP fence to community	Qn	
52	no. of DCA incidents	Qn	31
53	budget for fence upgrade/maintenance	Qn	
54	number of DCA outbreaks	Qn	44,65
55	adequate KNP fencing (%, km)	Qn	
56	% of employed fence workers that are local	Qn	
57	number of skilled fence workers/village	Qn	
58	causes of fence damage	Qn,Ql	
59	no. of patrollers	Qn	
60	time spent patrolling	Qn	
61	no. of field rangers employed	Qn	
62	number of fence vandalism events	Qn	
63	number of poachers/poaching incidents	Qn	
64	number of cases of corridor disease	Qn	
65	number of DCA outbreaks	Qn	44,54
66	kilometers of buffer created	Qn	
67	amount of good land for grazing	Qn,Ql	
68	time taken to respond	Qn	37,42
69	injuries leading to death, where death could have been prevented	Qn,Ql	
Interviews and/or Literature			
70	religious affiliation	Qn	
71	ethnicity & cultural beliefs	Qn,Ql	
72	social group	Qn,Ql	
73	household income	Qn	
74	gender	Qn	
75	age	Qn	
76	level of education	Qn	
77	agricultural expansion	Qn	
78	choice to own livestock	Ql	
79	purpose for keeping livestock	Ql	

80	coping mechanisms	Ql	
81	personal experience with DCAs	Ql	
82	perceived risk of DCAs	Ql	
83	level of retaliatory killing/habitat destruction	Qn,Ql	
84	reporting of illegal activity	Qn,Ql	
85	resistance to conservation (e.g. rhino campaign)	Ql	
86	level of internal strife/conflict as a result of decisions regarding compensation scheme	Ql	
87	improved interaction between stakeholders and institutions	Ql	
88	improved social learning	Ql	