

**Learning, governance and livelihoods:
Toward adaptive co-management under resource poor conditions in
South Africa**

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By

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Abstract

Through collaborative monitoring and case study comparison, this thesis explores conceptual and methodological approaches to monitoring transitions toward adaptive co-management. In so doing, a number of knowledge gaps are addressed. Firstly, conceptual and methodological frameworks are developed for monitoring transitions toward adaptive co-management. Secondly, a conceptual and practical approach to monitoring the processes of collaboration and learning is developed and tested. Thirdly, a conceptual and practical approach to monitoring the governance outcomes of adaptive co-management is developed and tested. Fourthly, a conceptual and practical approach to monitoring the livelihood outcomes of adaptive co-management is developed and tested. Based on the outcomes from these four components of the study, this thesis explores the ways in which transitions toward adaptive co-management might be initiated under the resource poor conditions that characterise South Africa's communal areas.

The four case studies explored in the study are described as resource poor in terms of institutional capacity, ecosystem productivity and social vulnerability. From a resilience perspective these case studies can be described as being in the re-organisation phase of the adaptive cycle following multiple disturbances over time, largely due to South Africa's historical separate development policies. Scholars have suggested that it is in this re-organisation phase that innovation and novelty might occur.

The lens of social learning is applied to analyse collaborative processes within these contexts. Results indicate that the institutional innovation necessary for transitions toward adaptive co-management relies on careful facilitation by an honest broker. Equally important is finding a balance between maintaining key individuals and knowledge holders within decision making networks, and preventing rigidity and vulnerability within communities of practice. The results point to an over simplification in the rhetoric that currently surrounds the learning outcomes of multi level networks.

The governance outcomes of the initiatives are explored through the lenses of adaptive governance, social capital, adaptive capacity and self-organisation. Results indicate that under resource poor conditions creating the conditions that facilitate self-organisation is the major challenge facing transformations toward adaptive governance. Long term access to reliable information and capacity and financial support for adaptive management are key constraining variables.

The livelihood outcomes of the initiatives are analysed through the lens of resilience and diversification. Results suggest that flexibility, rather than livelihood diversity, is the key livelihood strategy employed by households in situations where options are limited. Interventions that enhance opportunities for households to specialise in situ by actively dealing with structural constraints, such as access to markets and credit, is vital to encouraging innovation during transitions toward adaptive co-management. Based on the results from monitoring, this study identifies key focus areas that require a great deal more attention if transitions toward adaptive co-management are to be initiated under resource poor conditions.

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Glossary

CBNRM	Community based natural resource management
DEAT	Department of Environmental Affairs and Tourism
Development Trust	A trust exists when a community hands over the control of its assets to persons (trustees) for its benefit. Beneficiaries own the wealth, property, money or other assets of the trust but trustees manage it. The role of trustees is to ensure that the affairs of the trust are properly managed. Amongst others, a trust can be used for the control and distribution of land.
DLA	Department of Land Affairs
DWAF	Department of Water Affairs and Forestry
Ecosystem services	The range of benefits that people obtain from ecosystems (MA 2003)
EPWP	Expanded Public Works Programme
Governance	The interactions among structures, processes, rules and traditions that determine how people in societies make decisions and share power, exercise responsibility, ensure accountability and how stakeholders have a say in the management of natural resources (Abrams <i>et al.</i> 2003; Lebel <i>et al.</i> 2006; Raik and Decker 2007)
Institution	The rules actually in use that regulate people's interactions with ecosystems (Ostrom 1990; Ostrom 1992); including formal constraints (rules, laws, constitutions), informal rules and constraints (norms of behaviour, conventions, self imposed codes of conduct), and their enforcement characteristics (North 1994)
Livelihood	The capabilities, assets (including both material and social resources) and activities required for a means of living (Carney 1998b; Scoones 1998)
Livelihood strategies	The range and combination of activities and choices that people make/undertake in order to achieve their objectives (DFID, 2000).
LSU	Large Stock Units

PASC	Project Advisory and Steering Committee
Resilience	The capacity of a system to absorb change or cope with a disturbance, without a qualitative change in the systems structure, function and feedbacks (Holling 1973; 1986).
SANParks	South African National Parks Board
Section 21 Company	A Section 21 Company is a company that is set up not for profit. It is a company that is made up of members who select a board of directors. The board manage the company in the interests of its members. It can receive funds and distribute these to projects.
Social-ecological system	Interacting systems of people and nature (Berkes and Folke 1998); social-ecological systems are complex self-organizing systems dominated by cross-scale interactions, non-linearity, variability, and uncertainty (Costanza <i>et al.</i> 1993; Levin 1999).
Social learning	The collective action and reflection that takes place amongst both individuals and groups when they work to improve the management of the interrelationships between social and ecological systems (Keen <i>et al.</i> 2005b)
SRP	Social Responsibility Programme
State variables	Variables used to define the —state space” of a system. Walker <i>et al.</i> (2004) use the example of a rangeland system: if a range land system is defined by the amount of grass, shrubs, and livestock, then the state space is the three-dimensional space of all possible combinations of the amounts of these three variables. The state of the system at any time is defined by their current values.

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Chapter 1: INTRODUCTION AND CONCEPTUAL OVERVIEW

This chapter outlines the objectives of this study, and presents the conceptual and methodological frameworks used to guide the achievement of these objectives.

1.1 Introduction

Adaptive co-management is a governance based approach aimed at dealing with complexity and uncertainty in natural resource management (Ruitenbeek and Cartier 2001; Olsson *et al.* 2004a). The approach is increasingly seen as a means to marry the strengths of adaptive and collaborative (co-)management through a focus on adaptive learning and linkages between actors and organisations operating at multiple levels (Armitage *et al.* 2007; Olsson *et al.* 2007). The rhetoric of adaptive co-management has arrived atop two decades of ambiguous experiences with community based conservation in Southern Africa (Hulme and Murphree 2001; Blaikie 2006), but is nevertheless gaining increasing leverage among international funding agencies and government departments alike.

Indeed, there is a tendency to see adaptive co-management as a ‘panacea’ (sensu Ostrom 2007a; but see also Adams and Hulme 2001) for dealing with uncertainty in natural resource management. There is, however, growing scepticism that the concepts and processes involved are poorly understood, and that adaptive co-management is largely an intellectual construct that is not grounded in the realities of day to day natural resource management. Indeed, the multi-disciplinary nature of adaptive co-management, combined with its often lofty claims, has left a number of conceptual and empirical gaps.

Firstly, monitoring the conditions under which adaptive co-management emerges, and the success or failure of adaptive co-management under certain conditions, has been neither systematically addressed nor rigorously assessed (Armitage *et al.* 2007; Plummer and Armitage 2007a). Secondly, although it is widely assumed that learning provides the basis for shaping and creating appropriate institutional structures for dealing with uncertainty (Folke *et al.* 2005; Fazey *et al.* 2007), scholars have not yet clearly articulated appropriate learning processes in adaptive co-management (Armitage *et al.* 2008). Thirdly, while there is a need to evaluate the processes and outcomes of adaptive co-management (Plummer and Armitage 2007b), approaches to achieving this have not been tested on the ground. Fourthly, the majority of the case studies that have informed our understanding of

transitions toward adaptive co-management have their roots in the developed world (see for example Olsson *et al.* 2004b; Olsson *et al.* 2006; Olsson *et al.* 2007). Research suggests however that collaborative management faces particular challenges in developing countries (Kellert *et al.* 2000), and analysts have warned of the “multi-level cascade of errors” that can result from importing ecosystem management solutions based on developed country cases (Sanderson 1995: 386).

In order to address these gaps, this study aims to:

- i. develop conceptual and methodological frameworks for monitoring adaptive co-management under resource-poor conditions
- ii. use these frameworks to develop and test monitoring systems to assess the learning, governance and livelihood outcomes of adaptive co-management
- iii. evaluate the outcomes of adaptive co-management in terms of:
 - a. learning and innovation;
 - b. governance and
 - c. livelihoods
- iv. Recommend ways in which transitions toward adaptive co-management might be initiated under resource poor conditions.

The remainder of this chapter seeks to address the first objective by presenting the foundations of a conceptual and methodological framework for monitoring transitions toward adaptive co-management. The chapter begins by outlining the conceptual orientation of this thesis. The implications of complexity and uncertainty for natural resource management are discussed, and the roots of adaptive co-management are then traced in order to highlight the simplification that often characterises the objectives of the approach. Based on this background, the critical elements required to track transitions toward adaptive co-management are presented. The second part of this chapter presents the methodological orientation adopted in this study, with an emphasis on the challenges posed by complexity and scale. Criteria for well designed monitoring systems are distilled from existing monitoring and evaluation frameworks, and the opportunities and potential challenges of a collaborative approach to monitoring are discussed.

1.2 Conceptual orientation

1.2.1 Complexity and uncertainty

Natural resource management takes place in contexts of incomplete knowledge and high levels of uncertainty (Walters 1986; Gunderson and Holling 2002). Management actions seldom lead to predictable outcomes; responses tend to be complex, and may be subject to time lags, sharp increases, slow declines or even cyclical change (Walters and Holling 1990). Complexity theory, emphasising nonlinear dynamics (Capra 2003), has thus been making in-roads into the field natural resource management and ecology for a number of decades (Holling 1978; Casti 1994; Levin 1999; Gunderson and Holling 2002). The growing recognition of complexity in natural resource management has come at least in part as a response to the failed orthodoxy of ‘command and control’ approaches (Holling and Meffe 1996), focussed largely on single issues or individual resources, that have sought stability through a worldview that emphasises predictable, gradual and incremental change (Folke *et al.* 2005). This misplaced belief in the ability to maintain stability, and to plan and predict change has manifested in attempts world-wide to resist ecosystem change and to centralise decision making, often at inappropriate scales for the resource being managed (Cash *et al.* 2006; Olsson *et al.* 2007). The inappropriateness of this type of approach has been demonstrated time and time again, not least in South Africa (du Toit *et al.* 2003; Bohensky and Lynam 2005).

Attempts to address the complex challenges of natural resource management have made headway into the field as theories that emphasised a dichotomy between people and the environment, and the inherent ecological limits to population growth (for example Malthus 1798; Meadows *et al.* 1972) proved inadequate in explaining observed phenomena. Reactions to these types of approaches lead to more inclusive paradigms that stressed human adaptation to environmental and social change (Boserup 1965; Tiffen *et al.* 1994). This emphasis on adaptation has paved the way for a systems perspective, with principles and ideas that emphasise complex adaptive system dynamics (Holling 1986; Kay *et al.* 1999; Gunderson and Holling 2002).

Complex adaptive systems have a number of unique attributes, including surprise, uncertainty, and nonlinearity (Walker and Abel 2002; Berkes *et al.* 2003; du Toit *et al.* 2004). Complex adaptive systems have structures and functions that cover a wide range of spatial and temporal scales, and these structures and functions are linked across scales,

although change might be observable only at a given scale (Gunderson and Holling 2002; Walker *et al.* 2006). This frustrates decision making in natural resource management because key drivers (defined as any natural or human-induced factor that directly or indirectly causes change in a social-ecological system, (MA, 2003)) of system change may only be evident above or below the scale of the decision maker. In natural resource management, complexity thinking often emphasises the interactions among people and ecosystems. The term social-ecological system is used to refer to interacting systems of people and nature (Berkes and Folke 1998). This interaction has been described as a dynamic and adaptive dance (Walters 1986; Gunderson 2003). Social-ecological systems are increasingly considered to be self-organising, with a loose hierarchical structure (Gunderson and Holling 2002), various emergent processes (Kay *et al.* 1999), and subject to relatively sudden re-configurations from one state to another (Scheffer *et al.* 2001).

Social-ecological systems exhibit thresholds, a shift beyond which can lead to regime shifts (*sensu* Scheffer *et al.* 2001). A threshold is exceeded when system feedbacks lead to lasting changes in the function and structure of the system (Walker *et al.* 2004). Social-ecological resilience, which refers to a) the amount of disturbance a system can absorb and still remain in the same state or domain of attraction, b) the degree to which a system is capable of self-organisation (versus lack of organisation or organisation forced by external factors), and c) the degree to which the system can build and increase the capacity for learning and adaptation (Gunderson and Holling, 2002, as cited in Folke *et al.* 2002: 2), has thus become a key concept when dealing with complex system dynamics.

While the recognition of uncertainty, surprise and non-linearity in complex systems has helped researchers and decision makers to better understand observed phenomena, these characteristics also pose challenges, including how to deal with; i) a plurality of perspectives; ii) the need to consider processes and interactions across multiple scales; iii) the demand for new research paradigms and approaches; and iv) decision making amid uncertainty and incomplete knowledge. These challenges are developed in greater detail below.

A plurality of perspectives - Many fields of research relevant to natural resource management have contributed toward the recognition of complex system dynamics in human and natural systems. As a result however, although the approach is largely accepted, a myriad of perspectives and disparate emphases exist. For example, while general systems theorists argue for an emphasis on connectedness, context and feedback

(von Bertalanffy 1968), chaos and complexity theorists argue for the recognition of self-organising behaviours in social and ecological systems (Casti 1994). Evolutionary theorists, on the other hand, argue for an emphasis on feedback to avoid simple dichotomies between human and natural systems (Wicken 1987; Adger 1999a), while historical ecologists emphasise the importance of history in understanding observed change (Balee 1998). Post-normal scientists call for an emphasis on uncertainty and methods to ensure the validity of conclusions in inherently complex systems (Funtowicz and Ravetz 1990). More recently, Capra (2003) has extended the concept to argue for a unity in understanding biological, cognitive and social systems. Thus, while many fields of research acknowledge complexity, there is currently a lack of any single agreed upon approach for dealing with the concept. The unavoidable need to consider the issue of scale is however one point on which there has been convergence (Bloschl and Sivapalan 1995; O'Neill and King 1998; Gibson *et al.* 2000; Leach and Fairhead 2000; Schulze 2000; Allen and Holling 2002).

Ambiguities about Scale - Scale refers to the “spatial, temporal, quantitative, or analytical dimensions used by scientists to study objects and processes” (Gibson *et al.* 2000: 219; see also O'Neill and King 1998). Ecological and social systems tend to organize into strongly interacting clusters of processes operating at similar spatial or temporal scales (Allen and Holling 2002). Consequently, an understanding of how a selected scale of analysis may influence the patterns observed, and therefore inferences regarding causal relationships, is essential in understanding interactions between human and natural systems (Gibson *et al.* 2000; Munda 2000). A number of pitfalls exist when attempting to describe and interpret patterns and processes operating at different spatial and temporal scales, these include; i) *Ostensible chaos*: patterns and processes that appear random at one scale or level of organisation, may appear highly organised at another, and visa versa (Schulze 2000). ii) *Misinterpreted trends*: if the duration of an observation is incongruent with the characteristic temporal scale of the process, a directional trend in the process may be incorrectly inferred (Jewitt and Gorgens 2004). iii) *Misread patterns*: if the resolution of the observation is incongruent with the characteristic spatial scale of the process, spatial patterns may go undetected (Bloschl and Sivapalan 1995; Leach and Fairhead 2000). Therefore, research that deals with social-ecological system dynamics must address the issue of scale in order to avoid, or at least be aware of, these pitfalls and mitigate against them.

The demand for new research paradigms and approaches – Complexity thinking highlights the fundamental inadequacy of traditional scientific disciplines to deal with complex social-ecological issues (Bammer 2005). Complexity thinking demands new paradigms that enable people to think outside of traditional language and metaphor. A key challenge is overcoming divisions between the producers of scientific knowledge, and the users of this and other forms of knowledge (Burns *et al.* 2006). This is problematic in institutes of higher education, where institutional inertia and traditional academic assessment criteria (such as peer-reviewed publications) create barriers for scientists who seek to reinvent the role of scientist as facilitator within the systems that they study (Sayer and Campbell 2004). Nevertheless, it has become incumbent on researchers to accept their active role in both understanding and creating change in the social-ecological systems that they work in (Kates and Dasgupta 2007; Section 1.3.3).

Decision making amid uncertainty – Decision making processes based on assumptions of stability and predictability are unhelpful when dealing with complex adaptive systems. Traditionally in natural resource management, a technical decision making approach was encouraged that followed a linear process of goal identification, exploring challenges and opportunities, selecting the most desirable solution, and then implementing the management decision (Lynam *et al.* 2007). However, a fundamental challenge posed by a complex systems perspective is that decisions are made with imperfect knowledge, which undermines the ability to forecast the future in any exact way (Walker *et al.* 2002). This uncertainty is compounded by the fact that decision makers themselves become drivers of system change, which makes long term forecasting extremely problematic. Participatory approaches that view decision makers as part of the system, and that stimulate creative thinking about the future in collaborative settings have thus been advocated (van der Heijden 1996; Walker *et al.* 2002; Lynam *et al.* 2007).

The recognition that natural resource systems are complex thus implies engaging with multiple academic disciplines, which often cut across the social and natural sciences. It entails dealing with the challenges posed by uncertainty and scale, and also with the wealth of literature that has emerged on participatory approaches to resource management. The remainder of the chapter explores these issues as they relate to adaptive co-management and monitoring.

1.2.2 A tendency toward simplicity

Despite this growing recognition of complexity in natural resource management, a tendency toward simplification remains in many conceptual and analytical models, even those used to understand social-ecological system dynamics (Ostrom 2007a). The evolution of adaptive co-management from the fields of adaptive and co-management is one such example of this tendency. Despite the lofty goals of adaptive co-management, which seeks to marry the strengths of its predecessors, the approach remains embedded within many of the basic, and subsequently heavily criticised (Murphree 2000; Campbell *et al.* 2001a; Shackleton and Campbell 2001), assumptions that underpinned earlier attempts at community based natural resource management, or CBNRM.

These assumptions included the idea that community based management would help solve open access dilemmas by creating local controls over resource use, that it would be pro-poor and therefore reduce poverty, that it would promote democratic principles, and help solve many of the inadequacies of centralised decision making (see Blaikie 2006 for a review). Many of these assumptions remain implicit in adaptive co-management, which suffers from the same dearth of clearly defined ‘outcomes’ (Plummer and Fitzgibbon 2004; but see Plummer and Armitage 2007b) that exposed earlier approaches to criticism (Kellert *et al.* 2000; Agrawal and Chhatre 2006a). Baseline studies and monitoring that provide a sense of the ‘before’ and ‘after’ situation are strikingly absent. As a result, the rhetoric of adaptive co-management runs the risk of repeating the mistakes of its predecessors by glossing over the institutional complexities posed by common pool resources, and, in Africa at least, historical legacies of dispossession and state intervention into natural resource management that have tended to frustrate efforts on the ground (Ainslie 1999; Adams and Hulme 2001; Campbell *et al.* 2001a).

Adaptive co-management is heavily influenced by its roots in adaptive management, which has generally been accepted as a methodological approach of ‘learning by doing’, where decisions are regarded as experiments (Walters and Holling 1990) that can be adapted as understanding increases and trends change (Walters 1986). The purpose of adaptive management is to improve management, and to understand outcomes when knowledge is incomplete and uncertainty is high (Holling 1978; Schreiber *et al.* 2004).

In this context, learning is an iterative process involving various stakeholders who learn through a cyclical process of setting objectives (hypotheses), planning, taking action,

monitoring and reflecting on the outcomes, learning, and taking action again (Figure 1.1, Walters 1986; Daniels and Walker 2001). In adaptive management, collaboration is considered central to bounding the management problem, facilitating knowledge sharing, and identifying realistic outcomes (Schreiber *et al.* 2004). Adaptive management starts with a model or framework set of hypotheses to be tested; the role of experimentation is to validate, refute and, ultimately, modify and refine the model and make informed trade-offs between conflicting goals, for example deriving short term versus long term economic benefits, managing provisioning versus supporting ecosystem services, defined as the range of benefits that people obtain from ecosystems (MA 2003), or deciding between short term expediency through top-down decision making versus a long term investment in capacity development (Holling 1978; Margoluis and Salafsky 1998; Gurung *et al.* 2006).

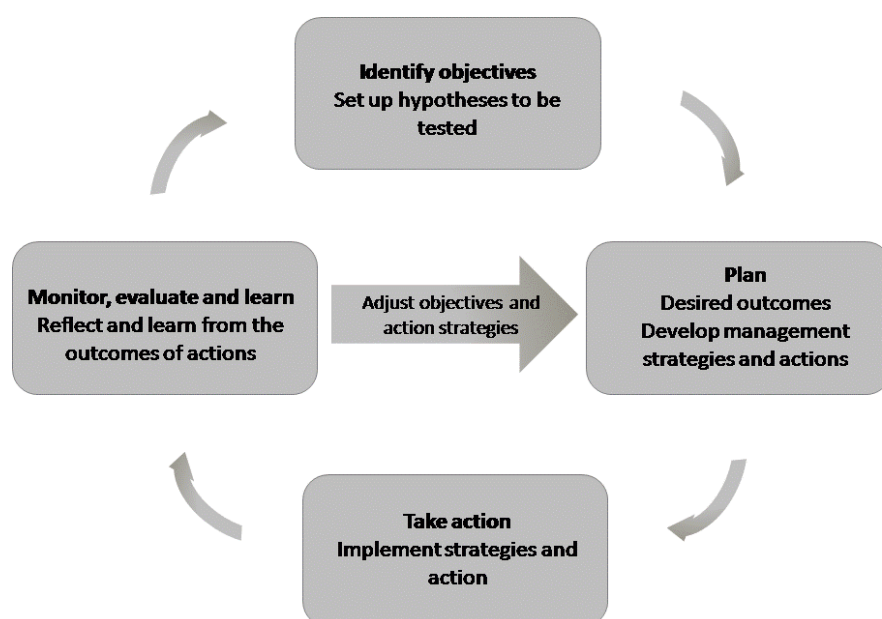


Figure 1.1: The adaptive management cycle consists of iterations of objective setting, planning, action, monitoring and adjustment (Adapted from Walters 1986; Lee 1993; Margoluis and Salafsky 1998)

A different body of literature and experiences influenced the development of the co-management discourse. Co-management was informed partly by a growing recognition that traditional command and control approaches to managing ecosystems were neither socially just nor ecologically effective (Holling and Meffe 1996; Adams and Hulme 2001). In conjunction with this shift, early property rights debates regarding the appropriateness of

private versus common property regimes for conservation lead to greater contributions from the fields of institutional and political economics (Hardin 1968; Berkes 1989; Ostrom 1990; Bromley 1991). A fundamental contribution from these fields included the recognition that common pool resources could be managed effectively by local people under certain conditions (Ostrom 1990), with appropriate levels of decentralization (Muphrree 2000). Simultaneously, Chambers (1994) was arguing for greater civic participation in development decision making, and Sen (1981; 1999) was calling for rights based approaches to development that empowered the poor and focused on issues of access and entitlements (see Mansuri and Rao 2004 for a review). The outcome of these various contributions was the widespread recognition that co-management was both a viable and, from a rights based perspective, a desirable form of resource management.

Early approaches to co-management defined it in an essentially dualistic way; as an approach that involved some form of power-sharing between the state and resource users (Berkes *et al.* 1991; Berkes 1994). More recently, growing recognition of the complexity of social-ecological interactions in co-management has lead to the understanding of co-management as a system of governance (Berkes 2004; Berkes 2006) aimed at improving decision making where knowledge is incomplete (Folke *et al.* 2005). Linked to this recognition of multiple scales of interaction, and the resultant uncertainty in decision making, has been a growing emphasis on mutual learning and trust building between a variety of actors and organizations relevant to decision making in specific localities (Berkes 2004; Keen *et al.* 2005a; Pahl-Wostl 2006).

Adaptive co-management has emerged from this interchange of ideas as an approach that relies on collaboration among a diverse set of actors, and on a form of social coordination in which actions are coordinated voluntarily by individuals and organisations in a self-organising and self-enforcing manner (Ruitenbeek and Cartier 2001; Olsson *et al.* 2004b; Olsson *et al.* 2006). The approach seeks to achieve this through the adaptive management focus on learning-by-doing, monitoring and action, and co-management's focus on collaborative and inclusive decision making (Figure 1.2). The approach aims to encourage the development of nested institutional structures that incorporate structural and functional redundancy (Gunderson *et al.* 1995; Dietz *et al.* 2003; Carpenter and Folke 2006; Olsson *et al.* 2007). One of the key goals of these nested institutional structures is to create opportunities for linkages between actors and organizations that facilitate adaptive learning (Olsson *et al.* 2004a; Armitage *et al.* 2007). By drawing on a variety of sources of

knowledge and information it is expected that the danger of superimposing set prescriptions about management on specific places and contexts will be avoided (Olsson *et al.* 2004b)

In theory, this evolution from multiple approaches to one encompassing approach appears to be a natural progression, and indeed has been described as such (Plummer and Armitage 2007b; Armitage *et al.* 2007). However, an attempt to clearly articulate ‘what’ adaptive co-management aims to achieve, and ‘how’ transitions toward adaptive co-management might take place, reveals the complexity implicit in the assumptions that underpin it, and this is the subject of the section that follows.

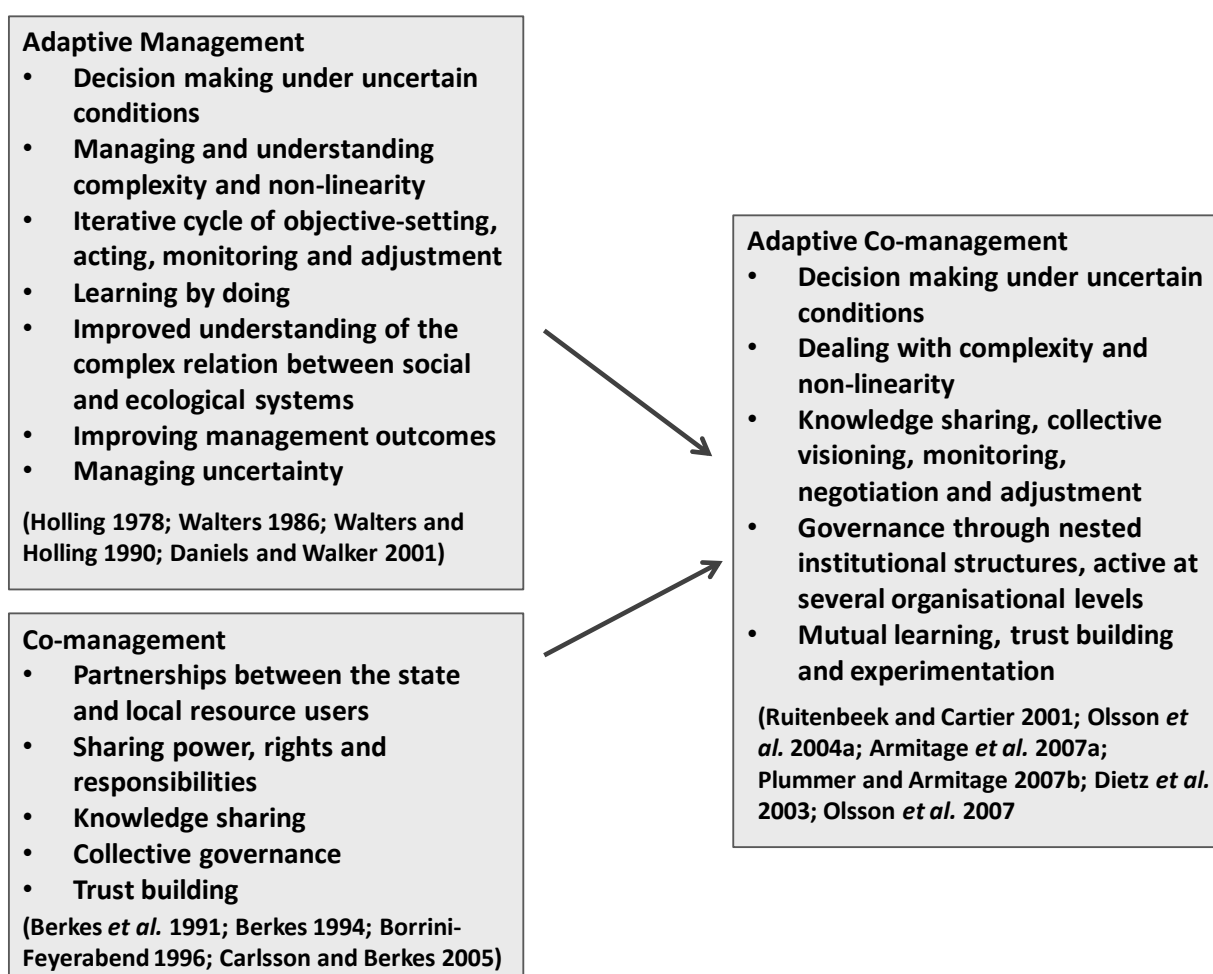


Figure 1.2: Features of adaptive co-management

1.2.3 Transitions toward adaptive co-management

The emergence of adaptive co-management is often framed in terms of transitions and transformations (Olsson *et al.* 2004b; Olsson *et al.* 2006). A transition is said to have lead to a ‘transformation’ when there is a change in the state variables that define a system (*sensu* Walker *et al.* 2004, refer to glossary), and in the relationships between key cycles and

feedback loops across scales (Walker *et al.* 2006). An example of such a transformation has been provided by Walker *et al.* (2006), who describe the shift from sheep farming on a single farm to wildlife-based ecotourism that involves joint enterprises by combining properties to operate at larger scales. A descriptive analysis of transformations in local governance has been provided by Olsson *et al.* (2006) based on case study comparisons. However the mechanisms that drive transformations in social-ecological systems are not well understood (Walker *et al.* 2006). Understanding the ways in which such transformations can be initiated and monitored is therefore crucial (van der Brugge and van Raak 2007).

Four factors have been identified as key to encouraging transformations toward adaptive co-management (Olsson *et al.* 2004b; Olsson *et al.* 2006), these include: learning to live with change and uncertainty, nurturing diversity for reorganisation and renewal, combining different types of knowledge for learning, and creating opportunities for self-organisation (Folke *et al.* 2003). Innovation, based on on-going processes of collaboration and learning are therefore critical to initiate transformations toward adaptive co-management (Figure 1.3; Carlsson and Berkes 2005; Olsson *et al.* 2006; Plummer and Armitage 2007b).

Social learning

Social theories of learning (the centre of Figure 1.3) provide the most appropriate starting point for understanding transitions toward adaptive co-management for a number of reasons. Firstly, an emphasis on social learning within collaborative efforts focuses attention on the ways in which innovation takes place through active questioning of the assumptions and values that underpin institutions (Keen *et al.* 2005b). This process of active questioning is particularly important in participatory processes aimed at managing natural resources, where power is re-distributed within new forms of governance, creating a new context in which to cope (Wildemeersch 2007). Secondly, social learning aims to find ways to enable people to transcend social norms, values and traditional ways of thinking about problems, in order to cope with social-ecological change (Wals and van der Leij 2007). In the pedagogical literature, social learning therefore represents a shift from transmissive expert-based teaching, toward transformative community-based learning (Capra 2007).

There is however no universal theoretical basis or terminology for social learning (Wals and van der Leij 2007), which makes it difficult to monitor. While some place emphasis on

learning by individuals in social settings, others refer to learning at the level of the group or society (Parson and Clark 1995). For example, while Wildemeesch (2007) defines social learning as learning that takes place in groups or social systems that operate in new, unexpected, uncertain and unpredictable circumstances, Bandura (1963) initially described social learning as the learning that individuals obtain through their interaction and observation of others in a group. This latter definition has however been criticized as being too narrow to encompass all of the different forms of learning relevant to natural resource management (Pahl-Wostl 2006).

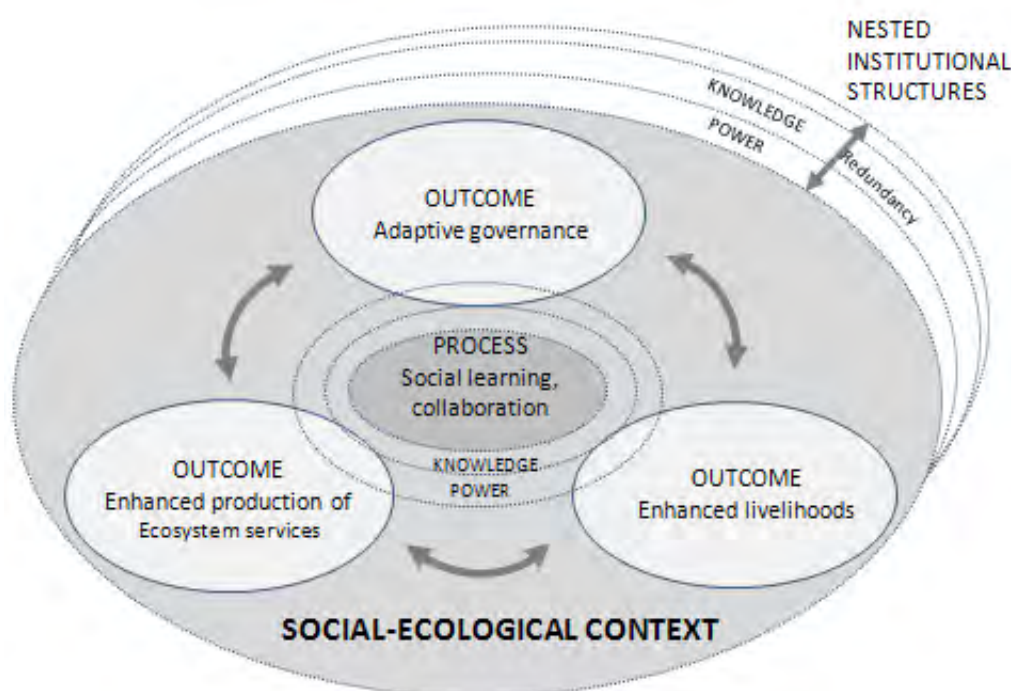


Figure 1.3: A conceptual framework for monitoring transitions toward adaptive co-management

In the field of natural resource management social learning has been defined as *the collective action and reflection that takes place amongst both individuals and groups when they work to improve the management of the interrelationships between social and ecological systems* (Keen *et al.* 2005b). This is the definition adopted in this study.

On-going reflection is a key part of the social learning process. Reflexivity refers to reflecting on the learning that has taken place during a given process, and using that reflection to stimulate more learning (Dyball *et al.* 2007). Keen *et al.* (2005b) present this reflexive process in a series of learning cycles to provide a framework for continuous reflection on actions and ideas, and on the relationships between knowledge, behaviour

and values (Figure 1.4). The framework encourages a sequence of steps, starting with diagnosing what is important or the problem to be solved, designing or imagining what could be, doing what is possible, and then reflecting on and evaluating that practical experience. This is similar to the adaptive management cycle presented earlier (Figure 1.1); the difference is that here emphasis is placed on reflecting not only on objectives, actions and outcomes, but on the learning that has taken place during that process.

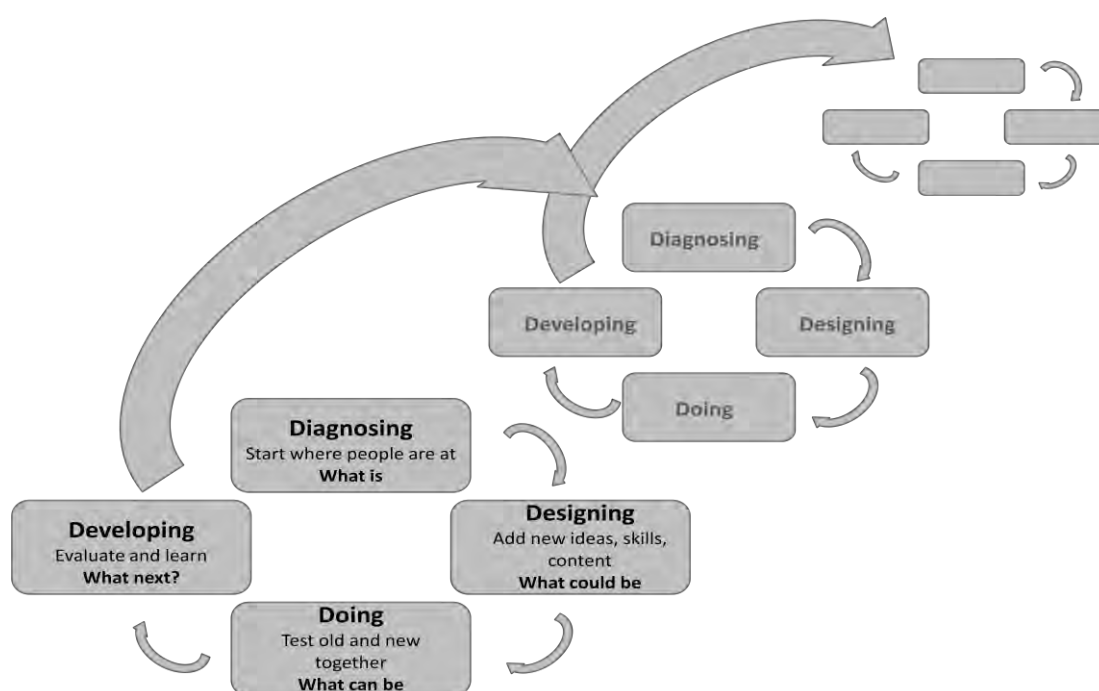


Figure 1.4: A framework for social learning cycles in natural resource management
(Adapted from Keen *et al.* 2005b)

Processes that foster social learning include; careful facilitation, small group work, repeated meetings, opportunities to influence the flow of events in a given process, open communication, diverse participation, unrestrained thinking and the inclusion of multiple sources of knowledge (Muro and Jeffrey 2008, See Chapter 3). By design, both social learning and adaptive co-management therefore entail a commitment to bring together people who have very different world views and knowledge systems. The power dynamics implicit in bringing different knowledge holders together influence both the ways in which collaboration occurs, and the subsequent outcomes that are possible for other components of the system (Figure 1.3; Wildemeersch 2007). Indeed, some analysts reject the very idea of integration and argue that communicating between knowledge systems leads to further marginalisation of the non-dominant knowledge systems concerned (Latour 1987; Nadasdy 1999). In adaptive co-management, the reasons for integrating different knowledge systems

tend to come from the more pragmatic management perspective: local people use and rely on natural resources every day and therefore have lessons to share about adaptive management (Gadgil *et al.* 1993; Colding 1998; Berkes *et al.* 2000; Gadgil *et al.* 2003).

Governance

Governance (upper centre in Figure 1.3) refers to the interactions among structures, processes, rules and traditions that determine how people in societies make decisions and share power, exercise responsibility, ensure accountability and how stakeholders have a say in the management of natural resources (Abrams *et al.* 2003; Lebel *et al.* 2006; Raik and Decker 2007). Governance is influenced by social learning and provides the social context that allows collective action, rule making and institutions for social coordination (Dietz *et al.* 2003). A change in governance can therefore be understood as one of the key outcomes of transitions toward adaptive co-management.

Institutions (periphery of Figure 1.3) refer to the rules actually in use that regulate people's interactions with ecosystems (Ostrom 1990; Ostrom 1992); including formal constraints (rules, laws, constitutions), informal rules and constraints (norms of behaviour, conventions, self imposed codes of conduct), and their enforcement characteristics (North 1994). These early definitions have been criticised as too functionalist or normative, ignoring the ways in which institutions enable as well as constrain action (Mehta *et al.* 1999). This criticism has led to more open-ended definitions of institutions as regularised patterns of behaviour between individuals and groups in society (Leach *et al.* 1999). However, the lens of linked social-ecological systems offered by complexity thinking, and the focus on resource management specifically, reveals the earlier definitions to be more helpful in understanding transitions toward adaptive co-management, and this is the definition adopted in this study.

Adaptive governance is gaining increasing recognition as a framework for managing complex environmental problems (Gunderson and Light 2006; Olsson *et al.* 2007; Folke *et al.* 2005). In adaptive governance the science is contextual, multiple stakeholders with different worldviews are present, and decision making is both top-down and bottom-up (Folke *et al.* 2005). Adaptive governance is therefore frequently identified as one of the objectives of adaptive co-management (Olsson *et al.* 2004b; Olsson *et al.* 2006; Olsson *et al.* 2007).

Some critical points of concern for adaptive governance include the development of nested institutional structures with overlapping functions that incorporate structural and functional

redundancy (Dietz *et al.* 2003; Folke *et al.* 2005; Folke 2007), and the role played by bridging organisations in matching the scale of decision making to the scale of ecological processes (Olsson *et al.* 2007). However scholars have warned that governance systems characterised by strong linkages and nesting hold the potential to create opportunities for actors at higher scales to mobilise knowledge and exert power over local resource users, and therefore question the assumption, so salient in adaptive co-management, that a high degree of linkage is necessarily desirable (Adger *et al.* 2006).

Monitoring the governance outcomes of transitions toward adaptive co-management is therefore vital, but depends on the identification of key variables that influence the possibility of a transformation. The identification of such variables, and the ways in which they might be monitored, is the subject of Chapter 4 in this thesis.

Livelihoods

Rural people pursue multiple activities to secure their livelihoods (Wolmer and Scoones 2003, lower right, Figure 1.3). Nurturing diversity for re-organisation and renewal has been identified as an important factor that enhances the ability of social-ecological systems to cope with change (Folke *et al.* 2003), and is therefore central to transitions toward adaptive co-management. Livelihood diversification refers to a continual adaptive process by which rural households add new activities, maintain existing ones and drop others, in order to survive and improve their standards of living (Ellis 1998a; Ellis and Allison 2004). Diversification has been shown to play an important role in enabling people to cope with shocks and surprises, thereby building resilience (Marschke and Berkes 2006, see Chapter 5).

A livelihood is defined as comprising —the assets (natural, physical, human, financial and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household” (Ellis 2000: 10). The sustainable rural livelihoods approach (Chambers and Conway 1992; Carney 1998a) has been put forward by analysts as a useful organising framework for evaluating change in complex systems (Campbell *et al.* 2001b; Plummer and Armitage 2007b), and therefore provides a potentially useful framework for monitoring livelihood changes that take place during transitions toward adaptive co-management.

Ecosystem services

Ecosystem services refer to the benefits that people derive from ecosystems. Many practical experiences of developing collaborative monitoring and evaluation processes have identified the need to focus on natural resources from which people derive some form of livelihood benefit as an incentive for voluntary participation (Stuart-Hill *et al.* 2005; Hockley *et al.* 2005). A focus on ecosystem services is not only useful as an incentive however, and has equally been pursued by many other types of studies. The Millennium Ecosystem Assessment (MA 2003) divided these services into a number of categories, including provisioning services such as food and water; regulating services such as drought regulation, land degradation and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual and other nonmaterial benefits.

While monitoring ecosystem services is considered crucial, of concern in this thesis are the outcomes of adaptive co-management that build the capacity of people and organizations to cope with and adapt to social-ecological change, as well as the ways in which learning can be promoted as part of the monitoring process. The research regarding monitoring ecosystem services was conducted primarily by a Masters student who participated in this research initiative, and the results of the work will therefore be included in that thesis (Bolos, Forthcoming).

Summary

By combining conceptual and practical lessons from a multitude of disciplines, the adaptive co-management approach represents an holistic, all encompassing and therefore increasingly popular approach to natural resource management. However, to date monitoring transitions toward adaptive co-management has not taken place in any formalised manner; comparisons have tended to be conducted with the benefit of hindsight.

An effort to proactively identify the key system components that would need to be monitored in order to track or initiate transitions toward adaptive co-management reveals the complexity of processes and outcomes that need to be monitored simultaneously in order to achieve this (Figure 1.3). Indeed, change in one component of the system is influenced by, and causes, change in other components of the system, and observed outcomes are likely to be influenced by trends and surprises that take place both above and below the scale of decision making. The outcomes that are possible for people and ecosystems are therefore

unpredictable, and subject to the vagaries of emergence that characterise complex systems.

Monitoring the processes and related outcomes of transitions toward adaptive co-management is therefore critical, but poses major conceptual challenges. While this section has explored what should be monitored, the section that follows attempts to unpack how this monitoring might take place.

1.3 Methodological orientation

There is an urgent need for a shift away from seeking single correct models for dealing with resource management problems (*sensu* Ostrom 2007b), and toward the development of research approaches that use a diversity of perspectives and models by bringing different role players together to produce a shared understanding (Boyle *et al.* 2001). This section provides a rationale for adopting a collaborative monitoring and evaluation approach, based on comparative case study analysis, as an opportunity to pursue this imperative. This section provides the broad methodological basis that informed the design of this study, while the specific methods and indicator selection processes are discussed in Chapters 3, 4 and 5.

1.3.1 Monitoring and Evaluation

Monitoring provides the basis for governance and management in the context of uncertainty by providing the feedback necessary for learning and adaptation (Boyle *et al.* 2001). Traditional approaches to monitoring have focussed on indicator selection, data collection and reporting, and have generally failed to influence decision making in any significant way (Boyle *et al.* 2001; Stem *et al.* 2005). New approaches and tools that incorporate complexity and promote learning within monitoring programmes are required. However, despite growing calls for evaluation (Innes and Booher 1999; Kellert *et al.* 2000; Plummer and Armitage 2007b), empirical research (Agrawal and Chhatre 2006a), and greater emphasis on ways to operationalise learning within adaptive co-management (Armitage *et al.* 2007; Armitage *et al.* 2008), only fleeting reference is made to monitoring as a means to achieve this. A possible reason for the general failure of monitoring to present itself as a means of gathering data and promoting learning is the apparent discontinuity between theory and practice in the monitoring and evaluation literature (Lynam and Stafford Smith 2004), and the undue emphasis on performance monitoring at the expense of exploring processes.

Two key issues stand out. Firstly, integrated evaluation and performance assessment aimed at understanding complex problems is common in the theoretical literature (Campbell *et al.* 2001b; Plummer and Armitage 2007b; Gottret and White 2001). In ecosystem management practice, however, analysts tend to refer to monitoring rather than evaluation, and the focus is almost invariably on ecological monitoring alone (Danielsen *et al.* 2005a; Babu and Reidhead 2000). Secondly, while the theory of monitoring and evaluation tends to emphasise a ‘quantum leap’ (Western 2004) in the number of variables needed to understand complex systems (Campbell *et al.* 2001b; Gottret and White 2001), the practical literature emphasises that successful cases of monitoring have been based on simple data collection and analysis methods (Andrianandrasana *et al.* 2005; Uychiaoco *et al.* 2005).

It is important to differentiate between monitoring and evaluation, since this is often a source of confusion (Stem *et al.* 2005). The key difference is the frequency with which each takes place. While monitoring is an on-going *process* of observation aimed at feeding into decision making, evaluation is generally aimed at determining the effectiveness of an intervention, usually but not always after it is completed. Monitoring data can feed into evaluation, but is aimed at improving decision making rather than reaching a conclusion regarding the efficacy of an intervention (Abbot and Guijt 1998). Both monitoring and evaluation are aimed at examining ‘before and after’ situations in relation to an intervention. In both monitoring and evaluation, it must be decided what information is relevant, what methods of data collection are appropriate, who the information is for, who will analyse and interpret the information, and who should be involved (Western 2004; Abbot and Guijt 1998). There are essentially two different, but inter-related types of monitoring and evaluation (see Plummer and Armitage 2007b), and these are often confused in the literature. The first type of monitoring is referred to as *process* monitoring. Process monitoring asks the question: *how* has the intervention been implemented, or how has the process evolved? The second type of monitoring is referred to as *impact* or performance monitoring. Impact monitoring asks the question: *what* has been achieved by an initiative? Since monitoring is carried out for different reasons by different actors, it is useful to consider its purpose and the challenges posed by adaptive co-management.

The role of monitoring in adaptive co-management

While monitoring and evaluation are often considered objective processes, decisions regarding what is important, what is measured, and therefore what is left out, are

necessarily subjective and based on preconceived ideas about the purpose of monitoring, scientific understanding about how systems function, and user needs (Abbot and Guijt 1998). Defining the purpose of monitoring and evaluation is dependant on who will use the monitoring and evaluation data.

On the one hand, there is general agreement that the role of integrated monitoring is to improve our understanding of complex system dynamics (Western 2004; Allen *et al.* 2005; Cumming *et al.* 2005; Bliss 2006; Lynam and Stafford Smith 2004). Within this objective, monitoring and evaluation is carried out to improve management decision making, increase transparency and accountability, reduce risk and uncertainty, foster learning, and improve the ways in which projects are implemented (Bellamy *et al.* 2001). Complex systems monitoring is also aimed at assessing the relative state of a resource or system, warning managers about an approaching event or crisis, and improving the understanding of managers about how systems function (Lynam and Stafford Smith 2004). Another purpose of monitoring is to help inform our understanding of the limits of collaborative efforts (Conley and Moote 2003). From a process perspective, monitoring is often undertaken with the purpose of linking information to decision making more directly (Uychiaoco *et al.* 2005), and building social capital in nested institutional structures through trust building and increased transparency (Andrianandrasana *et al.* 2005; Becker *et al.* 2005; van Rijsoort and Jinfeng 2005).

The role of monitoring will be perceived differently by different actors. For example, while resource managers and policy makers might be seeking guidelines that are applicable in other settings (Western 2004), resource users might be more interested in ensuring a continued flow of ecosystem goods and services to secure their livelihoods (Danielsen *et al.* 2005b). At the same time, donors will be looking for evidence that money has been well spent, or for areas in which to invest, while advocates of adaptive co-management might be looking for proof of success, and critics might be interested in evidence that supports their concerns (Conley and Moote 2003). Monitoring will be carried out in different ways depending on the purpose of the exercise.

In collaborative settings, such as those advocated in adaptive co-management, one of the core goals is to promote learning and the ability of decision makers to respond to social-ecological change (Folke *et al.* 2003). Monitoring has long been a part of local ecological knowledge practices, and the role of these practices in developing and maintaining

knowledge have been documented by many (Davidson-Hunt and Berkes 2003; Moller *et al.* 2004; Parlee *et al.* 2005; Noss *et al.* 2005).

Monitoring challenges posed by adaptive co-management

When dealing with complex adaptive systems the use of simple sampling techniques to measure progress toward clearly defined goals is not always effective, and the identification of measurable goals is particularly problematic (Conley and Moote 2003). Complexity and scale are two fundamental challenges facing efforts to monitor adaptive co-management.

Complexity - Traditional approaches to monitoring that are based on linear impact chains aimed at causal description are inadequate when dealing with complex social-ecological systems (Boyle *et al.* 2001). Time delays between an intervention and an impact, combined with non-linearity, make it difficult to assign causality to a particular intervention or event (Campbell *et al.* 2001b). This challenge is exacerbated by adaptive co-management efforts in areas where long term data from carefully designed monitoring programs do not exist (Conley and Moote 2003; Blaikie 2006). Complex adaptive systems are influenced by a multitude of factors operating at various scales. A multivariate, integrated approach is therefore essential (Bellamy *et al.* 2001; Connick and Innes 2001; Campbell *et al.* 2001b). The rate of change in variables varies from one scale to another (Lynam and Stafford Smith 2004), and non-linear interactions mean that monitoring systems must find ways to capture both the intended and the unintended outcomes of an intervention (Bellamy *et al.* 2001). In addition, these outcomes might be either tangible, and therefore directly measurable, or intangible (Innes and Booher 1999). In order to capture some of these intangible outcomes, monitoring the process of implementation as well as the outcomes is necessary (Conley and Moote 2003).

Scale - A careful consideration of scale, in terms of both spatial and temporal variability, is vital. A focus on just one scale in monitoring might obscure important controlling processes at other scales (Schulze 2000). Change within social-ecological systems occurs at different rates, and therefore it is important to pay attention to the interactions among fast and slow changing variables (Lovell *et al.* 2002). In considering fast and slow changing variables, Lynam and Stafford Smith (2004) make the point that slower changing variables might be undetectable because of the noise created by monitoring fast changing variables. An example here might be monitoring management decision making processes at monthly intervals versus government level policy changes regarding rights and responsibilities

annually. Another challenge is the fact that while some variables change stochastically (e.g. fire, pests), other variables are easier to plan for in monitoring, such as seasonal changes in rainfall or veld condition (Schulze 2000; Lovell *et al.* 2002). The challenge with these cyclical and stochastic changes is that they overlap with one another at various spatial and temporal scales, making system thresholds (Section 1.2.1) notoriously difficult to identify before they are crossed (Walker and Meyers 2004). Matching the frequency of monitoring to the rate of change (Western 2004) is therefore vital, but capturing unpredictable stochastic events and surprises that might signal the crossing of a threshold is equally important. This requires a manager or monitor who is in touch with the system being monitored, which is why participatory monitoring essential, and this is discussed in Section 1.3.3.

1.3.2 Existing frameworks for monitoring and evaluation

Analysts from various fields have made contributions to the conceptual understanding of monitoring and evaluation that hold important lessons for adaptive co-management. The contributions come from integrated natural resource management, rangeland management, resilience thinking and the co-management literature. Here two generic categories of approaches are identified based on the main objective of the frameworks developed: integrated approaches that have been designed for performance evaluation in complex systems, and user driven approaches aimed at promoting learning and buy-in (Table 1.1). The main observation that can be made from Table 1.1 is that while conceptual frameworks aimed at performance evaluation abound, there are remarkably few conceptual frameworks that aim explicitly to promote a user-driven approach to monitoring and evaluation.

Table 1.1: Frameworks that hold lessons for monitoring and evaluation in adaptive co-management

Framework objective	Key themes	Key references
Performance evaluation in complex systems	Systems based Integrate social and ecological variables Integrate variables inside and outside local context Capture unexpected outcomes Focus on both process and performance Capturing fast and slow changing variables Capturing tangible and intangible outcomes Creating awareness about possible future trajectories Surrogates for measuring resilience	Innes and Booher 1999; Bellamy <i>et al.</i> 2001; Boyle <i>et al.</i> 2001; Gottret and White 2001; Campbell <i>et al.</i> 2001b; Connick and Innes 2001; Conley and Moote 2003; Andries <i>et al.</i> 2004; Lynam and Stafford Smith 2004; Western 2004; Berkes and Seixas 2005; Bennet <i>et al.</i> 2005; Carpenter <i>et al.</i> 2005; Cumming <i>et al.</i> 2005; Garnett <i>et al.</i> 2007; Plummer and Armitage 2007b
Promoting learning and buy-in	Collaborative monitoring and evaluation Collective sense making Conscious and deliberate learning processes Trust building Social change	Abbot and Guijt 1998; Babu and Reidhead 2000; Danielsen <i>et al.</i> 2005a; van Rijsoort and Jinfeng 2005; Mutimukuru <i>et al.</i> 2006

The most comprehensive attempt at developing a framework aimed specifically at evaluating adaptive co-management has been produced by Plummer and Armitage (2007b). The authors provide parameters for performance evaluation in a framework that consists of the three components of; ecological, economic and process variables. Economic variables are drawn from the five capitals in the sustainable livelihoods framework (Chambers and Conway 1992; Carney 1998a), while the ecological variables are drawn from the critical natural capital approach (Ekins *et al.* 2003) rather than ecosystem goods and services as advocated by other analysts (for example Anderies *et al.* 2004; Western

2004). The framework takes cognisance of fast and slow changing variables, and also considers both tangible and intangible outcomes from adaptive co-management, as advocated by Innes and Booher (1999). Plummer and Armitage (2007b) emphasise the role of institutions and power in determining project outcomes, and highlight the need to evaluate both the process and performance of initiatives.

However, this framework, along with the vast majority of other frameworks, emphasises performance evaluation at the expense of on-going monitoring, and does not provide practical guidance about how to implement the framework in collaborative settings, such as those that characterise adaptive co-management. Similarly, frameworks aimed at monitoring complexity have tended to be heavily theoretical, with concepts such as *'resilience'* and *'thresholds'* (Bennet *et al.* 2005; Carpenter *et al.* 2005; Cumming *et al.* 2005), which tend to be exclusionary to local resource managers. Frameworks aimed at promoting learning and buy-in, on the other hand, have tended to be very simplistic, often aimed at ecological monitoring alone and to ignore social variables and issues of scale (Danielsen *et al.* 2005a; van Rijsoort and Jinfeng 2005).

Indeed, while the criteria offered by these frameworks provide insight into *'what'* a monitoring system should look like, they do not assist in describing *'how'* to conduct monitoring in an adaptive co-management context. By combining insights from the social learning literature (Section 1.2.3) with insights from existing frameworks, the following criteria can be identified as necessary for a well-designed monitoring system:

- i. Recognise complexity and non-linearity and therefore seek to integrate variables at more than one spatial and temporal scale (Campbell *et al.* 2001b; Bellamy *et al.* 2001);
- ii. Integrate both social and ecological variables (Bellamy *et al.* 2001; Connick and Innes 2001; Plummer and Armitage 2007b);
- iii. Be predictive, and seek surrogates for resilience that help to identify approaching thresholds (Lynam and Stafford Smith 2004; Western 2004; Carpenter *et al.* 2005);
- iv. Monitor both the outcomes (performance) of natural resource management systems, and the process of implementation (Innes and Booher 1999; Plummer and Armitage 2007b).
- v. Be reflexive and encourage ongoing reflection on the learning that has taken place (Dyball *et al.* 2007);

- vi. Involve decision makers directly in indicator selection, monitoring and analysis through a collaborative process that encourages input from multiple knowledge systems (Babu and Reidhead 2000; Muro and Jeffrey 2008).
- vii. Effective learning is about practice, and monitoring should therefore feed directly into decision making and encourage experimentation and action (Wenger 2000; Connick and Innes 2001);
- viii. Encourage participants to work toward an ideal, or best practice, and encourage visioning about ‘what could be’ alongside ‘what is currently possible’ through a process of collective sense making (Keen *et al.* 2005b; Mutimukuru *et al.* 2006).

1.3.3 Research design: Collaborative monitoring and social learning

A social constructivist understanding of knowledge informs this study in that knowledge is considered to be intimately linked to social experience and particularly past experiences (Macnaghten and Urry, 1998, Burningham and Cooper, 1999). The validity of different forms of knowledge and understanding are recognised (Symanski, 1994; Hannigan, 1995; Milton, 1996). This post modernist paradigm is informed largely by the practical experiences of a large number of scientists working in the field of natural resource management, where the ability of traditional or local knowledge to contribute toward understanding conservation, sustainable use and adaptive management has been clearly indicated (Gadgil *et al.*, 1993; Alcorn, 1989; Colding, 1998; Johannes, 1998; Mauro and Hardison, 2000; Berkes *et al.*, 2000; Martello 2001; Berkes *et al.*, 2003; Gadgil *et al.*, 2003).

In terms of the research design in particular, this study is necessarily an exploratory one (*sensu* Babbie 2004) due to the paucity of examples of efforts to monitor adaptive co-management in general and of social learning approaches to monitoring in particular. Within this exploratory approach, three units of analysis are considered: the individual (Chapters 3 and 4), the household (Chapter 5) and formal social organisations in the form of co-management organisations (Chapters 3 and 4). In seeking to evaluate learning, innovation and governance, a longitudinal study approach was adapted in which measurements were taken over the course of eighteen months. Longitudinal studies are considered most effective when the goal is to make assertions regarding the cause of change or observed patterns (Babbie 2004). In order to evaluate livelihood outcomes, a longitudinal approach was sought through the inclusion of retrospective questions.

Triangulation of research results is sought throughout this study, which is designed to bring together the strengths of qualitative inquiry and quantitative analysis. A second approach aimed at increasing the perceived validity of the data gathered was to conduct a multiple case study analysis. The collection and analysis of multiple case study evidence in this study followed the principles put forward by Yin (1994). In particular, emphasis was placed on integrating various sources of information, including archival records, documents, open-ended and structured interviews, focus group discussions and direct participant observation.

Participatory Learning and Action (PLA) was the dominant data collection method adopted in this study. PLA is a term used to refer to a wide range of similar approaches, including Participatory Rural Appraisal (PRA) and Rapid Rural Appraisal (RRA) (Chambers, 1994). The common theme is the participation of people in the processes of identifying their needs and opportunities, and in the action required to address them (IIED, 2003). Action research entails an iterative cycle of problem identification, diagnosis, planning, intervention and evaluation (Cassell and Johnston 2006). The approach aims to integrate theory and practice in a self-reflective process that enables practitioners to improve practice (McKernan 1996, cited in Cassell and Johnston 2008). Action research comes in many forms, but is generally accepted to be an approach to scientific enquiry that is implemented by external researchers with the participation of a group of people around an issue that is of genuine concern to them (Eden and Huxham 1996). Action research acknowledges the normative dimension of research, and assumes that the knowledge developed during a research process is not purely of scholarly interest, but should also benefit participants (Blythe *et al.* 2008). Intervention, and not purely description and analysis, is therefore a given in action research.

Although originally conceived as a means to empower local actors through a focus on knowledge, action and awareness raising, participatory research has been criticised for focussing too heavily on knowledge production (or extraction) at the expense of action and awareness raising (Brock 2002). Action research does however pose challenges, including defining the line between researcher, facilitator and participant in management decision making (Ludwig 2001; Sayer and Campbell 2004). The relationship between the researcher and participants in action research varies considerably, usually along the lines of who poses the research questions, who selects the methods, who carries out the research, and who reports back the results (Blythe *et al.* 2008).

The principle data collection strategy adopted in this study was that of collaborative monitoring with an emphasis on action research and engendering shared learning processes amongst all participants. Monitoring is often conducted to meet short term regulatory requirements, rather than being aimed at feeding into long term adaptive management (Mutimukuru *et al.* 2006). Traditionally, ecological monitoring has been lead by ‘experts’, and has been considered costly and therefore unsustainable in the long term (Danielsen *et al.* 2005a). Information from scientific monitoring is rarely accessible to local resource users, or explained to them by the experts (Uychiaoco *et al.* 2005), and through a lack of consultation shifts attention away from livelihood needs and the objectives of resource users (Danielsen *et al.* 2005a).

Based on the criteria identified in the previous section, the methodological framework adopted to monitor transitions toward adaptive co-management in this research is presented in Figure 1.5. The framework is drawn from the work of a number of analysts who have suggested an iterative process for case study analysis (Yin 1994), steps for policy oriented monitoring (Babu and Reidhead 2000), collaborative monitoring (Abbot and Guijt 1998), social learning in environmental management (Keen *et al.* 2005b), participation in adaptive management (Stringer *et al.* 2006) and analysing co-management in general (Carlsson and Berkes 2005).

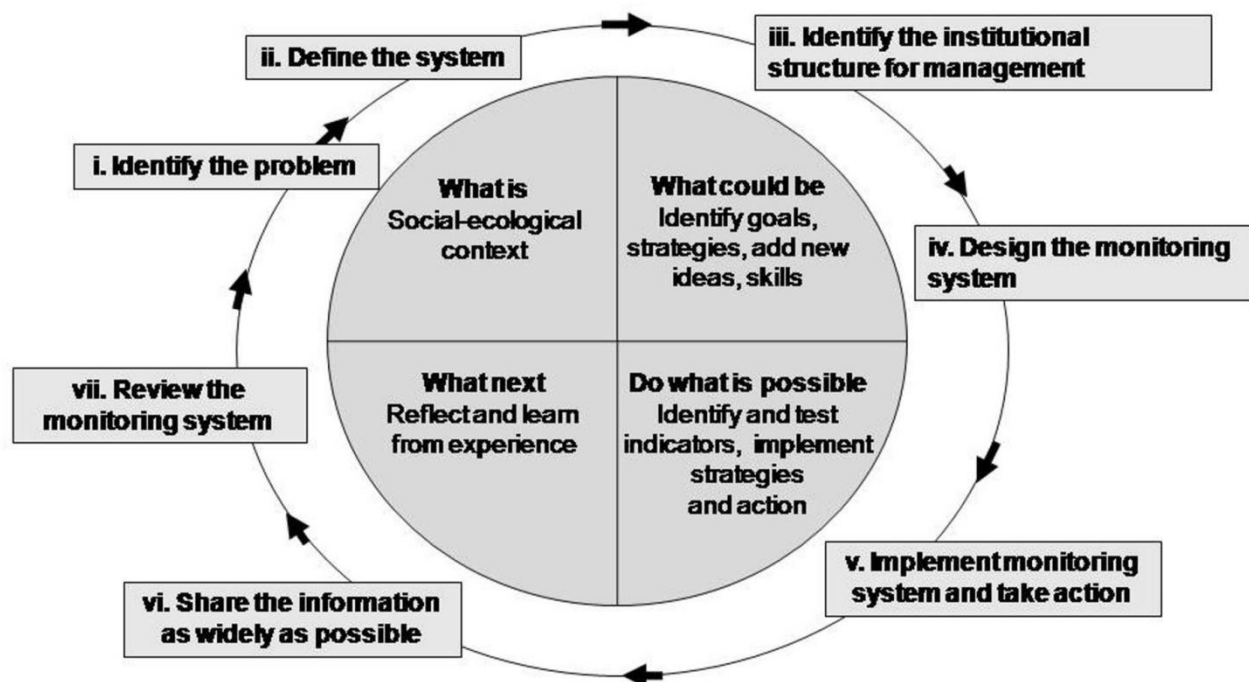


Figure 1.5: A social learning approach to monitoring (synthesised from Babu and Reidhead 2000; Keen *et al.* 2005b; Stringer *et al.* 2006).

Even a well designed monitoring system (Section 1.3.2) that includes all of the relevant variables and manages to over-come the challenges posed by complexity and scale (Section 1.3.1), will fail to improve decision making if it is not based within existing institutional structures (Babu and Reidhead 2000; Boyle *et al.* 2001). A social learning approach to monitoring entails a cyclical process of problem identification, visioning, monitoring, taking action, reflection and redefining the problem (Figure 1.5). The application of monitoring in this study, in terms of frequency, participants, specific methods and lessons learned are dealt with in Chapters 3, 4, and 5, and are reflected upon in Chapter 6 of this thesis, however the broad monitoring steps depicted in Figure 1.5 include (Babu and Reidhead 2000; Keen *et al.* 2005b; Stringer *et al.* 2006):

- i. *Identify the problem that needs to be solved:* Identify the information needs, the different kinds of knowledge that are relevant, and who is going to use the information.
- ii. *Define the social-ecological system of interest:* Define the unit of analysis, i.e. a resource system, a community, a group; identify the social, political, economic and ecological drivers that influence the system of interest.
- iii. *Identify the institutional structure for data collection, analysis and action:* Identify the objectives of monitoring and evaluation from the perspective of all participating actors; re-visit steps 1 and 2 using participatory methods and approaches, and adjust if necessary; define the extent to which each group is willing to take part in monitoring; map the essential management tasks to be performed; define the short-term, medium term and long term decision that must be taken and identify who is responsible for these tasks.
- iv. *Design the monitoring system:* With stakeholders, identify indicators for impact and process monitoring; identify data collection methods and frequency of data collection depending on time, skills, and nature of variable being monitored; decide who is responsible for the different activities; identify analytical methods, matched to the level of expertise of participants; test and fine-tune methodologies with participants, training workshops and practical activities may be necessary.
- v. *Take action and implement the monitoring system:* Refine or change methods if it becomes clear that they are not providing the information required.
- vi. *Share the information and learn from actions:* Collate and analyse data; involve those who collected the information and those who are going to use the information in analysis; build capacity to identify trends and understand results; share information periodically, but regularly; integrate findings into decision making processes; encourage decision making bodies to adjust activities in response to monitoring results; reformulate the findings for different audiences using appropriate presentation methodologies, but be aware of misrepresenting data.
- vii. *Review the monitoring system:* revisit the problem to be solved, is it the same as before? Redefine the social-ecological system based on new understanding from monitoring; change the institutional structure where necessary; redefine methods where necessary.

Collaborative monitoring is a means to promote conscious and deliberate learning processes that in turn create opportunities for consensus building, collective sense making

and action (Mutimukuru *et al.* 2006; van Rijsoort and Jinfeng 2005). From a management perspective, collaborative approaches tend to increase the probability that monitoring data will be considered valid, will be understood, and will be used to improve decision making (Gottret and White 2001; Poulsen and Luanglath 2005). Collaborative monitoring and evaluation however comes with a number of challenges. In developing countries, there is a need to make trade-offs between precision and the long term viability of a monitoring initiative (Brashares and Sam 2005). To promote long term viability, methods should be kept simple (Andrianandrasana *et al.* 2005). A concomitant challenge is ensuring that these simpler methods are able to detect trends and changes outside of the local context. The interpretation of data is problematic, and the difficulties inherent in this regard have been demonstrated in the case of the Event Book system in Namibia (Stuart-Hill *et al.* 2005). The long term viability of collaborative monitoring is also influenced by the availability of incentives for resource users to participate in monitoring (Hockley *et al.* 2005; Topp-Jørgenson *et al.* 2005; Poulsen and Luanglath 2005). These issues, as they were experienced in this study, are reflected upon in chapters 3,4,5 and 6.

1.3.4 Indicator selection

Monitoring is often considered synonymous with the identification of indicators that reflect the ‘core’ set of variables to measure in order to draw conclusions about observed trends (Boyle *et al.* 2001). A danger with externally identified and quantifiable indicators is that many context specific processes might not be detected, and an opportunity to engage local decision makers in a learning process is lost (Fraser *et al.* 2006).

The identification of indicators during collaborative processes is however problematic for a number of reasons; i) people bring with them very different assumptions about ‘what is important’ to monitor, the objectives of an initiative, and what constitutes success, ii) funding is often constrained by the need for objective and quantifiable indicators that allow comparison across sites (Fraser *et al.* 2006), and iii) analysts often argue for large numbers of variables to be tracked simultaneously in order to cope with complexity (Western 2004). However, when attempting to monitor transitions toward adaptive co-management, there is a need to make trade-offs in indicator selection between precision and the learning objectives considered key to transformation. Substitutes are required for the expensive and time consuming sampling methods needed to monitor large numbers of indicators (Walters and Holling 1990).

The identification of multiple conceptual tiers to understand system dynamics (Ostrom 2007b) is one way of dealing with these trade-offs. While the broad components of a monitoring system, the system attributes relevant to each component and in many cases even the key variables (sensu Walker *et al.* 2006) that influence system attributes, can be identified by the researcher based on theoretical insights, the specific outcome indicators that underlie each variable can be adjusted by local participants to suit the context. This ensures that at the lowest level, at the level of people's everyday lives, the indicators are of interest and direct relevance to participants, while still providing theoretical insights. The specific indicators used in this study, and the process of their selection, are discussed in Chapters 3, 4 and 5.

1.3.5 The scope of this study

This study develops conceptual and methodological frameworks that can help guide the process of monitoring adaptive co-management under resource-poor conditions. These frameworks are used to develop and test monitoring systems to assess the learning, governance and livelihood outcomes of four different case studies in South Africa. The outcomes of the monitoring activities in each case study are used to recommend ways in which transitions toward adaptive co-management might be initiated under resource poor conditions. In achieving the aims of this study, trade-offs had to be made in terms of the content of this thesis. For example, it was necessary to dedicate a lengthy introductory chapter to developing the conceptual and methodological frameworks that guide this study. In addition, since a social constructivist approach was adopted, laying out the social-ecological context was considered crucial, and thus Chapter 2 is dedicated to this subject. As a result of these two fairly lengthy chapters, it was thought more appropriate to reflect on methodological issues within each results chapter, rather than being dealt with in a single location. The final chapter reflects on these issues to the extent appropriate to achieving the aims of this study.

1.4 Conclusion

Monitoring transitions toward adaptive co-management is undermined by the existence of a number of conceptual and methodological knowledge gaps. Collaborative monitoring provides a means of tracking change in social-ecological systems while exploring these

gaps in a way that tests theoretical insights against the experiences of resource users and managers on the ground.

Until present, collaborative monitoring has been focussed narrowly on community participation in ecological monitoring. This study expands this focus to engage participants in process, governance and livelihoods monitoring (Figure 1.3). Each of these components is elaborated upon in the subsequent chapters of this thesis. In each of these chapters, the broad methodological framework is brought down to earth and the specific methods used are elaborated upon. Chapter 2 explores the social-ecological context of South Africa and each of the study sites where monitoring took place. Chapter 3 explores the processes through which learning and collaboration have taken place in the four case studies. Thereafter, Chapters 4 and 5 explore the outcomes of these processes for governance and livelihoods respectively.

CHAPTER 2: SOCIAL-ECOLOGICAL RESILIENCE IN SOUTH AFRICA

This chapter describes the social-ecological context of four case studies that form the focus of this study. The national social-ecological context, as well as the context in each case study, provides the basis for understanding the processes of implementation described in Chapter 3, and the governance and livelihood outcomes described in Chapters 4 and 5 respectively.

2.1 Introduction

While ecosystem function is necessarily a product of the given biophysical context, ecosystem change is nested within the broader context of political, economic and biophysical trends of the linked social-ecological system. Observed large scale change is the result of the cumulative and often synergistic impacts of these different components of the system, and takes place through local livelihood practices, land and resource use patterns (Wilbanks and Kates 1999). Institutions at various scales, in turn, mediate the allocation and use of ecosystems by people (Adger 1999b). Specifically, formal and informal institutions determine the ways in which the external context and trends influence local livelihoods and therefore patterns of resource use (Leach *et al.* 1997; Scoones 1998), and their effects on ecosystem change. This process is dynamic, particularly at the local level; institutions strengthen and weaken through interactions with factors outside of the local context, and are constantly negotiated and readjusted through a process of collapse, learning and adaptation in response to changes in the local environment, and through interactions with the wider social-ecological environment (Mearns *et al.* 1998; Colding *et al.* 2003; Gadgil *et al.* 2003).

A loss of social-ecological resilience (Section 1.2.1; Chapter 1) can lead to increased social vulnerability (Folke *et al.* 2002). Social vulnerability is defined as the susceptibility of a system to harm, through the exposure of groups or individuals to stress as a result of social and environmental change (Adger 1999b), its sensitivity to stress, and the absence of the capacity to adapt (Adger 2006). Stress in this context may refer to unexpected changes and the disruption of livelihoods (Adger 1999b). Ecosystem services (Section 1.2.1, Chapter 1) and institutional capacity (Section 1.2.3, Chapter 1) in communal areas are often tightly coupled (Berkes and Folke 1998; Dietz *et al.* 2003; Agrawal 2002); local level institutions

are important determinants in the allocation and the use of ecosystems by people (Adger 1999b). The interaction and feedback between institutions, governance, resource use and the ecological context over time shapes the capacity of ecosystems to generate services.

In Figure 2.1 a ball and cup model is used in order to visualize the current situation in many of South Africa's communal areas. In many instances, communal systems are in a state of low institutional capacity, high social vulnerability and reduced ecosystem productivity. From a resilience perspective, many of South Africa's communal areas might be described as being in the 'de-organisation' phase of an adaptive cycle (Gunderson and Holling 2002) following major social and ecological disturbances across multiple spatial and temporal scales. These areas can therefore be described as 'resource-poor', where the ability to create and maintain transitions toward more desirable states is extremely low. It is however in this back loop phase of the adaptive cycle that innovation and novelty are thought to occur (Folke *et al.* 2003). This model is used as a purely illustrative tool to present the context discussed in this chapter from a resilience perspective. The ball and cup model is one approach for depicting the phase shifts and resilience changes that social-ecological systems can experience. As the system moves from one state to another through the loss of resilience, vulnerability increases while institutional capacity and the production of ecosystem services declines. This process has not been a linear one, and as this chapter aims to demonstrate, many of the factors that have reduced resilience have overlapped with one another, and interacted in non-linear ways to produce the current situation.

This chapter begins by describing how, in the past, interventions into natural resource management have often entailed social engineering through for example forced population removals and 'villagisation' schemes, which arrived atop already simmering conflicts over land and resource scarcity, and were therefore highly politicized. Indeed, Abel and Blaikie (1986) have described conservation in the region as becoming part of an ideological and political struggle over access to and decision making over natural resources. The forced removal of people from traditional settlement areas has had far reaching social and ecological effects (Timmermans 2004; Reid and Turner 2004). In particular, people became hostile to top down government interventions into natural resource management (Fabricius and de Wet 2002; Fabricius 2004).

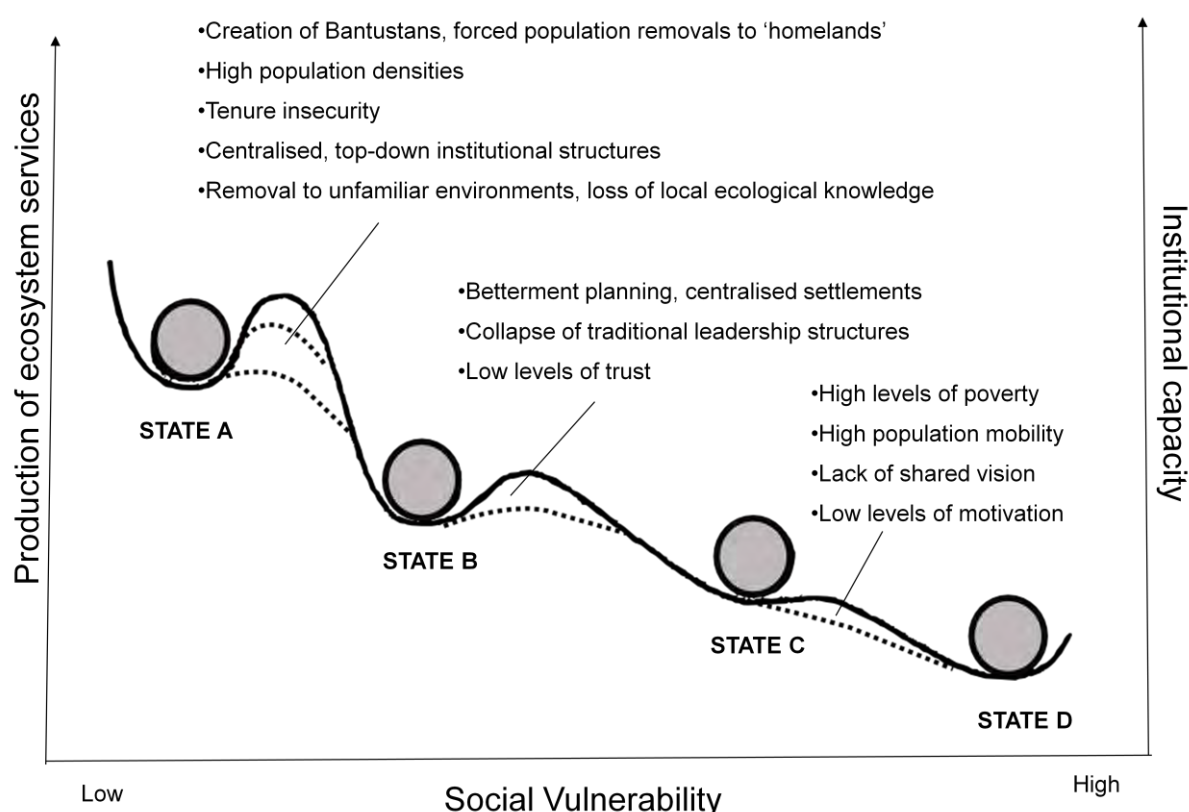


Figure 2.1: A graphic model depicting transitions between governance states. Dotted lines indicate the loss of resilience.

It is against this backdrop that the promotion of benefits from conservation for rural communities, particularly in those areas that were previously excluded from such benefits, has become a national priority in South Africa (Section 2.2). Note that the direction of movement required for a transformation toward adaptive co-management is not backward up the ‘steps’ depicted in Figure 2.1 but rather forward, toward a fundamentally new configuration. This diagram is not intended to convey the idea that there is a need to ‘return to the way it was before’, rather, the aim is to demonstrate; i) that in communal areas we are dealing with resource-poor systems and, ii) the need for innovative solutions that are able to guide resource use and management toward a more sustainable future.

2.1.1 Population pressure and tenure insecurity in communal areas

Population pressure and the resulting tenure insecurity that emerged through the creation of ‘homelands’ and the subsequent forced removals discussed in this section, contributed toward a ‘regime shift’ (sensu Walker *et al.* 2006) within South Africa’s communal areas, from State A to State B (Figure 2.1). Land dispossession was a key feature of the colonial and particularly Apartheid rule (characterised by ‘separate development’) in South Africa,

and has historically been a key driver of ecological change in communal areas. Indeed, in excess of 3.5 million people were forcibly removed from their land in the period 1960 to 1983 alone, as the South African government sought to consolidate the African homelands (Surplus People Project 1985).

The political and constitutional origins of the former Homelands can be traced back to the Native Land Act (No. 27 of 1913, Table 2.1) (Haysom 1983). This Act formalised the Native Reserve system, allocating a little over 13 percent of the land area of the country for exclusive occupation by black people, who constituted 80 percent of the population. This was followed by the Native Trust and Land Act (No. 18 of 1936), which sought to consolidate the native reserve areas by establishing the South African Native Trust, with the responsibility of: i) consolidating the reserves by purchasing additional land, specifically from white farmers whose land fell within the reserves prior to the Native Land Act of 1913; and, ii) ‘rehabilitating’ the existing reserves which were regarded at the time as severely degraded (de Wet 1995). These conservation related activities are discussed further in the next section.

The intention of the South African government in establishing these ‘homelands’ was ostensibly to enable separate development of ‘blacks’ and ‘whites’ that benefited both groups. In pursuance of this, the Black Authorities Act (1951) and the Promotion of Black Self Government Act (1959) were passed, which gave renewed power to traditional political structures such as chieftain rule and village headmen. As part of this process, legislative and executive powers were granted to homeland political structures such as ‘Tribal Authorities’ (Manona 1995). The result was a form of communal tenure in the Homeland areas that had some basis in customary law, but which was manipulated by the South African state (Lahiff 2000).

Communal land tenure was, and remains, the dominant form of tenure in the former homelands. In almost all cases, the land was owned officially by the state, but was held in trust by traditional leaders, with use rights allocated to individuals by these leaders (Hendricks 1990). Narratives from the time reveal high levels of uncertainty and tenure insecurity amongst black farmers forced to move from land designated for white settlement to the ‘homelands’ (van Onselen 1996).

Table 2.1: State interventions into the management of natural resources (Ainslie 1998; Bundy 1979)

Policy change	Intervention
Native Land Act No. 27 of 1913	• Legally reinforced the reserve system. • Set aside land exclusively for occupation by Africans
Native Trust and Land Act No. 18 of 1936	• Additional land set aside for African occupation. • The South African Native Trust would henceforth administer the scheduled areas set aside by the Land Act of 1913 and the 1936 act. • In practice, the headmen continued to control access to resources, and remained answerable to the magistrate. • The Act explicitly called for remedial action to be taken in reserve areas affected by erosion and degradation.
The Native Economic Commission of 1930-32	• Described environmental <u>crisis</u> in African reserve areas. • State responded with rehabilitation schemes where land was divided into arable, grazing and residential areas and people and livestock were relocated. • Programme also included livestock culling, fencing, contour ploughing and soil and water conservation measures
Tomlinson Commission 1955	• The ruling party wanted to maximise the number of people in the reserves. • Recommended that reserve populations be divided into farmers and rural-based wage earners. • To contain the ecological implications of such an intervention, the policy of Betterment Planning was adopted (Section 2.1.2)

Betterment Planning 1958 – 1990	• Imposed fines for breaking contours, impounded cattle found outside allocated grazing areas, devolved responsibility for policing rehabilitation to headmen in line with the Black Authorities Act. • Allowed the state to exert control over chiefs, lead to a challenging of the legitimacy of traditional leaders who accepted Betterment schemes in their villages.
1994 - Democratic elections	• Former homelands re- incorporated into South Africa. • Homeland governments dissolved. • Homelands now fell under the administrative system of South Africa.

Local ecological knowledge is place-based and cumulative; it is gained through experience in particular environments (Woodley and Erickson 2005). The forced removal of millions of people into different environments than those for which local ecological knowledge had been accumulated, almost certainly would have influenced the success rate with which agricultural endeavours met, at least initially. The combination of population pressure and forced relocation lead to degradation and therefore renewed efforts by the South African state to intervene in land use planning in the former homelands (De wet 1995). These efforts and the outcomes for common pool resource management are discussed below.

2.1.2 Betterment Planning and the erosion of traditional leadership

Betterment Planning and the concomitant erosion of traditional leadership structures further undermined institutional capacity, thereby undermining productivity and increasing the vulnerability of households to shocks and surprises, and resulting in a second shift, from State B to State C (Figure 2.1). State intervention into resource management in the former homelands (Table 2.1) can only be understood within the broader context of the political and ideological aspirations of the South African government of the time (De Wet, 1995). Indeed, the justification for conservation in the homelands became bound up with broader political imperatives, including racial segregation (Beinart 1989). The state wanted to stem African urbanization, maintain the migrant labour system between the African reserves and the 'white' cities, and to 'develop' Africans in their 'own' areas. Soil conservation was thus seen as a positive means of maintaining economic incentives for Africans to remain in the

reserves. Betterment Planning is an example of one such intervention that resulted from this thinking.

Betterment Planning emerged as a response to growing concerns about ecological degradation in the newly created homelands. As early as 1936 the Native Trust and Land Act (No. 18 of 1936) had already identified population pressure as a major driver causing erosion and degradation in the homeland areas. Later, the Tomlinson Commission (1954) identified the major environmental problem in the reserves as population, congestion, and the Bantu himself (Houghton 1956). Over stocking and erosion was identified as a direct result of the sociological, psychological and cultural condition of African people.

The solution was seen to lie in removing surplus people from scattered settlements into centralised rural villages, the reduction of livestock numbers and the establishment of viable agriculture by providing substantial inputs into the development of agriculture based on scientific methods (De Wet, 1995). The rationale was that those people moved into villages would then form the basis of the migrant labour required by the burgeoning mining and industrial sector in neighbouring South Africa.

This history of forced removals and dislocation has obvious implications for trust within communities, and between communities and government representatives. In particular, state manipulation of traditional leadership structures led to people's disillusionment with traditional leaders in many areas. For example, in the former Ciskei homeland, the collaboration of traditional leaders with government departments led to major conflicts in the early 1990's, where headmen's homes were burnt by enraged community members, some murdered, and decision-making power was handed to democratically elected community-level bodies instead (Manona 1995). These democratic structures did not, however, succeed in replacing the land allocation and rule enforcement functions of the traditional leadership structures, and an institutional vacuum was thus created in some instances (Manona 1995; Ainslie, 1999).

Shared norms and values within communities, or social capital (See Chapter 4), were undermined by the migrant labour system that was a result of the Homeland and Betterment Planning process. This high mobility of individuals, often the heads of households and therefore decision makers, negatively impacted on the management of common pool resources, and this is illustrated in the case studies presented in Section 2.3 of this chapter.

2.1.3 Growing inequality and poverty

In the past few decades, South Africa as a whole has experienced growing inequality and poverty, which can manifest as voicelessness and an inability to participate in governance (Sen 1999). This is leading to a third shift, from State C to State D (Figure 2.1). Land degradation in South Africa, in the form of soil and veld (e.g. deforestation, bush encroachment and invasive alien species) degradation has been identified as more severe in communal than in commercial farming areas (Hoffman and Ashwell 2001). The reasons for this difference include the legacy of 'Betterment Planning', overstocking, a lack of education and extension services, deforestation and the absence of soil conservation works, amongst others (Hoffman and Ashwell 2001).

From a socio-economic perspective however, national censuses do not differentiate between former homelands and former South African areas, only between rural and urban. Therefore, wherever possible statistics are provided that relate to the black African population, since this is the population group that was formerly restricted to homelands areas, and is therefore the population group of concern in this thesis.

South Africa has a total population of approximately 47 million people (Kane-Berman *et al.* 2007) of which roughly 80 percent are black African (Statistics South Africa 2001). Life expectancy at birth is estimated at 51 years, having dropped from 62 years since 1986 (Kane-Berman *et al.* 2007). South Africa has experienced positive economic growth for well over a decade, with a 5 percent growth in Gross Domestic Product (GDP) being reported for 2006. However, in the same year, the unemployment rate in the country was 25.6 percent, an increase of 28 percent since 1994, and the number of people who consider themselves discouraged work-seekers has increased by 118.7 percent during the same period. The proportion of total unemployed workers that were black African was 88.7 percent.

In terms of poverty trends, between 1996 and 2005 there was a 122.6 percent increase in the number of people living on less \$1/day; an increase from 4.5 percent of the population in 1996, to 8.8 percent of the population by 2005. Twenty two percent of households receive their main sources of income from social grants and pensions. 'Relative poverty' in South Africa refers to individuals who live in households where income is less than R871¹ per month per individual (Kane-Berman *et al.* 2007). Within the same period, the number of

¹ The exchange rate between ZAR and US\$ at the time of writing is R6.8/US\$1

people living in relative poverty increased from 40.5 percent to 47 percent, 77 percent of whom were either black African or of mixed race.

Education trends within the country have been more positive, with a decrease in the number of people with no schooling at all, and increases in all levels of education. In 2005, literacy rates in the black African population were 86 percent. However, only 1.8 percent of black Africans, compared to 15 percent of other racial groups, have any tertiary education at all.

In terms of access to basic services, 74.2 percent of the total population has access to free basic water (comprising 6000 litres per month), of which 69 percent are classified as poor. In terms of household energy usage, whilst 55 percent of black Africans rely on electricity as their main source of energy, 92 percent of other races do the same (Kane-Berman *et al.* 2007). In communal areas, the reliance of households on wood for fuel has been placed at 99 percent (Hoffman and Ashwell 2001).

The history of segregation, and unequal access to opportunities, has had obvious consequences for South Africa's black African population. In recent years, despite positive economic growth at national levels, poverty and inequality have tended to increase, rather than decrease.

2.2 Efforts toward a new trajectory: conservation and development in South Africa

In Southern Africa, co-management in its various forms is generally referred to as CBNRM. The past three decades of experimentation in CBNRM in the region has witnessed a shift from a focus on high value wildlife species in protected areas, to multiple use resource management regimes in communal areas (Whande 2007). Increasingly, CBNRM is being integrated into national and international poverty relief programmes within formerly marginalised communities (Blaikie 2006), and as the next section will demonstrate in the description of the case studies of interest here, international agencies who offer technical support during implementation have been increasingly influenced by the rhetoric of adaptive co-management.

The early years of CBNRM practice in Southern Africa were influenced by innovative programmes aimed at improving the livelihoods of the rural poor through economic benefits from wildlife (Child 2004). Most notable amongst these was the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) in Zimbabwe (Metcalf

1994). Some of the key features of the approaches that emerged from this experience were an emphasis on devolution in decision making functions, sustainable use and collective ownership of resources (Whande 2007). The debates that emerged from this early approach were therefore founded strongly on finding economic incentives for effective management. However, two key factors have lead to the expansion of CBNRM efforts in the region to consider multiple resources and issues in communal areas.

Firstly, post-independent states such as Zimbabwe and Namibia, and newly democratized states such as South Africa, were placed under increasing pressure to deal with past inequalities in access to land and natural resources. One of the ways that countries have dealt with this has been to find ways to expand the benefits from conservation into communal areas (Whande 2007). Secondly, there has been a growing realization that the way in which CBNRM was conceptualized was too simplistic, focusing only on economic incentives and ignoring the complexity of social and ecological system interactions (Fabricius 2004). Emphasis has thus come to bear on the tangible and intangible benefits of CBNRM. A recognition of the role played by multiple natural resources in securing rural livelihoods (Shackleton *et al.* 2000a) has lead to the expansion of CBNRM to cover multiple, often low value, resources (Turner 2004). From a management perspective, the emphasis in CBNRM has begun to shift toward understanding different kinds of partnerships and greater emphasis has been placed on governance (Fortmann *et al.* 2001; Koch 2004).

Regionally and nationally, the opportunity and the will exists to move toward an adaptive co-management model for resource management in communal areas. This shift is supported by the national legal frameworks that affect natural resource use and management in South Africa. Since the first democratic elections in 1994, South Africa has developed some of the most progressive legislation in the world regarding conservation and human rights. The South African Constitution and Bill of Rights enshrine the principles of co-operative governance and citizen participation in decision making. The Constitution stipulates that citizens have the right not only to a healthy environment (Section 24(a)), but also the right to benefit from natural resources for social and economic development. The right to security of tenure and clear property rights is enshrined in Section 25, as is the responsibility of the state to take reasonable legislative measures to enable citizens to gain access to land on an equitable basis (Section 25(5)). Section 24(b) provides the right to have the environment protected through reasonable legislative measures, while Sections 32 and 38 provide the

right of access to information, and the right of citizens *‘toget involved’ (locus standii)* in any decision making process that affects either them or the environment.

Under the constitution, South Africa has a number of enabling policies and laws that relate to education, governance, environmental management, agriculture, marine systems, forestry and tourism which have a bearing on acceptable approaches to conservation (Fabricius *et al.* 2003). These policies and laws have in common the goal of improving the livelihoods of the rural poor, the requirement of community participation, the need to redress historical imbalances in access to resources, and all highlight the problem of unsustainable use (Fabricius *et al.* 2003).

South Africa also has a land reform programme with the goal of restoring land that was lost as a result of legislated dispossession under Apartheid (see <http://land.pwv.gov.za/home.htm>). The programme focuses on past injustice, and the current problems associated with poverty, inequality and under development (Hall *et al.* 2003). Riemvasmaak, one of the study sites of concern in this thesis, is one of these rural restoration settlements.

A growing concern with poverty alleviation has lead the national Department of Environmental Affairs and Tourism (DEAT) to include CBNRM within its Social Responsibility Programme (SRP, formerly called Poverty Relief, see <http://www.deatsrp.co.za>). The SRP initiative seeks to promote sustainable development principles for local economic development, and as such has identified Sustainable Land Based Livelihoods as one of its focus areas, within which CBNRM falls. DEAT has thus taken the lead nationally in spear-heading CBNRM within government, as discussed in Section 2.3.

Therefore, the possibility of a new trajectory for people and ecosystems in South Africa's communal areas is supported both legally and intellectually, based on decades of experience with CBNRM on the one hand, and over a century of experience with failed command and control interventions into resource management by the state on the other. The will exists at the national level, but the communities and the ecosystems within which adaptive co-management type interventions are taking place have experienced the failed approaches discussed previously first hand. In the section that follows, the four case studies considered in this thesis are presented.

2.3 Case studies

The case studies described in this section are viewed through the lens of resilience offered in Figure 2.1. Under the ambit of the South Africa's Expanded Public Works Programme (EPWP), and supported by an international development agency, DEAT has provided substantial SRP funding for eight CBNRM initiatives since 2004. Given the resource poor conditions with which the initiatives were faced, in all cases priority was given to building various forms of capital, including physical (e.g. fencing for grazing land, roads, lodges for tourism), financial (e.g. through job creation), human (e.g. through formal training programmes), natural (e.g. through restoration and rehabilitation schemes), and social capital (e.g. through the creation of multi-stakeholder steering committees). Building these different forms of capital was considered crucial to initiating positive change in each site.

The four case studies selected for this study all received SRP funding between 2005 and 2008 (Table 2.2, Figure 2.2), and all had the same international agency acting as the implementing agent on behalf of DEAT. The projects were designed to consist of six components which ran concurrently; i) conceptualisation, administration and management, ii) the creation of partnerships and knowledge networks, iii) training and capacity building, iv) marketing of local products, v) conflict management and, v) monitoring and evaluation (Mitchell *et al.* 2008). This common design played a crucial role in the selection of the case studies of interest in this thesis because the creation of partnerships, knowledge networks, capacity building and monitoring and evaluation resonate strongly with the goals of adaptive co-management (Section 1.2.2, Chapter 1).

However, the case studies were also selected to provide the maximum contextual variation between sites, in order to draw general conclusions about the significance of observed trends in the processes and outcomes observed (Flyvbjerg 2006). The sites were selected for their distribution across the country (Figure 2.2), their representativeness of different cultural groupings, their different population sizes, histories, climates and landscapes (see below and Table 2.2). Finally, all of these initiatives have sought to achieve this task in situations where the resources are held under communal tenure. Each of the case studies are described below in terms of their history of land management and institutional capacity, the production of ecosystem services, and their social vulnerability (Figure 2.1).

2.3.1 Machubeni, Eastern Cape

The locality 'Machubeni' refers to a cluster of fourteen villages that collectively consider themselves part of one community and form part of a single electoral Ward. Machubeni is regarded as one of the most degraded areas in South Africa (Hoffman and Todd 2000), with extensive sheet and gully erosion on both the hill slopes and valley bottoms (ATS/Ikhwezi 2004; Shackleton and Gambiza 2008, Plate 2.1). In 2004, DEAT identified Machubeni as one of the poorest communities in the country, and therefore earmarked it for SRP funding. The objectives of the initiative are summarised in Table 2.2. Importantly, it was hoped that a model for integrated catchment and natural resource management by communities would be designed for dissemination to other parts of South Africa, through ecosystem repair, employment and capacity development (Mitchell *et al.* 2008).

History of land management and institutional capacity

Land allocation and management has until recently taken place largely through traditional structures, with a sub-headman responsible for each of the 14 villages that make up Machubeni, and a headman to whom these sub-headmen report. The creation and enforcement of rules governing access to resources similarly took place through these structures. However the last six decades have witnessed growing incursions into land management by the state, and the concomitant weakening of local institutional structures for resource management.

During the 1960's and 1970's Betterment Planning was implemented in Machubeni and entailed moving scattered homesteads into consolidated villages. Those living on the mountain sides were the most severely affected as they were forced to relocate with very little consultation. As in other areas, it is likely that the traditional leaders in Machubeni co-operated in the process. Two decades later, between 1986 and 1987, the Machubeni Dam was constructed to supply water to the Lady Frere district and surrounding areas. Once again, there was no consultation or negotiation with the community. Some compensation was paid to the households, however resentment still lingers over the lack of consultation over the construction of the dam and the relocations.

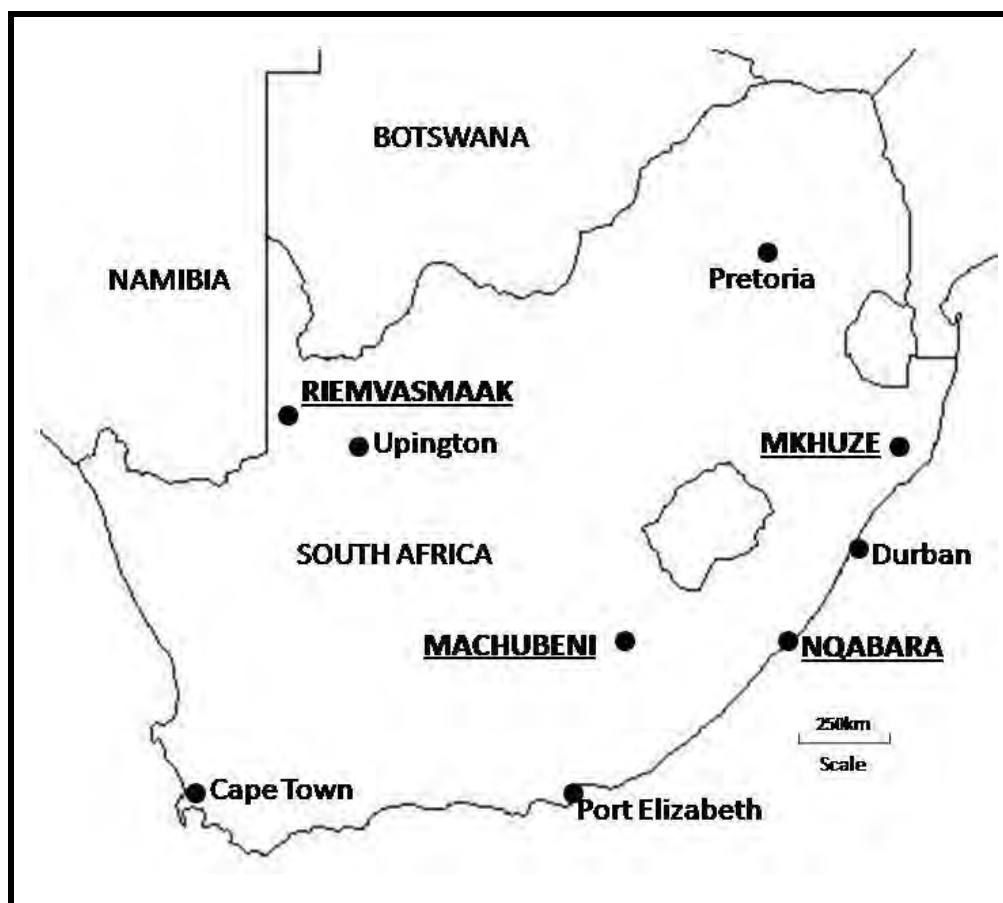


Figure 2.2: Map of South Africa indicating the location of research sites

Table 2.2: Case study summaries

	Machubeni	Mkhuze	Nqabara	Riemvasmaak
Location	Emalahleni Local Municipality, Eastern Cape	Hlabisa and Nongoma Local Municipalities, Kwa Zulu Natal	Mbashe Local Municipality, Eastern Cape	Siyanda District Municipality, Northern Cape
Land tenure	Communal	Communal	Communal	Communal
Population	7 344	360 000	3 369	780
Land area affected	16 150 ha	8 500 ha	1 500 ha	75 000 ha
Average annual rainfall	590 mm	605 mm	1080 mm	125 mm
Land use	Crop cultivation, livestock farming, brick making, grass harvesting	Conservation	Crop cultivation, livestock farming, harvesting of forest products	Limited livestock farming, tourism
Time frame of intervention	March 2005 to September 2007	April 2005 to February 2008	February 2005 to March 2008	April 2005 to January 2008
Budget of intervention	R 7 604 598 (US\$ 1 118 223)	R 6 342 390 (US\$ 932 704)	R 2 813 341 (US\$ 413 726)	R 3 613 385 (US\$ 531 380)

Objectives of intervention	Reinstate community access to high quality drinking/irrigation water	Develop a diverse and flexible range of livelihood options	Support the establishment of a conservancy through -	Develop deproclaimed land (Melkbosrand) into a community conservancy
	Improve the agricultural production systems	Establish economic and other livelihood incentives for sustainable resource use	The rehabilitation and restoration of the natural landscape	Develop conservation and tourism services capacity
	Reverse the process of land degradation	Develop active and effective involvement of supporting institutions	Removal of alien plants and propagation of indigenous trees in degraded areas	Job creation in the conservation and tourism sectors
	Stop further siltation of the dam	Create an economic partnership between the communities, Ingonyama Trust, private land owners and Wildlands Conservation Trust	Upgrade and construct facilities for conservancy	Involve communities in combating desertification and managing land
	Create income from catchment management		Incorporate a craft production centre, office and meeting venue/workplace	Link community into the DEAT initiative to develop community conservancies
	Design a model for integrated catchment and natural resources management by communities		Identify, rehabilitate and prepare a site for lodge development	

The 1990's witnessed a period of institutional inertia and confusion over land use and management. During this period, traditional leaders in many cases lost their ability to control land use, due in large to being associated with the state's Bantu Authorities system, whereby traditional leaders were paid by the state, and because of their apparent collusion with the state during the forced removals in the 1960's and 1980's. The result was that many people felt that leaders were accountable to the state rather than to the people. Traditional leadership in Xhosa culture has always relied on the support of the people (Pieres 1981), and therefore the lack of faith in traditional leadership severely reduced their power base. During this period, democratic processes began to gain momentum, and local democratic structures attempted to assert their authority (Manona 1995). However, there was no clear national policy or locally accepted norms that gave these democratic structures the power to manage and allocate land use rights. Thus, land use and management all but disappeared in the leadership vacuum that resulted. One symptom of

this collapse was the fact that fences that formerly separated grazing areas and fields were stolen in the 1990's to fence off homesteads, with no repercussions for the perpetrators (ATS/Ikhwezi 2004).

The former Transkei homeland, in which Machubeni was situated, was reincorporated into South Africa in 1994. Since 1994, land allocation and management have formally fallen into the hands of local government structures, particularly the Ward committee and an elected Councillor, although traditional leadership still has a strong position and is consulted of necessity. Indeed, an application for land by an individual would seldom reach the elected Councillor without first having gone through the hands of the sub-headmen and the headman. The current institutional structure responsible for rule enforcement and land management, which was developed specifically to deal with adaptive co-management, is discussed in Chapter 3.

Ecosystem services

Machubeni is characterized by hilly and mountainous terrain. The underlying geology is a mosaic of mudstone and sandstone with dolomite intrusions. The soils are generally shallow and stony, except in the valley bottoms. The area falls within the Grassland Biome, and is characterized by both Tsomo Grassland and Tarkastad Montane Shrubland (Ladislav and Rutherford 2006). The average annual rainfall is 590 mm, 80 percent of which falls between October and March. This rainfall is erratic however, and dominated by convective storms (ATS/Ikhwezi 2004). Although temperatures can exceed 40 °C, average day time summer temperatures are 20 °C, and 12 °C in winter. Temperatures of below zero do occur and winter snowfalls are not uncommon.

Ecosystem productivity is severely undermined by extensive and increasing gully and sheet erosion (ATS/Ikhwezi 2004). Sheet erosion is found close to roads and on the open veld, caused by trampling and over grazing. Gully erosion occurs along the water courses and in the relatively deeper soils of the valley bottoms. Due to the deeper soils and flatness of the land, these areas have historically been cultivated, and the villages are generally located in these areas too. The majority of the erosion occurs in these flatter areas due in large to inappropriate ploughing practices.

Although people value crop production and arable lands in Machubeni, crop yields are extremely low (ATS/Ikhwezi 2004, Plate 2.2). Nevertheless, fruit trees tend to be grown within garden plots, while maize, sorghum, wheat, barley, pumpkins and a range of

legumes are grown in fields. Crops are rain fed, and hand held tools are the dominant mode of cultivation. The main restraining factors for cultivation are the lack of water, infrastructure and resources such as equipment and capital.

The main water source is the eCacadu River, which flows through Machubeni and into the Machubeni Dam. This river only flows after rains and during the wet season. There are also numerous natural springs, which are utilized for domestic and stock water.

Livestock ownership is widespread within the community, with an estimated 37 percent of households owning stock, and average ownership across Machubeni being 10 large stock units (LSU) per stock owner. There is no fencing between villages or to divide grazing camps. There is no rotational grazing system or collective system of grazing management. The total carrying capacity for Machubeni is 1 129 LSU, with a maximum potential of 2 691 LSU if erosion was prevented and the veld restored to its optimum. A survey conducted in 2003 suggested that there were 7 670 LSU in Machubeni, which contradicts the Department of Agriculture estimate of 11 097 LSU (ATS/Ikhwezi 2004). Machubeni is nevertheless severely over-stocked and the productivity of the land is reducing constantly due to erosion.

There are three planted woodlots, and also three brick making plants within the area. Grasses are harvested for roofing and for sale, as are medicinal plants. The invasive *Euryops*, a plant species that has flourished in the degraded soil, is used by the majority of households for fuel, and for kraal² building (Shackleton and Gambiza 2008).

Social vulnerability

Social vulnerability has increased progressively at Machubeni through the combination of multiple forced relocations, the resultant weakening of local institutional capacity for land management, and the progressive erosion of the land as a result of this. These factors represent successive and synergistic stresses on the social-ecological system. Social vulnerability is equally influenced by the socio-economic conditions that characterise the area.

The Eastern Cape as the highest proportion of people living in poverty in South Africa, with 71.9 percent of the population living on less than R871 per month, and 12.3 percent of the population surviving on less than \$1 a day (Kane-Berman *et al.* 2007). Machubeni is remote, with little infrastructure or formal employment opportunities, and therefore

² The term kraal refers to a livestock enclosure

households are reliant on family members sending remittances from urban centres, arable production, livestock and ecosystem goods and services as described above (Shackleton and Gambiza 2008). Fifty seven percent of households are female headed, and 41 percent of households are headed by people over the age of 60. Well over 50 percent of the population is under 20 years of age, indicating that the permanent population is made up largely of children and the elderly. Population figures from the 1995 and 2001 census suggest that the population declined by 13 percent, a rate of 2.6 percent per annum. Population growth in the area is affected by both out migration and a high death rate rather than a declining birth rate.

Ninety five percent of the local population is unemployed with only 14.8 percent actively looking for work (Statistics South Africa 2001). However, between 35 and 40 percent of households have access to some form of wage income during the year due to part time, seasonal and self employment (ATS/Ikhwezi 2004). In terms of household income, between 1995 and 2001 the number of households declaring a nil income more than doubled, indicating growing poverty in the area. Forty nine percent of households receive a government welfare grant (ATS/Ikhwezi 2004). Two of the 14 villages have community taps for household water, and none of the households have taps inside the home.

2.3.2 Nqabara, Eastern Cape

The area referred to as ‘Nqabara’ in this thesis corresponds to a local government administrative unit, the Nqabara Administrative Area. In 2001, the Department of Water Affairs and Forestry (DWAF) began a process of developing a Participatory Forest Management (PFM) committee for the Nqabara Administrative Area. This later evolved into a more far-reaching institution referred to as the Nqabara Development Trust (refer to glossary), a registered legal body mandated by the community to make decisions regarding natural resource use and management. In 2005, DEAT allocated a budget of just over R2.8 million for a EPWP project that would support the establishment of a community conservancy in the community, referred to as the Nqabara Mouth Conservancy. The objectives of the initiative are summarised in Table 2.2.

History of land management and institutional capacity

“We didn’t like to come here, we were forced. If I had an opportunity, I would like to go back there.” (Anonymous man referring to Betterment Planning, born 1938 in Nqabara, quoted in De Klerk 2007)

The history of Nqabara is characterised by similar processes and events that have shaped the history of Machubeni since both fall within the former Transkei homeland. A thorough environmental history of Nqabara has been produced by De Klerk (2007). Unless otherwise stated, this compressed history of land management and institutional capacity draws extensively on the work of De Klerk.

Traditionally, land allocation and management was the responsibility of headmen and sub-headmen, in conjunction with senior men from the affected locality. During the 1920's, the proclamation of the Native Administration Act removed the responsibility of land allocation and management from the traditional leadership structures, and placed the responsibility in the hands of the Natives Affairs Department, through a local magistrate appointed by the state. The Department consulted with traditional leaders, however the result was growing rigidity in decision making and a lack of sensitivity to local conditions.

In the 1930's, the state intervened directly in land management once again, and the Transkei Forestry Department declared the majority of indigenous forests in Nqabara to be state owned and precluded the use of any forest products by the community. The forests that remained under the control of the headmen were equally regulated through the use of a permit system that was implemented by the headmen.

Betterment Planning gathered pace in Nqabara in the mid 1970's, and took the form of large scale forced resettlement of approximately 230 homesteads between 1975 and 1977. Approximately one third of the population had to relocate to fit into the Plan. Betterment Planning resulted in a dramatic change in the spatial distribution of homesteads, and represented a reduction in the size of both residential and field sizes, and had major ecological consequences with rapid expansion of forests through bush encroachment, at the expense of grasslands. De Klerk asserts that the immediate and lingering social, psychological and economic consequences of forced resettlement as a result of Betterment planning at Nqabara are significant (see also de Wet 1995).

Despite these interventions, land allocation and management has continued to be conducted through an *ilali* to some extent (De Klerk 2007), which refers to villages or sub-places within Nqabara. Applications for residential or for cultivated field sites must pass through these traditional institutional structures, which are made up of a sub-headman and senior men from that village. The more recent past has however witnessed a growing democratisation of institutions responsible for land allocation and management. The

development of Ward Committees, and the establishment of the Nqabara Development Trust in 2002 has done a great deal to help people circumvent traditional decision making systems, and also to deal with the resentments around state involvement in the selection (and employment) of traditional leaders in the past. The Development Trust has played a significant role in increasing the security of tenure and enhancing development along democratic lines. The Trust has however been less successful in enforcing rules governing the use of natural resources, mainly because local norms do not recognise the authority of elected community members to enforce rules in the way that traditional leaders did in the past. The Trust has however taken responsibility for negotiating with various government and private actors toward for the initiative of interest here, and this is discussed in Chapter 3.

Ecosystem services

Nqabara is situated on the eastern seaboard of South Africa, in a climatic transition zone between the temperate south coast and the subtropical north coast. The average summer maximum temperature is 24°C and the average winter maximum is 21.4°C. The average annual rainfall over the period 1972 to 2005 recorded at the closest weather station is 1080 mm.

The soils have generally low fertility levels, except on flood plains and on doleritic intrusions (De Klerk 2007). Topographically, the area consists of a mosaic of hills, ridges, valleys and floodplains, which creates a wide variety of slopes, aspect and altitudes, creating a range of microclimates (De Klerk 2007, Plate 2.3). The vegetation has been described as a grassland-woodland-forest mosaic (Timmermans and Naicker 2002) and is dominated by Eastern Thorn Bushveld (Low and Rebello 1996), which consists of small shrubs and grasslands with numerous and extensive patches of forest (Acocks 1988). Nqabara contains 33 forest pockets, to which people have differing levels of access. Goods and services derived from forests include construction wood for homes, kraals and fencing, fuel wood, medicinal fruit and bark, and wild game for food and medicine.

Although Nqabara has a long and continuing history of labour migrancy and remittance, people use the land in a wide variety of ways in order to sustain their livelihoods. Agriculture is generally regarded as a high risk activity due to unreliable markets and unpredictable rainfall, however, most households do have a home garden where vegetables, maize and other household staples are cultivated (Plate 2.4). Cultivated fields have tended to decline

in size, indicating an intensification of agriculture, and are generally under a hectare in size. The total area under cultivation at Nqabara amounts to 7.9 percent of the land (De Klerk 2007).

Livestock numbers are only available for cattle, with an average of approximately 2.5 - 2.9 cattle per household (De Klerk 2007). Livestock are grazed in open camps with no fencing, and there is no actively managed system of rotational or other organised grazing. Livestock ownership is becoming an increasingly exclusive activity in Nqabara because the land is less productive than previously due to landscape change and the reduction of grasslands that resulted from Betterment Planning, and because the young choose not to invest their money in livestock, but nevertheless remains an important aspect of land use.

Social vulnerability

Nqabara experienced similar stresses to Machubeni, including state intervention into natural resource management, the weakening of the position of traditional institutional structures, the failure of democratic structures to fill this void of institutional capacity, and the resultant declining productivity of the land. The socio-economic conditions that characterise the area further highlight the current vulnerability context of the area.

The Mbashe Local Municipality has an unemployment rate of 92 percent, with 50 percent of the population under 15 years of age. Forty percent of households report having no annual household income, and 88 percent of individuals who do receive a monthly income earn R800 or less (Statistics South Africa, 2001). At an individual level, 82 percent report having no income at all, while 15 percent report earning between R1 and R1 600 per annum. In terms of water availability, 72 percent of the population relies on rivers, streams and springs as their main source of water. 26 percent have received no schooling at all.

Of the 836 households in Nqabara, 53.6 percent are female headed. Roughly 35 percent of the population over the age of 20 has no schooling at all, and only 5 percent has 12 years or more of schooling (Statistics South Africa 2001). Seventy eight percent of the economically active population is unemployed, and 99 percent of the population do not have access to electricity. The Integrated Development Plan (2003) for the area suggested at the time that 66.4 percent of people were living below the poverty line, which equates to a household income of less than R871 per month according to current standards.

2.3.3 Mkhuze, Kwa-Zulu Natal

In 2004, DEAT granted EPWP funding to a project in northern Kwa-Zulu Natal to establish a community based game reserve, and to engage in the related land restoration and institutional development activities required in order to achieve this. The land on which the game reserve will be located is referred to as Bartlow Combine. The land falls within the UmKhanyakude District Municipality. There are two rural communities involved in the project, the Mandlakhaze and the Mdletshe traditional communities, both of which lie to the west of Bartlow Combine and together constitute a population of approximately 360 000 people. These communities straddle two local municipalities, the majority of the Mdletshe community fall within the Hlabisa Local Municipality to the south, while the Mandlakhaze community falls predominately within Nongoma Local Municipality to the north.

The land is managed by the Ingonyama Trust, which manages all communal land on behalf of the King of the Zulu nation, King Goodwill Zwelithini kaBhekuzulu. The Ingonyama Trust agreed to lease the land to the Mdletshe and the Mandlakhaze communities for the purpose of establishing a community based game reserve that would provide benefits to the wider community, and the goal was to create partnerships between the Ingonyama Trust, the Mandlakhaze and Mdletshe communities, and private land owners for the development of community based conservation enterprises. One of the central objectives of the project was to empower community leaders to facilitate the necessary institutional structures that would underpin the development of the project, and enable these leaders to form a legal entity for land and business management. Associated goals are listed in Table 2.2.

History of land management and institutional capacity

In 1879 the British defeated the Zulu army at the battle of Ulundi, and the nation was divided into thirteen districts, each under chiefs that were appointed by the British. Later, in 1897, Zululand was officially annexed into Natal through the Natal Act (37 of 1897). A commission consisting of two people (The Zululand Land Delimitation Commission) was established to decide on the boundaries of 'Nāive Reserves' and areas for white settlement.

A period of feuding and chaotic inter-clan rivalry followed the inclusion of Zululand under British rule (Guy 1982). Almost concurrently with this confusion over the locus of institutional power, a combination of ecological drivers severely impacted on the traditional economy of Zululand (Thanda 2005). Zululand has always been subject to diseases that have affected livestock production, including nagana, east coast fever, rinderpest, heart water, and many

others. In 1897 a rinderpest epidemic hit farmers, killing approximately 85 percent of the cattle, the chief form of storable wealth. East coast fever struck in 1904-1905, further weakening the already much reduced herds. Droughts were also a constant feature between 1895 and 1907. Locusts posed a major threat to grazing land and crop farmers in Zululand. In 1895, 1898, and again between 1904 and 1906, immense locust swarms swept through the area, decimating crops and grazing land (Thanda 2005). The combination of these social and ecological events severely undermined institutional capacity within traditional decision making structures.

However, the 1950's witnessed the promulgation of legislation that gave renewed power to the flailing traditional leadership structures throughout South Africa (Manona 1995, Table 2.1). Unlike the former Transkei, the tribal authorities in the former Kwa-Zulu homeland managed to retain their powers after 1994. Today, traditional leadership is still extremely strong in the area. Indeed, traditional authorities still perform certain judicial functions under customary law. These include dispute resolution and land allocation and administration. Tribal Authorities consist of the chief, his headmen from the constituent Wards, traditional councillors, and a secretary (Sarpn 2002). It is not entirely correct to consider these structures to be 'traditional' since they have been heavily influenced by the history of state appointed traditional leadership over many decades. Nevertheless, the processes of democratisation of institutional structures that have characterised the experiences of Machubeni and Nqabara are not evident in the Mandlakhaze and Mdletshe communities.

All grazing is shared as commonage, while male heads of households receive an allotment of land for residential purposes through a sub-headman (Sarpn 2002). Generally, land is allocated for cultivation, residential and grazing land. If a person is allocated land for farming, and does not use it for about three years, the land is repossessed by the headman on the advice of the sub-headman, and allocated to someone else (Sarpn 2002). Institutional capacity, from a rule enforcement and adherence point of view, is comparatively high in this case.

Ecosystem services

This case study is different to the other sites because Barlow Combine, the land in question, has not traditionally been used by the communities concerned; it belongs to the King of the Zulu Nation. The land was formerly under private ownership, and before that formed part of the Mdletshe Game Reserve (between 1895 and 1907). More recently, the

land has been used for cattle grazing and there are a number of boreholes that make this activity possible.

The climate of the area is sub-tropical and semi-arid, with little or no moisture surplus in any season (Wildlands Conservation Trust 2004). This is a summer rainfall area, with 69 percent of precipitation falling in summer and little rain in winter. Mean annual precipitation is approximately 610 mm, with low spatial variation from 590-620 mm. Rainfall is highly variable from year to year, and ranges from a maximum of 1048 mm, to a minimum of 316mm. The estimated average evaporation for the catchment is 1880 mm, which is more than three times annual average rainfall. Although 35 percent of the land is arable, and 14 percent has high cropping potential, the erratic and unpredictable rainfall has long confounded agricultural efforts in the area (Wildlands Conservation Trust 2004).

In addition, the vegetation type has long been considered most suitable for game ranching rather than agriculture (James 2003). The area falls within the Savannah Biome, and is characterised by Northern Zululand Sourveld, and by Zululand Lowveld (Ladislav and Rutherford 2006; Plate 2.5). Northern Zululand Sourveld occurs at altitudes between 450-900m, with a dominant structural vegetation type of wooded grassland, in some places pure sour grasslands and in some instances dense bushveld thickets. The terrain is mainly low, undulating mountains (Plate 2.6). In the lower lying regions, from an altitude of about 50-450m, Zululand Lowveld characterises the extensive flat or slightly undulating landscapes. This vegetation type supports a complex of various bushveld units (Plate 2.5), ranging from dense thicket of *Dichrostachys cinerea* and *Acacia* species, through to park like savanna with flat topped *A. Tortilis* to tree-dominated woodland with broad leaved open bushveld (Ladislav and Rutherford 2006).

Social vulnerability

Although local institutional capacity declined in the early years of colonisation by the British as a result of multiple social and ecological pressures, currently institutional capacity is relatively high in Mkhuze. The production of ecosystem services has never been particularly high, although the land is considered suitable for the intended land use of game farming. However, the socio-economic context of the area does point to high levels of social vulnerability.

The Umkhanyakude District Municipality has an unemployment rate of 67 percent, with 27 percent of the population having received no schooling at all (Statistics South Africa 2001).

Ninety nine percent of those without any schooling are Black African. Although the Mdletshe and the Mandlakhaze communities fall within different local municipalities, these municipalities border one another, and therefore socio-economic data for Hlabisa Municipality alone is provided. In terms of income, 60.6 percent of the population in the district live below the poverty line (defined as less than R871 per individual/month), and 26 percent of household heads in Hlabisa Municipality have no income whatsoever. Thirty two percent rely on rivers or streams as their main source of household water, while 30 percent rely on community stands, of which 62 percent are more than 200m from their dwelling (the maximum national standard). Only 29 percent of the population use electricity as their main source of energy for lighting, while 68 percent use candles (Statistics South Africa 2001).

2.3.4 Riemvasmaak, Northern Cape

Riemvasmaak is a communal area bordered to the west by Namibia, and to the south by the Orange River. The settlement has received a tremendous amount of attention from development agencies, NGO's and government departments since 1994, when it became one of the first successful land restitution cases in the newly democratic South Africa. The current initiative was launched in 2005. In line with the objectives summarized in Table 2.2, the outputs of the initiative were intended to include increased local capacity for informed participation in the planning, development, marketing and management of the Riemvasmaak Community Conservancy (Mitchell *et al.* 2008).

History of land management and institutional capacity

"...scenes of uprootment...have fallen officially on deaf ears, blind eyes. The juggernaut of Nationalist Party ideology is impervious to tears...Only the plan, conceived in some soulless Pretoria office is deemed important...It is authoritarian. It is heartless. It is typical of so many Government actions against people who cannot vote back" (Cape Times, 13 October 1973, cited in McKenzie 1995).

In 1994 the Riemvasmaak community won one of the first ever land restitution claims in South Africa, winning back approximately 75 000 ha of land from which they had been forcibly removed during the 'back spot' removals of the Apartheid government in 1973 and 1974. This history plays out in the present through resource use and management conflicts, distrust and ecological degradation, all of which form part of efforts to re-forge a sense of 'community' following many decades of separation.

The area along the Orange River was originally inhabited by Khoikhoi pastoralists and San hunter-gatherer-fishers (Reid *et al.* 2004). In the 1870's, Nama, Damara and Herero

families began to arrive in the area as they fled conflict in Namibia, and it is believed that the founders of the Riemvasmaak community came from among these groups (Mckenzie 1995). These groups were later joined by ‘Coloured’³ pastoralists and Xhosa speakers from south of the Orange River.

By the late 1940's the Apartheid government had begun its programme of consolidating the African homelands, and sought in particular to remove ‘black spots’ from areas designated for white settlement (Mckenzie 1995). Since Riemvasmaak was an ethnically mixed community, and was outside of the larger homelands, the government offered alternative land to Riemvasmaakers. By the 1960's pressure to move had increased, and eventually in 1971 the Bantu Affairs Commissioner for Kakamas ordered the removal of people from Riemvasmaak (Mckenzie 1995). This mounting pressure was in no small part due to the desire of the South African Defense Force (SADF) to use the land for training troops and testing weapons.

Prior to the removal, the community was divided into three groupings. In 1973, those classified as ‘Xhosa’ were moved to Welcomewood in the former Ciskei homeland, now part of the Eastern Cape Province. Those classified as either Nama or Damara were forcibly relocated to the uninhabited peripheries of the Namib desert in northern Namibia between 1973 and 1974 (Reid *et al.* 2004). Those who were classified as Coloured remained in the immediate area, settling in Marchand, Augrabies and Keimos (Mckenzie 1995). These racial classifications were based on arbitrary classifications made by officials during the issuing of ‘Bantu reference books’. As a result of this, and also of inter-marriage across ethnic lines within the community, families were split during the relocations.

Those relocated to the former Ciskei homeland found themselves in Xhosa communities, whose language they did not speak and whose culture they did not understand (Mckenzie 1995). Many of the livestock moved from Riemvasmaak to the Ciskei died from disease shortly after arrival (Lund 1998). During this period, many of the headmen in the former Ciskei homeland were generally regarded as despotic and aligned to the then President for Life of the Ciskei, Brigadier Oupa Gqoza (Manona 1995). Riemvasmaakers complained of being harassed by headmen. Life in Namibia was, in some ways, even more difficult (Mckenzie 1995). People were moved to an area without shelter, and lions in the area meant that stock losses were frequent. They were then moved to De Riet, where they

³ Local term used to refer to people of mixed race

complained of being at the mercy of a group of elephants, who would break the wind pump in search of water and raid vegetable gardens. People also found it difficult to get work in Namibia since they were not Namibian citizens. Riemvasmaakers who remained in the immediate area of Riemvasmaak lost access to grazing land, and sought work in surrounding centers. The SADF gained control of Riemvasmaak in 1974. All domestic stock was removed from the land after the removal, and wild ungulates were reintroduced (Reid *et al.* 2004). In 1982, 4500 ha of Riemvasmaak was incorporated into Augrabies Falls National Park, this area is referred to as Melkbosrand.

In 1992 Riemvasmaakers, lead largely by those that had been exiled to the former Ciskei, began to mobilize the ‘community’ and to create an institutional structure that would allow them to claim back their land. After a hearing in Upington in December 1993, the Department of Land and Regional Affairs announced that the Riemvasmaakers had won their land back. The Riemvasmaak Development Trust was elected the following year, and the first Riemvasmaakers returned to their land. By 1998 some 218 households were recorded (Lund 1998). Despite the successful land claim, Melkbosrand was not returned to the community until 2004, and on-going conflicts between the community and the South African National Parks board (SANParks) over access to this land has lead to a turbulent relationship between these neighbours.

Prior to the forced removal, land allocation and management took place through traditional institutional structures, although there is currently some uncertainty about how this functioned. Those who experienced the despotic behaviour of Headmen in the former Ciskei homeland refuse to consider the return of traditional leadership. Currently, land allocation and management takes place through the Riemvasmaak Development Trust, a legally recognised body that holds elections every two years. This legal body has however encountered continuing difficulties in controlling access to resources, due both to the conflict and resentment that has grown between the community and its neighbour SANParks, but also because elected community members find it difficult to assert their authority through rule enforcement.

Another factor undermining institutional capacity is the fact that the return to Riemvasmaak has revealed not one but two communities. Cultural and ethnic divisions, magnified by the lack of a shared history after more than a generation of separation, have played out in various ways since the community’s return. In 1997, mounting conflicts over land tenure, land use, decision making and the allocation of land and other resources lead to

approximately one third of the community splitting away from the main settlement at the Mission (Lund 1998, Plate 2.8). The Mission is populated predominantly by those that returned from Namibia, while Vredesvlei on the Molopo river mouth is populated by those who returned from the Ciskei. Xhosa speakers are the minority, and feel that their role in the return of the land is not appreciated. The outcomes of many of these conflicts, and the distrust of outside parties that is the result of decades of human rights abuses for resource co-management is discussed in Chapters 3 and 4.

Ecosystem services

Riemvasmaak is one of the most arid areas in South Africa, and Hoffman *et al.* (1995) suggest that when considered on a monthly basis, water availability does not exceed evaporative demand at any point during the year, and a state of permanent drought therefore exists. Long-term rainfall data for the period 1918-2005 indicates large fluctuations in annual rainfall totals (Hoffman *et al.* 2005). In some years, less than 25 mm was recorded while for 1976 more than 350 mm was measured (Hoffman *et al.* 1995). The mean annual temperature is 21.6 °C and although the mean daily maximum temperature for the warmest month (January) is 37.4 °C, summer temperatures frequently exceed 40°C, while winter temperatures reach -2 °C (Ladislav and Rutherford 2006; Hoffman *et al.* 1995).

Riemvasmaak falls within the Nama-karoo biome (Ladislav and Rutherford 2006, Plate 2.7). Lower Gariep Broken Veld, also referred to as Orange River Nama Karroo (Low and Rebelo 1996), characterises the higher lying areas. This vegetation type occurs on hills and low mountains, with sparse vegetation dominated by shrubs and dwarf shrubs. The lower lying plains are characterized by Bushland Arid Grassland (Ladislav and Rutherford 2006), described as semidesert steppe, sparsely vegetated by grassland and dominated by white grasses.

Households make use of a variety of ecosystem services. There is some extensive livestock farming, however according to a census carried out in 1960, only eight household heads out of 318 households stated that they were livestock farmers - most worked as farm labourers outside of Riemvasmaak (Mckenzie 1995). The area is described as having a low carrying capacity, with a recommended stocking rate of 60 ha per LSU (Land Development Unit 1993), which translates to a total of 1028 LSU for the entire area (Hoffman *et al.* 1995). In the ten years since resettlement, stock numbers had increased from 183 LSU in 1995, to 1122 LSU in 2005 (Hoffman *et al.* 2005). This is thought to be due to the high quality

grazing that was available immediately following resettlement. In the interim, vegetation cover has almost halved. The concentration of livestock in the sandy pediments in the lower lying regions is thought to be responsible for much of this change. Sheep and goats (1617 individuals) are by far the most dominant domestic livestock, although cattle (57 individuals), donkeys (49 individuals) and horses (29 individuals) are also kept.

A long term ecological monitoring programme was started in Riemvasmaak in 1995 (Hoffman *et al.* 1995), and was followed up in 2005 to identify the biological impacts of resettlement (Hoffman *et al.* 2005). Vegetation cover in the low-lying and flatter areas declined by roughly a half between 1995 and 2005 (from 30 to 15 percent), although plant diversity does not appear to have been affected. Wildlife was shown to have declined dramatically. The tree component has not changed significantly, although grass cover has declined, with evidence of an overall homogenization of the landscape. The monitoring programme has suggested that livestock owners will become more vulnerable in the next ten years due to the decline of perennials, and emphasis will probably shift toward goats.

Although Riemvasmaakers are traditionally farmers, they have begun developing alternative livelihoods over the last few years. Chalets and hot springs have been developed. Grapes are being cultivated on eight hectares of land along the Orange River as part of community-based agriculture developments, with another two hectares available for planting crops.

Social vulnerability

Social vulnerability in the area has grown through the forced relocations, separation of families and subsequent resettlement on the land and more recent ecological degradation that has resulted, all of which have constituted major stresses on the social-ecological system. The socio-economic context within which these stresses have played out sheds further light on social vulnerability.

The Northern Cape Province has an unemployment rate of approximately 36 percent (Kane-Berman *et al.* 2007). In the Siyanda District municipality, 11 percent of the black African and coloured population have no income at all (Statistics South Africa 2001). In 2004 the Riemvasmaak Development Trust estimated that 50 percent of households had a household income of less than R600 per month (EcoAfrica 2004). Education levels at Riemvasmaak are perceived to be higher than surrounding areas, due to the Catholic mission station and a long history of education in the area. There is a primary school but no secondary school.

Most households in Riemvasmaak have maintained links with family members elsewhere, from whom they receive remittances (Lund 1998). Indeed, many Riemvasmaakers who had secure employment prior to the land claim did not return to the land although unemployed family members did. Social grants are the main reliable source of income, with an estimated 25 percent of households receiving a pension (Lund 1998). There is some local employment, for example through ecotourism enterprises and government sponsored expanded public works programmes, but this is erratic and unreliable. Many of the children in Riemvasmaak live with grandparents or single mothers, as parents live and work elsewhere. Local economic activities include; vehicle owners charging for transport into and out of the area, donkey carts being used to collect water and fuel wood, informal shops, and domestic employment. The main private economic activity is stock farming. However, more than 70 percent of the stock belongs to just 10 percent of the population, and approximately 50 percent of households have no stock at all (Lund 1998). People also work on local farms (sometimes seasonally) and in the local towns in domestic service.

2.4 Conclusion

All of the case studies presented in this chapter illustrate the resource poor conditions referred to in the title of this thesis, characterized by: low levels of institutional capacity, less productive ecosystems and high levels of social vulnerability. These conditions emerged from multiple social and ecological disturbances over time, and can therefore be portrayed as being in the re-organisation phase of an adaptive cycle (Holling 1986; Gunderson and Holling 2002). It is in the reorganisation phase of the adaptive cycle that novelty and innovation occur (Holling 1986; Berkes *et al.* 2003). Fostering innovation and renewal under these circumstances relies on learning, combining different forms of knowledge, nurturing diversity and creating opportunities for self-organisation (Folke *et al.* 2003). The approaches adopted by the implementing agents in each case study have sought to achieve this by building various forms of capital as an essential first step toward adaptive co-management.

The rhetoric of adaptive co-management, with its emphasis on enhanced governance, livelihoods and ecosystem services (Figure 1.3, Chapter 1) holds predictable appeal under the conditions described in this chapter. Indeed, the approach is supported by South Africa's constitutional and legal framework, and has political buy-in embedded within the country's land restitution and poverty alleviation programmes aimed at redressing past injustices. However, the case studies explored in this thesis differ to traditional notions of

adaptive co-management as an emergent and self-organising process (Ruitenbeek and Cartier 2001; Olsson *et al.* 2004b); in every case study considered here adaptive co-management is being implemented, with the intention of initialising a self-organising process.

The outcomes of this approach, and the conditions under which the approach is likely to succeed or fail, are explored in the remainder of this thesis. In the chapter that follows, the characteristics of collaborative processes that promote effective learning for institutional innovation under these conditions are explored.



Plate 2.1: The Machubeni landscape, with Euryops and erosion evident in middle-ground



Plate 2.2 A maize harvest in Machubeni with village and landscape in the background

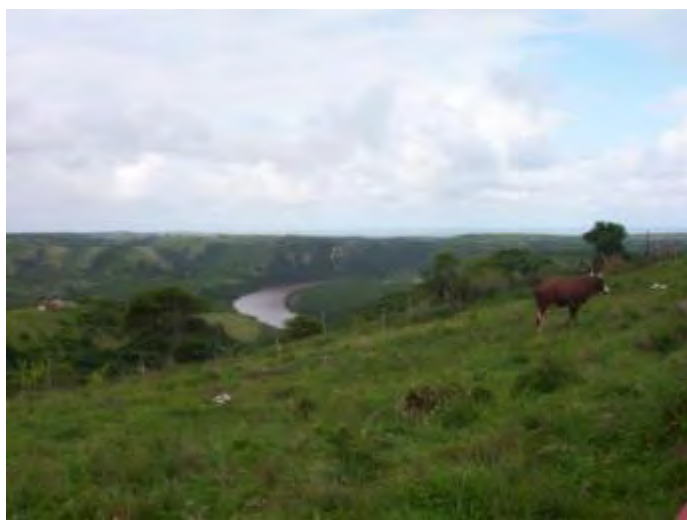


Plate 2.3: The Nqabara landscape



Plate 2.4: A village in Nqabara with home gardens evident around homesteads



Plate 2.5: The Mkhuze landscape



Plate 2.6: A village in Mkhuze



Plate 2.7: The Riemvasmaak landscape



Plate 2.8: The Mission settlement in Riemvasmaak

Chapter 3: MONITORING COLLABORATION AND LEARNING

In co-management, social processes are as important as outcomes (Innes and Booher 1999; Plummer and Fitzgibbon 2004; Brown *et al.* 2005), and the process of learning fosters innovation which influences the emergence of governance and institutional adaptations (Folke *et al.* 2003). This chapter identifies the characteristics of collaborative processes that promote effective learning for institutional innovation. The chapter outlines and tests a methodology for monitoring these processes in a collaborative way. Institutional innovation is used as an indicator of the learning outcomes, and therefore the development of governance and institutional structures is briefly included. This chapter provides the basis for a deeper understanding the governance outcomes of adaptive co-management which will be presented later, in Chapter 4.

3.1 Introduction

Transitions toward adaptive co-management rely on processes that build knowledge, create networks between multiple actors and foster effective leadership (Olsson *et al.* 2004b). However, these processes are founded on the principle that different types of knowledge will be combined and that learning will take place during this process (Folke *et al.* 2003). Learning thus provides the basis for fostering the innovation necessary for positive transitions in social-ecological systems (Fazey *et al.* 2007), and social learning in particular has been shown to facilitate institutional innovation (Kumler and Lemos 2008). While learning is often described as an organic or natural process that occurs over time (Berkes and Turner 2006), in all of the cases considered here adaptive co-management has taken the form of ‘interventions’ that have explicitly sought to create partnerships and knowledge networks (Section 2.3, Chapter 2). Therefore, understanding the ways in which arenas for collaboration and learning are created, and the effectiveness of these processes in stimulating innovation for transitions toward adaptive co-management, is crucial.

The objective of this chapter is to determine the characteristics of collaborative processes that promote effective learning and institutional innovation, and to test a methodology for monitoring these processes in a collaborative way. In order to achieve this objective, the following key questions are addressed:

- i. Which social processes promote learning and institutional innovation in adaptive co-management?
- ii. How can these processes be monitored?
- iii. How do collaborative processes influence institutional innovation in adaptive co-management?

In order to address these questions, monitoring data collected through participatory research techniques is combined with case study narratives of the collaborative and learning processes followed in each site. This narrative approach is consistent with analytical approaches used to investigate the process of collaborative management (Plummer 2006), social learning and institutional innovation (Kumler and Lemos 2008), and the learning outcomes of participatory resource management and public engagement (Bull *et al.* 2008; Sims and Sinclair 2008).

In transitions toward adaptive co-management, the expectation is that learning will lead to collective action. Institutional change in the form of rules, laws, customs and norms is a central feature of this (Pahl-Wostl 2006). Conceptual advancements that have taken place in the education and psychology literature (Fazey *et al.* 2007; Armitage *et al.* 2008), particularly those relating to situated learning, transformative learning, and the role of power and scale in influencing learning outcomes (Section 1.2.3, Chapter 1) hold insights for the field of adaptive co-management. This chapter begins by providing the conceptual basis for monitoring collaborative and learning processes, and then goes on to illustrate how this was implemented during the fieldwork phase of this research. The results focus on the characteristics of the processes that promote learning, adaptation and institutional innovation necessary for transitions toward adaptive co-management. The relationship between the processes followed and the observed institutional outcomes, as well as the effectiveness of the methodology are discussed.

3.2 Theoretical basis for monitoring processes of collaboration and learning

Understanding the processes involved in adaptive co-management is vital in order to understand the observed outcomes and to draw general lessons that are applicable to other sites and future efforts (Innes and Booher 1999; Conley and Moote 2003). A challenge when monitoring transitions toward adaptive co-management however is that there is no

generally agreed upon ‘best practice’ to monitor the collaborative processes and their impacts.

Although there is agreement that adaptive co-management entails participation, collaboration and learning, process evaluation frameworks that focus on collaboration tend to overlook the role of learning (see for example Anderies *et al.* 2004; Innes and Booher 1999, but see Plummer and Armitage 2007b). In this section, lessons from the fields of collaborative management, environmental management and education are combined to present a conceptual framework for monitoring and evaluating the collaborative and learning processes followed in each case study.

3.2.1 Collaboration as social learning

Social theories of learning define learning as active social participation in the practices of a community (Lave and Wenger 1991; Wenger 1998), and emphasise the dynamic interaction between people and the environment in the construction of meaning and identity (Muro and Jeffrey 2008). Social learning entails a reflexive process that encourages participants to actively question accepted modes of behaviour or belief, and to reflect and adapt (Keen *et al.* 2005b; O'Donaghue 2007). Therefore, when the goal of collaboration is institutional innovation, as is the case in transitions toward adaptive co-management, the institutional outcomes of collaboration can best be understood through the lens of social learning.

The level of participation and collaboration in co-management varies significantly depending on the context and the aims of an initiative, which therefore have to be explicitly stated (Borrini-Feyerabend 1996; Plummer and Armitage 2007b). In adaptive co-management, the objective of collaboration is to create knowledge or learning networks between a wide variety of stakeholders operating at various levels (Berkes 2004; Carlsson and Berkes 2005; Armitage *et al.* 2007). Communicative rationality (*sensu* Habermas 1984; 1987) plays a key role in problem solving, and can be reached through negotiation, deliberation and co-operation (Muro and Jeffrey 2008). However, the goal of learning is not explicitly addressed in this approach. More recently, a shift in worldviews, perceptions and behaviour have been identified as key outcomes of collaborative processes (Connick and Innes 2001; Daniels and Walker 2001; Conley and Moote 2003; Sims and Sinclair 2008).

Table 3.1 summarizes the criteria identified by different scholars for processes that promote collaboration on the one hand, and social learning on the other. The process criteria for social learning extend the criteria for collaborative processes by focussing attention on the

ways in which perceptions, values and beliefs shift through collaborative processes, and therefore the ways in which innovation potentially occurs.

Table 3.1: Process criteria for evaluating collaboration and social learning

Process criteria for monitoring collaboration

(Innes and Booher 1999)

- All relevant interests are included in the process;
- The process is driven by shared concerns and a purpose that is of real concern to the group;
- The process should be self-organising, and allow participants to identify the ground rules, objectives, tasks and topics of concern;
- Participants should be engaged and interested in the process, taking part in in-depth discussions and informal interactions;
- The process should challenge the status quo and encourage creative thinking about problems and their solutions;
- Accurate and meaningful information should be available, and its meaning should be agreed upon by all actors.

Process criteria for monitoring social learning

(adapted from Wals 2007; O'Donaghue 2007; Keen *et al.* 2005b)

- *Situating and engaging*: Key actors are identified and issues of concern or problems to be solved are identified with these actors in a way that is sensitive to the local context and their past experiences;
 - *Awareness raising, enquiry and deconstruction*: recognising different worldviews and understandings of a problem, and being aware of one's own frames of reference in relation to a problem. Clarifying and challenging one's own and other's frames of reference;
 - *Co-creating*: developing shared frames of reference for understanding the problem based on exposure to alternative worldviews, and visioning about what could be;
 - *Practical action and experimentation*: translating ideas that emerge from the previous steps into collaborative actions based on the co-created frames of reference, and testing the applicability of these to meet the challenges identified;
 - *Reflection*: assessing the degree to which issues of concern and challenges have been addressed, and also the ways in which frames of reference have been changed as a result of experience.
-

Argyris (1999; cited in Keen *et al.* 2005b) refers to single, double- and triple-loop learning, which offers insight into institutional innovation. Single-loop learning refers to improving actions, strategies and practices, which generally occurs within a project team engaged in ‘conventional’ adaptive management as depicted in Chapter 1 (Figure 1.1). Double-loop learning involves questioning the assumptions and mental models that underpin the selection of particular strategies and actions. This is particularly important in collaborative processes where different forms of knowledge and mental models come together. Triple-loop learning occurs when the values and norms that underpin these assumptions are questioned and reflected upon, which leads to a deeper understanding of the context, power dynamics and values that influence the capacity to manage natural resources (Keen *et al.* 2005b).

The concept of ‘communities of practice’ is potentially important for understanding the learning outcomes for decision makers involved in adaptive co-management. A community of practice refers to a group or groups of people who share a concern for something that they do, and learn how to do it better through regular interaction (Wenger 1998). Three basic elements of communities of practice are (Wenger 2000): i) There is a sense of joint enterprise that brings people together; ii) members interact and learn with one another through an ongoing history of mutual engagement, and iii) a capability of practice, or a shared repertoire of resources is developed, for example lessons learned, rules of thumb, vocabulary, and standards. This repertoire reflects the community’s accumulated knowledge. Ongoing interaction is what defines a community, and determines how the meanings of what members learn are negotiated, and how joint enterprise is defined and redefined over time.

3.2.2 Key variables that influence social learning

A variety of contextual factors influence the ways in which social learning takes place (Michael 1995; Wenger 1998; Ison 2005; Wals 2007). A generally agreed upon precondition for social learning is that multiple meanings, understandings and realities are acknowledged (Ison 2005; Fazey *et al.* 2007; Plummer and Armitage 2007b). This is related to the need to create arenas for collaboration, trust building and the willingness of participants to listen to alternative viewpoints (Pretty 2003; Olsson *et al.* 2004a; Armitage 2005; Kumler and Lemos 2008). Acknowledging uncertainty and creating opportunities to learn from errors requires procedures that embrace error (Michael 1995). This allows for adaptation and therefore resilience. In order to achieve this within adaptive co-management however, sufficient

funding is necessary to enable monitoring and timely responses (Olsson *et al.* 2004b). Conflict is part of collaboration and learning (Lee 1993), and needs to be facilitated by an ‘honest broker’ who is concerned with encouraging a learning process, rather than being focussed only on the outcomes of an initiative (Michael 1995; Brown *et al.* 2005).

Based on the work of scholars in both the collaborative and the social learning fields, the following factors can therefore be identified as the ‘preconditions’, or key variables, that influence the ability of role players to engage in the social learning process outlined in Table 3.1:

- i. Trust building between the different actors (Pretty 2003; Olsson *et al.* 2004a; Brown *et al.* 2005; Michael 1995; Kumler and Lemos 2008);
- ii. The existence of groups of common interest who have a similar stake in ecosystem management (Wenger 2000; Kumler and Lemos 2008);
- iii. The presence of economic and other incentives to participate (Pretty 2003),
- iv. Security of tenure over the resources of concern (Pretty 2003);
- v. A perceived value in sharing information (Armitage 2005);
- vi. A willingness to engage in collaborative learning and decision making (Armitage 2005);
- vii. Sufficient funding to enable practical action and experimentation (Olsson *et al.* 2004a; Wals 2007);
- viii. Social networks that allow effective information flow (Olsson *et al.* 2004a);
- ix. Effective local leadership or an ‘honest broker’ to facilitate conflict resolution (Lee 1993; Brown *et al.* 2005; Michael 1995)

This introduction has highlighted the conceptual foundations for addressing the first two key questions posed in this chapter. However, it remains challenging to monitor these largely intangible variables. In the next section the question of ‘how’ these conceptual insights might be used to monitor the process of adaptive co-management is addressed.

3.3 Methods

An action research approach was adopted in this study (refer to Section 1.3.3, Chapter 1) with a focus on case study descriptions and reflection on the individual experiences of participants during the adaptive co-management process. The approach is novel in the field of monitoring and evaluation in natural resource management because most collaborative

monitoring efforts are aimed at monitoring ecological variables, rather than social processes (see for example Stuart-Hill *et al.* 2005; Moller *et al.* 2004; Andrianandrasana *et al.* 2005; Poulsen and Luanglath 2005).

A dual approach was adopted in order to monitor social learning processes in this study. The first step was to monitor changes in the key variables necessary for social learning during the initiatives (as identified in the previous section). The second step was to use the criteria for social learning processes (as outlined in Table 3.1) to qualitatively evaluate the collaborative processes followed in each site.

A collaborative monitoring 'toolkit' was developed and tested in the four communities in which the fieldwork took place over the course of approximately eighteen months, and therefore participants were very familiar with its use. The toolkit was translated into the three languages spoken in the case study areas, and handed over to the decision makers in each site to assist them with monitoring and evaluating similar initiatives in their communities in the future. The toolkit does not form part of this thesis but can be accessed from <http://oldwww2.ru.ac.za/academic/departments/environsci/>.

3.3.1 Monitoring the key variables that influence social learning

The key variables identified in the previous section, and the outcome indicators that were derived from these for monitoring, are outlined in Table 3.2. Monitoring activities took place over the course of eighteen months between June 2006 and December 2007 in Machubeni, Nqabara, Mkhuze and Riemvasmaak (refer to Table 2.2, Chapter 2). Monitoring activities took place with the committees that had been elected by their respective communities for the purposes of the adaptive co-management initiative (see Section 3.4 for a description), and therefore did not need to be re-selected for this research process (Plates 3.1 – 3.3). In all cases except Mkhuze, these bodies stressed equal representation of women and men, and of the youth and the elders.

Four monitoring events took place in each community except Riemvasmaak, where the third event was cancelled due to poor co-ordination within the committee involved. In this case three monitoring events took place, but over the time frame as the other sites. Monitoring events generally took place every four months in each of the communities and lasted between one and two days in each locality. This time frame was selected because it suited both the researcher and the participants. More frequent and longer events would have lead to fatigue, and the opportunity costs to participants would have out weighed the

benefits of the process. For the researcher, aiming to conduct four monitoring workshops in four communities meant that this timeframe allowed enough time to conclude monitoring events in each site before the next phase began. Four months was therefore deemed appropriate by all parties and agreed upon during an introductory workshop in each site where the goals and objectives of the project were discussed.

Process monitoring was explained to participants as an opportunity to; i) improve the ways in which current and future initiatives were implemented in each site, ii) learn lessons about best practice from other parts of the world and to adapt these to suite local realities, iii) hold stakeholders accountable through more confident engagement during collaborative meetings, and iv) learn about monitoring and evaluation as part of the management process. Participants understood this, and were eager to learn about how to manage initiatives in their communities. The role of the collaborative monitoring activities in actually achieving these goals became clearer during the year as the benefits of being engaged were revealed more clearly to participants, as revealed by the following statements made during workshop evaluations:

"Monitoring helps us as human beings in our every day lives. It helps to set goals and to find ways of achieving those goals" (Nqabara, September 2007)

"Through monitoring we are learning how to plan for projects and also for the future. Before monitoring, we just watched things like erosion happen, we never planned" (Machubeni, June 2007)

Throughout, an action research approach was adopted. Participatory Learning and Action (PLA) is a term used to refer to a wide range of similar approaches, including Participatory Rural Appraisal (PRA) and Rapid Rural Appraisal (RRA) (Chambers 1994). The common theme is the participation of people in the process of identifying their needs and opportunities, and in the action required to address them (IIED 2003).

In Machubeni and Nqabara the author chose to live with community members in their homes during the monitoring periods. This enabled more in-depth insights into the challenges and opportunities that influenced local management but was not feasible in Mkhuze and Riemvasmaak because of concerns for the researcher's safety.

Monitoring took the form of rating systems that were administered during focus group workshops (Plates 3.4 and 3.5) and semi-structured discussions (Borrini-Feyerabend 1997). Although developed initially in market-oriented research, since the 1980's focus group interviews and workshops have been used increasingly in participatory research,

particularly in research seeking to identify and describe group perceptions and attitudes (Borrini-Feyerabend 1997).

The key variables outlined in Section 3.2.2 were converted into simple outcome indicators in the language of each community concerned (Table 3.2). The outcome indicators were rated four times during the year at each site (approximately every four months), each corresponding to a monitoring event. For each indicator, a rating of 1 (minimum, strongly disagree') to 5 (maximum, strongly agree') was agreed upon by the group, and an explanation for each rating was provided (Table 3.2). Participants used the indicators to evaluate the conditions necessary for social learning over the preceding four months. The group divided into smaller groups with mixed gender and age classes wherever possible, and then reported back to the whole group on ratings applied to each statement. Debates then ensued over the appropriate rating for a given indicator within the larger group. An important goal of the monitoring exercise was to elicit and discuss points of contention, and to grapple with differing interpretations of how well the project is going'. Once a rating had been agreed and the explanation provided, an action was identified that could improve the situation.

Table 3.2: Key variables and outcome indicators for collaborative monitoring. Each indicator was rated according to a 5 point scale (5=strongly agree; 1=strongly disagree)

Variables	Outcome indicator for monitoring	Ratings	Explanation	Action to be taken
Trust building	<i>Trust building is taking place between the groups involved in collaborative decision making</i> - Decision making is perceived as open and fair. Information is shared and understood by all participants.	5	Strongly agree	
		4	Agree	
		3	Neutral	
		2	disagree	
		1	Strongly disagree	
Shared norms and a common interest	<i>There is a common interest and shared vision</i> - Participants jointly identify and agree on the problems to be solved, and what the future should look like. It is clear to all participants why a decision making body is needed. Participants agree on what the major problems are, and what the benefits might be of resolving these problems.	5		
		4		
		3		
		2		
		1		
Economic or other incentives for collective action	<i>Incentives:</i> People who contribute more are rewarded, and people who loose ways of earning a living because of the project are compensated.	5		
		4		
		3		
		2		
		1		

Security of tenure over the resources of concern	<i>Security of access to resources</i> - There is long term security of access to resources. The decision making body is confident that they are/will be able to prevent outsiders from using the resources.	5
		4
		3
		2
		1
		5
A perceived value in sharing information	<i>Participants recognize the value of sharing information between actors</i> - The organization or committee involved in the initiative is made up of people from the community and from outside the community. These actors respect one another and listen to each others points of view.	4
		3
		2
		1
		5
A willingness to engage in collaborative learning and decision making	<i>All participants are willing to engage in collaborative learning and decision making</i> - All actors, from outside and inside the community, listen to each other and are willing to change what they are doing in response. <u>E</u> xperts' are willing to learn from resource users, and resource users are open to alternative ways of doing things. The project is viewed as a learning process by everyone involved.	4
		3
		2
		1
		5
Sufficient funding to enable practical action and experimentation	<i>A long term investment has been made</i> - The state or its partners are committed to making a substantial and long-term financial investment in the project. Long term skills and leadership development programmes are in place, and planning and decision making support is offered.	4
		3
		2
		1

Social networks that allow effective information flow	<i>Networks are established that connect the local decision making body with other institutions-</i> Outside partners, such as government officials, researchers and NGO's are involved and are willing to devolve decision making powers. Other, relevant, local decision making bodies are consulted and included in decision making. The roles of these different actors are clearly defined.	5
		4
		3
		2
	<i>Information flow</i> - There is good communication between everyone involved. People are informed about what is happening, and their views and opinions are listened to	1
		5
Effective local leadership/ <u>honest broker</u> '	<i>Leadership</i> - The leaders of the initiative care about more than just their own interests. The leaders are trusted and acknowledged by all actors	4
		3
		2
		1

Data analysis

Trends were analysed qualitatively since there were only four data points per site, which excluded the use of typical Lickert Scale analysis techniques. The sum of the ratings attached to each outcome indicator was divided by the number of times that indicator was rated during the eighteen months. This calculation gave an average rating for each indicator. Overall positive or negative change was discerned by comparing the first and final ratings attached to an indicator.

3.3.2 Monitoring the process of social learning

Several sources of evidence were combined in order to monitor social learning outcomes, and to construct case study narratives of the outcomes in each site. Developing case study narratives requires a level of flexibility on the part of the researcher in terms of the methods used, but also requires that procedures are followed to ensure the quality of the evidence this produced, for example through the establishment of a ‘chain of evidence’ based on a database in which qualitative data is stored (Yin 1994). Semi-structured interviews with key informants, participant observation during meetings, workshops, home stays and venn diagrams were combined with the formal monitoring processes described above to monitor the extent to which social learning processes took place during the initiatives. A key indicator of this was whether institutional innovation had occurred. All discussions arising from the formal monitoring events were stored in a database developed using Microsoft Access, along with the dates and places where discussions took place to ensure that evidence could be traced. Fieldwork notes taken during or directly following interviews, workshops and observation were dated and stored in site specific files stating the date, time and place of the discussion, the names of informants and their relationship to the initiative being discussed.

Key informant interviews are either structured or semi-structured interviews with individuals who are knowledgeable about a particular issue (Borrini-Feyerabend 1997), and are aimed at key individuals that hold specialised information that others do not have (Theis and Grady 1991). Key informant interviews took place concurrently with community leaders, local, district and provincial government officials involved in or responsible for the initiatives, and with consultants involved in implementing the initiatives. These interviews served to highlight cross-scale challenges in collaboration, to obtain alternative interpretations of the reasons behind observed outcomes, and to understand the broader political context within

which learning processes were situated. Key informants outside of the communities included: municipal managers, private sector partners, local economic development officers, tourism officers, development and planning managers, members of farming co-operatives, community development officers, forestry officers, project managers, and consultants, all of whom were key stakeholders in the collaboration process of each site.

These interviews were combined with participant observation during collaborative meetings between different actors, and also during monitoring workshops where debates and discussion ensued over points of contention. Participant observation is an ethnographic process of enquiry that is open-ended and flexible, it is opportunistic and requires constant redefinition of the problem based on the facts gathered in a specific setting (Jorgensen 1989). The method is especially useful in exploratory studies that aim to generate theoretical insights and in interpreting and making accessible the meanings and interactions of everyday life (Cohen *et al.* 2000). Observations were directed toward learning interactions, defined as any formal or informal situation in which learning takes place. Examples include workshops, meetings and conversations (Downsborough 2007).

The conceptual framework used to guide observations was drawn from the collaborative (Innes and Booher 1999) and social learning literature (Wals 2007; O'Donaghue 2007; Keen *et al.* 2005b) summarised in Table 3.1. The social learning outcomes of concern included the existence of a common understanding about problems, mutual agreement on potential solutions, and evidence of collective action to solve problems (Muro and Jeffrey 2008).

Venn diagrams were used to explore relationships between different actors during collaborative processes. Venn diagrams are diagrammatic representations of key organisational interactions, such as the key individuals and institutions and their interaction for decision making (Foss and Aune 2000; DFID 2000). This is a particularly powerful tool used to highlight relationships between social groups, as well as the institutional environment in a given setting.

3.4 Results

This section begins by describing the common collaborative strategy adopted by the implementing agent in all of the case studies, and this is followed by a discussion of the collaborative challenges experienced by stakeholders operating at different levels. Brief

narrative accounts of the social learning processes that took place in each site (based on Table 3.1) and the institutional innovation that occurred as a result are then provided. These narrative accounts provide necessary background information for the next section, which presents the results from collaborative monitoring that focussed on the key variables necessary for social learning (based on Table 3.2). Finally, common factors that undermined learning across all sites are identified.

3.4.1 The collaborative strategy adopted in all sites

Overall, the collaborative strategy adopted by the implementing agent met the criteria for collaborative processes (Table 3.1). In all of the sites, project advisory and steering committees (PASC's) were created as a means to improve communication between the multiple stakeholders that were involved. These PASC's were established as multi-stakeholder steering bodies that generally comprised of representatives from the implementing agent and contractors, provincial and local government, NGO's, community institutions (Table 3.3), and generally a representative from each of the villages that made each community.

The roles of the various government departments overlapped considerably which caused confusion and highlighted the important role played by the monthly PASC meetings in the collaboration process. For example, while irrigation water is provided by the Department of Water Affairs and Forestry (DWAF), once it reaches the fence of a farmer responsibility for irrigation infrastructure falls to the Department of Agriculture (DoA). Similarly, negotiations over state owned forests are in the domain of DWAF, while any forests that are not designated state owned land are the responsibility of the Department of Land Affairs (DLA).

PASC's were intended to support the project management teams in various ways. Firstly, the PASC's played a guiding, advisory and sometimes decision making role. Secondly, the PASC's were aimed at improving relationships between the various project partners by creating a forum for conflict management and discussion. Thirdly, the PASC's played a critical communication role between all partners, but especially between the steering committee and the larger community. Community representatives on the PASC's were expected to regularly inform their constituencies about the progress of the initiatives. The PASC's met monthly in each site.

Table 3.3: Role players in each site

	Machubeni	Mkhuze	Nqabara	Riemvasmaak
Community institutions	Ward committee, headmen, sub-headmen, youth forum, farmers association	Headmen and sub-headmen from the Mdletshe and Mandlakhaze communities	Nqabara Community Tourism Trust, Participatory Forest Management (PFM) committee, headmen, sub-headmen	Riemvasmaak Development Trust
Local and District government departments	Emalahleni Local Municipality, Chris Hani District Municipality, Department of Agriculture, Department of Water Affairs and Forestry	Ingonyama Trust, Hlabisa and Nongoma Local Municipalities, Big 5 local Municipality, Khanyakude and Zululand District Municipalities, Regional Department of Agriculture and Environmental Affairs	Mbashe Local Municipality, Amatole District Municipality, Department of Water Affairs and Forestry, Department of Land Affairs	Siyanda District Municipality, Department of Agriculture, Augrabies National Park, Department of Land Affairs
Private Sector	-	Thanda Game Reserve	-	-
Implementing agents and supporting organisations	GTZ Transform, Ruliv (Eastern Cape Rural Livelihoods Support programme), Ikhwezi (consultancy sub-contracted for project implementation)	GTZ Transform, Wildland Conservation Trust, Black Rhino Range Expansion Project (WWF)	GTZ Transform, Ruliv (Eastern Cape Rural Livelihoods Support programme)	GTZ Transform, RIKO (consultancy sub-contracted for the technical implementation of the project)
Provincial and National government departments	Department of Agriculture, Department of Environmental Affairs and Tourism	Department of Environmental Affairs and Tourism	Department of Environmental Affairs and Tourism, Department of Water Affairs and Forestry	SANParks, Department of Environmental affairs and Tourism

A mechanism was therefore created through which all relevant stakeholders could be included within the process (Table 3.1). A shared purpose was clearly identified in the form of the initiative, but this was not ‘co-created’ within this forum, it was predetermined through land use planning studies, some of which were participatory while others were not. The shared purpose did not necessarily imply shared concerns. Many of the community participants on the PASC’s were elected or otherwise selected to sit on the PASC, rather than having volunteered to participate through a sense of real concern (see next section). In addition, community members on the PASC were generally not allowed to be employed by the poverty relief initiative, although their family members could. Direct access to information about opportunities was therefore one incentive for participation, but this cannot be described as a shared concern with other stakeholders such as consultants or government officials. The contractors and implementing agent benefitted from sitting on the PASC through more streamlined discussion and advice from all actors. The PASC meetings were not self-organising, but were held with formal agenda’s, chairpersons, a secretary and on a pre-arranged monthly basis.

The ground rules, objectives and tasks of the PASC’s were decided by the contractors and implementers prior to their creation, although some room was available to adjust the agenda of each meeting to discuss topics of concern to all or any actors. The PASC meetings did not encourage creative thinking, but rather acted as ‘information days’ where project activities were reported. While the monthly meetings did not allow reflection on the degree to which challenges had been addressed, they did result in the sharing of accurate and relevant information between all actors. Therefore, while on whole this collaborative strategy met the criteria for effective collaboration in complex systems, it was not designed to promote social learning, and this is discussed in Section 3.4.3.

3.4.2 Major challenges facing collaboration

Table 3.4 summarises the collaborative challenges experienced by actors operating at different organisational levels, and is based on key informant interviews conducted with actors from government departments and the implementing agents, as well as various statements made by community members during monitoring events. All challenges identified by these actors are included in the table, although where necessary the statements have been summarised to reflect similar sentiments held by different individuals. A distinct set of challenges were identified within an actor’s own level of operation, for

example a community member collaborating with other community members or inter-departmental collaboration within government, compared to the challenges that were faced when collaborating across levels, for example community members collaborating with government officials. On balance, actors faced more challenges collaborating across levels than within their own level of operation.

Within their own level of operation, challenges related primarily to issues of human, physical and financial capital shortages. At the community level, access to information and funding, and particularly communication within the community, were critical issues. At the government level, challenges related to shortages of skilled personnel and resources to engage in collaborative efforts. Tight and inflexible funding timeframes that undermined the ability to allow more self-organising collaborative processes was identified as a major challenge facing implementing agents.

When attempting to collaborate across levels however, the challenges tended to be more intangible. For example, issues of power were identified by all stakeholders as a major challenge facing cross level collaboration. From a community perspective the challenge was generally a feeling of powerlessness, whilst from a government perspective the challenges related to dealing with manipulative individuals and ensuring that the most skilled individuals within the communities, rather than the most powerful individuals, took part in the collaboration. The lack of consistency in the individuals who participated in collaborations was an issue raised at the level of both the community and local government. This lack of consistency was seen to undermine both their understanding of the process and the trust that had been established between actors. The issue of capacity shortages within government and the community was also a key feature of the challenges facing cross level collaboration.

Table 3.4: Major challenges facing collaborative efforts from different perspectives

	Collaborating within own level of operation	Collaborating across operational levels
Community perspective	The willingness of the community at large to accept multiple institutions Accessing and understating legislation about rights and responsibilities Accessing funding for long term management Communication between decision making bodies and the broader community Finding enough time to attend meetings on a voluntary basis	A feeling of powerlessness to steer the process On-going capacity support from government or other stakeholders is not secure Low levels of attendance by government officials at community meetings Officials that attend community meetings do not always have the power to make decisions Officials responsible for initiatives often change, and the new person takes time to learn his/her role
Government perspective	Government staff, resource and capacity shortages to manage complex initiatives Fragmented government contributions, lack of communication between departments	Community manipulation by powerful individuals Conflicts over land within communities Legal bodies rotate members every two years, so people with skills are being lost Ensuring leaders are the most skilled, rather than the most powerful Community ownership of the initiatives: projects are owned and driven by outside actors Community focus on short term rather than long term benefits Committee members are not compensated for their time, this is a disincentive for participation Community mistrust of outsiders Community capacity is low, therefore difficult to engage Community expectations exceed what

		is possible
		Consultants hold all of the information about initiatives and when they leave government is expected to <u>pick up the pieces</u>
Supporting organisation perspective	Government funding is problematic: it is slow and extremely rigid, does not allow for adaptation	The confidence of community leaders to make decisions that will affect the entire community
	Training takes place concurrently with implementation, which can be disruptive	Community members need incentives to comply with rules
	Finding experts who are willing to mentor community entrepreneurs is problematic	Conflict between traditional and formal leadership within communities makes it difficult to engage with them
		Government procedures are not clear, e.g. for harvesting resources
		Marketing - people are interested in economic incentives, when these don't arrive they lose interest
		Capacity of government officers is often very low, especially in social facilitation settings
		Communication within communities, lack of attendance at information sharing meetings

3.4.3 Case study narratives - social learning and institutional innovation

Case studies presented in this section are analysed according to the criteria for social learning presented in Table 3.1.

Machubeni

The PASC in Machubeni was formed in the vacuum of institutional capacity for natural resource management described in Section 2.3.1 (Chapter 2). However, as this section will describe, by the end of the initiative a Section 21 Company (refer to glossary) had been formed that was based equally on the PASC model, a growing recognition of the need for cross-scale collaboration, and on locally appropriate norms in decision making that respected the autonomy of villages to create their own rules under the guidance of the larger body, which is akin to the relationship between headmen (who operate at the level of

the 'community') and sub-headmen (who operate at village level). Machubeni therefore displayed clear evidence of triple loop learning, which resulted in institutional innovation that incorporated redundancy at multiple levels.

Situating, engaging, awareness raising and co-creating - Since one of the goals in Machubeni was the creation of a model for integrated catchment management (Table 2.2, Chapter 2), a great deal of investment was made in social facilitation. The initiative as a whole was preceded by participatory land use planning and visioning workshops in which community members were encouraged to imagine 'what could be' and ways of achieving this. The election process for the PASC was also preceded by a 'roadshow' by the implementing agent during which the purpose of the PASC was explained and discussed, and the characteristics of the individuals who should sit on the committee were discussed. Examples of these characteristics included; they should be dedicated to community development, they should be hard working and they should be knowledgeable about the land.

Practical action and experimentation - The implementing agent brought in a group of consultants with the express intention of building capacity for ecosystem management and collaboration within the leadership of the community. A core group of locally recognized 'experts' in land management was therefore identified by the PASC to receive specialist training in land management, the development of management plans, indicator development and natural resource monitoring. This group became a sub-committee of the larger body, and became a hub for innovation. Indeed, within six months of the sub-committee being formed, their consultations with village headmen and community members had led to the suggestion of creating 'village land committees' in each village, which could feed into a larger and legally recognised land management body. These committees were based on a form of management that local people were familiar and comfortable with, and incorporated forms of both traditional and democratic governance norms.

Figure 3.1 illustrates the design of the Machubeni Section 21 Company that was eventually formed out of this process. The structure was designed to ensure communication from the village level to local and district government departments, and also to ensure that traditional leaders were fully integrated into decision making processes at all levels. As a result, a degree of redundancy was integrated into the design, because the relative autonomy of the lower levels meant that rule creation and enforcement could take place at both the village and the executive board level.

Reflection: The process in Machubeni was characterised by almost constant contestation, questioning, reflection and surprise. Indeed, the Section 21 Company was not formed without conflict. Power dynamics within the community, particularly at the level of the Ward committee and traditional leaders, led to a situation where only one of the initial members of the PASC who received training and experience in land management and collaborative decision making was voted onto this legal body during the crucial change-over phase when the PASC became legally recognised. This was due to infighting and jealousies between previously elected members of the PASC and formal and traditional leaders who felt sidelined by the initiative. This has caused a capacity shortage within the body, and upon reflection, community members have suggested that only fifty percent of the committee may be rotated out during an election event in the future.

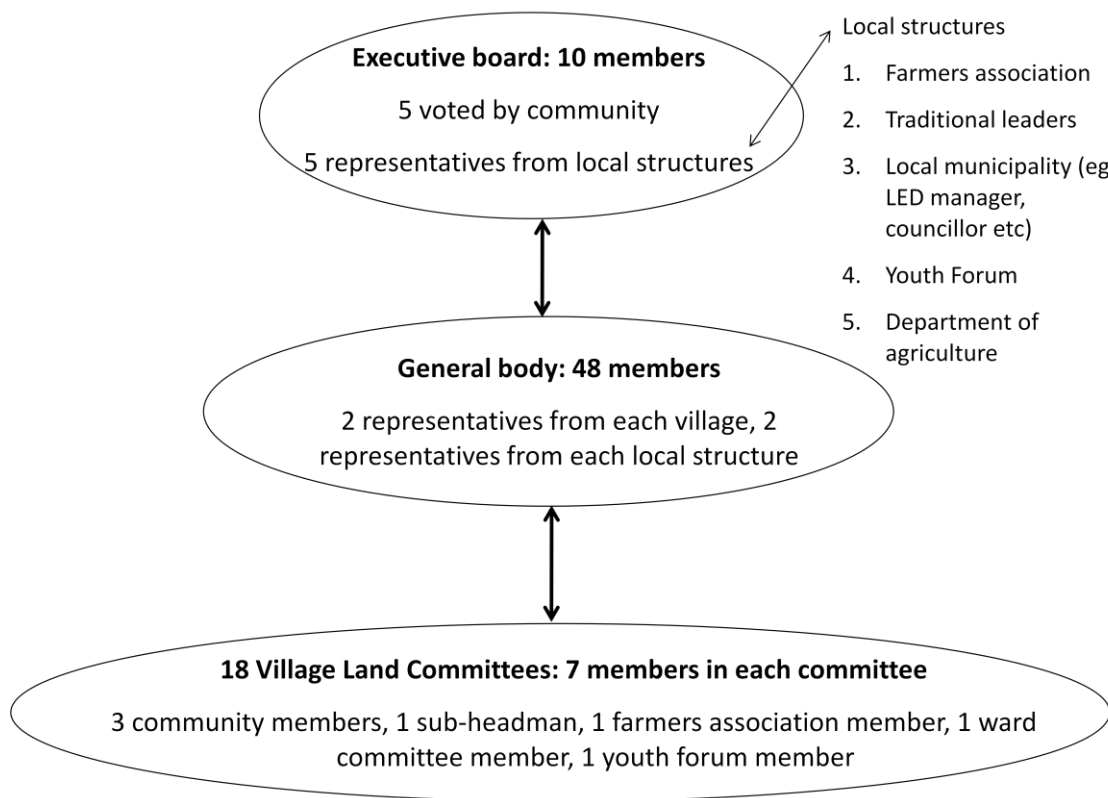


Figure 3.1: The Machubeni Section 21 Company

The learning that took place in Machubeni was situated within the local context, and showed clear evidence of questioning accepted norms and practice (triple loop learning). The sub-committee formed a community of practice where on-going engagement lead to the questioning of the status quo. The fact that these members were excluded from the

legal body in the end can be interpreted as the movement of members of a community of practice from the ‘core’ to the periphery, rather than the cessation of learning. However, from a social and human capital perspective, the loss of these actors represents the loss of critical capital out of the system.

Mkhuze

The initiative in Mkhuze took place in a context of powerful traditional institutional structures and deeply entrenched norms of decision making. These norms were not challenged in any significant way during the initiative. Opportunities for innovation through social learning were constrained both by the context in which the initiative was being implemented, and the nature of the goals of the project itself. The institutional body that was eventually formed in this case study did not integrate redundancy in any significant way, and indeed sought to centralise decision making within a single body.

Situating, engaging, awareness raising and co-creating - The Mkhuze ‘community’ is extremely large and amorphous, straddling two local municipalities and two Traditional Authorities (Section 2.3, Chapter 2). For this reason alone, awareness raising and elections for the community component of the PASC were problematic. However, this difficulty was compounded by the historically powerful traditional leadership who were responsible for land management and administration in conjunction with the local municipalities. ‘Co-creating’ a common understanding of the problems facing the community was not evidenced in this case.

Single loop learning, in form of adapting strategies and practices was evidenced throughout the management process, however the values and assumptions that underpinned those strategies was never seriously challenged. The community component of the PASC (Plate 3.3) was created by the Chief nominating headmen to sit of the committee, all of whom were male and most of whom were either middle-aged or elderly. Most of these representatives were adept at attending and participating in multi-stakeholder meetings, and had a vested interest in maintaining the status quo. Traditional leaders in Mkhuze did not feel that elections were necessary, and were not comfortable with the creation of sub-committees to deal with specific issues as they arose. Being traditional leaders, with direct access to the chief, and through him to the King, this committee was extremely powerful as a decision making body.

The homogeneity of the committee however made it potentially vulnerable, as revealed during discussions with stakeholders within the municipality:

“The lifespan of the project will be limited if the Ndunas [headmen] remain in control because they will not have the full support of the community” (Community Development Officer, Nongoma Local Municipality, May 2007).

“Luckily, in this municipality, it is easier to implement projects because although there are two traditional authorities involved, both chiefs are IFP [a political party], as is the municipal councillor. In other areas it can be very difficult...in this case it was just a coincidence, and it will probably change in the future” (Local Economic Development Officer, Hlabisa Local Municipality, May 2007).

Practical action and experimentation: Since the goal of the project was to create a protected area (Table 2.2, Chapter 2) emphasis was placed on creating linkages with private sector partners, rather than on social facilitation. The PASC eventually became the Mandlakhaze/Mdletshe Development Trust, and was made up entirely of traditional leaders. This Trust then entered into a mutually beneficial lease agreement with the Ingonyama Trust (the land owner), and Thanda Private Game reserve (a neighbour). As part of this agreement, Thanda agreed to pay the Ingonyama Trust for the lease of the land on behalf of the community, in exchange for access rights. However, all high value species remained the property of the Development Trust, who also maintained rights of first refusal on any developments that Thanda intended for the land. Therefore, as a venn diagram exercise demonstrated (Figure 3.2), power relations between these three partners were equitable.

Reflection was not encouraged as part of the process in Mkhuze. However, despite not having met the criteria for a social learning process, the traditional leaders did certainly form a community of practice which engaged over long periods of time with a sense of joint enterprise, perhaps more so than in other sites where members were elected during democratic processes. In this sense, the decision making body was effective, and escaped the learning challenges posed by election processes already described in Machubeni. However, the homogeneity of its membership meant that the body was potentially vulnerable to a lack support in the future.

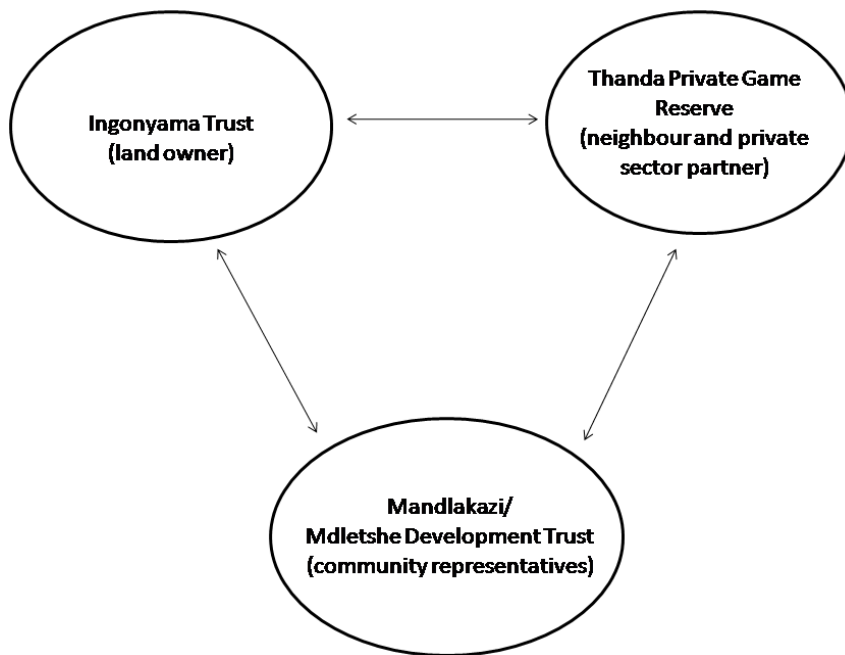


Figure 3.2: Venn diagram illustrating a perceived power balance in the lease agreement between Mandlakhaze–Mdletshe Development Trust, Thanda and the Ingonyama Trust

Nqabara

Since a Development Trust already existed in Nqabara prior to the initiative, the emphasis during the collaborative process was placed on the contractual obligations of the project, including infrastructure development for tourism facilities, rather than questioning underlying values and norms and therefore institutional design. The PASC in Nqabara was formed against the backdrop of over seven years of forestry co-management that had led to the formation of a Development Trust within the community. RULIV, the local partner to GTZ Transform, was very active in this site both before and during the current initiative, and several years previously had brought in professional conflict resolution experts to train the Development Trust in dealing with conflict. As a result, although the social learning process was not characterised by institutional innovation, it was characterised by the formation of an effective community of practice.

Situating, engaging, awareness raising and co-creating - The Nqabara Development Trust formed the community component of the PASC. A process of participatory land use planning and visioning had taken place a number of years previously, and the Trust had accumulated a great deal of experience with dealing with outside actors. Indeed, the Trust was populated by the same individuals who had initially been voted onto the Trust because

subsequent elections had never taken place. There were various reasons for this, including the fact that sitting on the Trust was time consuming and other community members did not want to perform the role. Another reason was that Trust members felt that benefits might be forth coming in the future, and since they had already invested so much time in the body, they wanted to benefit if that time ever came. Indeed, as time went on and the promise of benefits became more real, members of the Trust wanted less and less to question the status quo. The amount of time spent working together on land management issues over the years meant that a sense of common purpose, a capability of practice and a shared understanding of problems was developed within the Trust.

Practical action and experimentation – A number of collaborative challenges faced the PASC in Nqabara which both encouraged and undermined innovation and action. Firstly, political rivalries between the elected Councillor for the Ward and the chairperson of the Trust meant that this Councillor would not attend PASC meetings, and actively withheld applications from the Trust to the municipality for services such as piped water for a community nursery. This lead to a great deal of animosity:

[we have witnessed] the emergence of two opposing camps. The Councillor is currently on the opposite side to the members of the Trust, and does not attend meetings....comments like „we'll kill the councillor' are not helping matters, but demonstrate the seriousness of the situation" (Facilitator, Ruliv, February 2007)

Although the conflict was not resolved, the Trust members did develop a means of getting around this difficulty, and eventually by-passed the councillor and took applications directly to the relevant officials within the municipality. This indicates that the Trust was effectively identifying problems, finding solutions and taking action.

Secondly, by the time of the initiative, the Trust had been negotiating co-management agreements for state owned forests for over seven years, with very little being achieved in that time. While government officials blamed their superiors for not providing guidance on this issue, the Trust generally felt that the government did not trust them enough to hand over decision making authority, as revealed in the following dialogue between Trust members and a DWAF official during discussions about a Community Forestry Agreement:

1. *"Our only objective is to protect the forests, but we do not have the powers that we need in order to do this. We can see things happening, but we are helpless and powerless to prevent them"* (Trust member, September 2007)
2. *"This is the 7th year that we have been talking about this [participatory forest management]. Can you give us a time frame?"* (directed at DWAF by the chairperson of the Trust, September 2007)

3. *"We cannot give you a date because there are other people involved, my boss for example. I am in the regional office, we will need to meet with the national office and local offices so that when we come back we have something concrete to offer."* (Regional Forestry officer, DWAF, September 2007).

Although the length of time that participants had been engaged in co-management meant that communities of practice had formed and that social learning had taken place, learning was less successful in the collaborative efforts with outside actors; officials tended to be unwilling to commit to decisions, or become politicised and therefore not participate.

Reflection - The status quo of the membership of the Trust was not reflected upon or challenged during the process. The long tenureship of the members of the Development Trust meant that the organisation had become increasingly rigid and therefore vulnerable since all of the learning and experience was concentrated in a small set of key individuals. Were elections to be held in Nqabara, there is a danger that the accumulated learning and experience of this group would be lost.

Riemvasmaak

Active trust building did not take place in this site, and the initiative lacked consistent outside input and facilitation because the contractor hired for the day-to-day implementation of the initiative was a local resident. Throughout, the politics of the Development Trust, which had been extant for ten years prior to the SRP initiative, and conflicts between the two settlements (Section 2.3.4, Chapter 2) tended to dominate decision making. The lack of outside facilitation also meant that there was little room for institutional adjustment or experimentation. From the community's perspective, this was because they were unaware of their legal options and did not have access to the information they needed in order to make informed decisions:

"We don't know what our options are: how do we make the Trust accountable? The Trust has not held a community meeting in two years. But there is a lot of nepotism, so certain families support the Trust no matter what." (PASC member, Riemvasmaak, February 2007).

Situating, engaging, awareness raising and co-creating – The development of shared frames of reference for understanding the challenges facing the community was undermined by a number of factors. Firstly, the remoteness of the site meant that attendance of PASC meetings by key stakeholders in the municipality was very low. Secondly, members of the Trust sat on the PASC, but unlike Nqabara, they were joined by elected community members who did not sit on the Trust, and the simmering hostilities

between the Trust and the community at large influenced the ability of these two parties to reach a common understanding. Thirdly, key informant interviews and venn diagrams demonstrated that there were in fact multiple distinct ‘communities’ who held sway over decision making (Figure 3.3). Two of these were resident at Riemvasmaak, and the others were living in the Eastern and Western Cape, and in Namibia (Section 2.3.4, Chapter 2). The two local settlements have more or less equal amounts of power within the Development Trust. The expatriate members are linked to households in both settlements, and are relatively powerful since they were often the ‘bread winners’ within local families. These people are however not allowed to sit on the Trust, and their influence is therefore indirect.

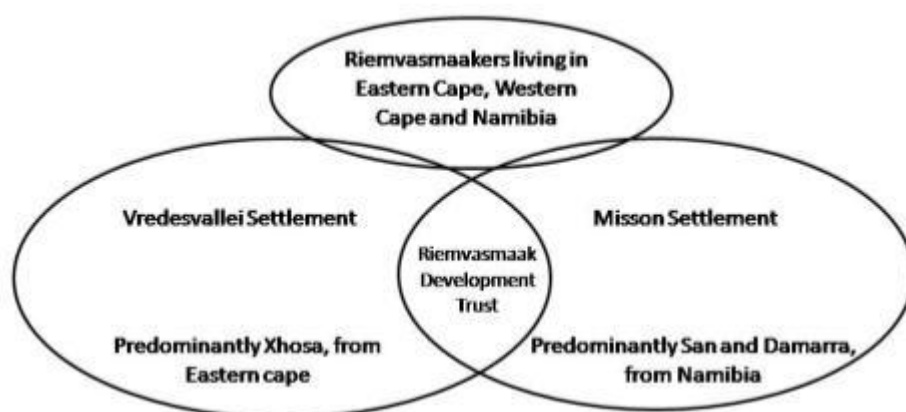


Figure 3.3: Venn diagram of power relationships within the Riemvasmaak community

Fourthly, democratic processes were well entrenched in the community, and elections took place every two years for the Development Trust. These election processes further undermined the development of shared frames of reference for understanding problems because membership changed every two years.

Practical action and experimentation – The general distrust both within the community and between the community and outside agencies undermined the ability of the PASC to translate ideas into shared action for which everyone took responsibility:

“There is always a cloud of distrust and suspicion...take for example Melkbosrand, people want to live there but the Trust has agreed to maintain the land for conservation, so people start asking what’s up there, why hasn’t the land been restored to the claimants? People fail to link management with development and so cast accusations at the Trust” (Former chairperson of the Trust, February 2007).

Reflection – Reflection and active criticism were a common feature of the collaborative process in Riemvasmaak. However, a feeling of helplessness in the face of the challenges that were identified was equally salient. This feeling of helplessness stemmed largely from a lack of access to information and sound advice, which in turn was partly a product of there being no active facilitator or ‘honest broker’ involved in the initiative.

3.4.4 Trends in key variables necessary for social learning

Riemvasmaak and Mkhuze indicated a number of negative trends or no change in key variables affecting social learning, whilst Machubeni and Nqabara reported only positive or no changes in key variables (Table 3.5). When compared with the narrative accounts just presented, this suggests that collaborative monitoring is sensitive enough to track social learning processes.

Table 3.5: Key variables necessary for social learning

Variable		Machubeni	Mkhuze	Nqabara	Riemvasmaak
Trust building	Average rating	5 ▲	3 ▼	4 ▲	2 --
	Event 1	5	4	4	3
	Event 2	4	3	4	2
	Event 3	5	3	4	--
	Event 4	5	3	5	2
Groups of common interest	Average rating	3 --	4 ▲	4 ▲	5 ▲
	Event 1	3	3	4	4
	Event 2	5	3	4	5
	Event 3	3	5	4	--
	Event 4	3	4	5	5
Economic or other incentives for collective action	Average rating	3 ▲	2 ▲	3 ▲	1 --
	Event 1	1	2	1	1
	Event 2	3	0	2	2
	Event 3	3	2	4	--

	Event 4	4	3	4	1
Security of tenure over the resources of concern	Average rating	4 --	3 ▲	4 --	4 ▼
	Event 1	4	2	3	5
	Event 2	4	2	4	3
	Event 3	3	4	4	--
	Event 4	4	4	3	3
A perceived value in sharing information	Average rating	4 --	5 ▲	4 ▲	5--
	Event 1	4	4	4	5
	Event 2	4	4	3	4
	Event 3	3	5	5	--
	Event 4	4	5	4	5
A willingness to engage in collaborative decision making	Average rating	4 ▲	3 ▼	4 ▲	3 ▲
	Event 1	3	4	3	2
	Event 2	4	--	4	2
	Event 3	4	4	4	--
	Event 4	4	3	4	3
Sufficient funding to enable practical action and experimentation	Average rating	4--	3 ▼	3▲	4 ▼
	Event 1	4	3	2	5
	Event 2	4	4	2	5
	Event 3	4	2	4	--
	Event 4	4	2	5	3
Social networks that allow effective information flow	Average rating	3 --	3 --	4 ▲	4 ▼
	Event 1	3	3	3	4
	Event 2	4	3	4	5
	Event 3	3	3	4	--

	Event 4	3	3	5	3
Effective local leadership/ „honest broker’	Average rating	4 ▲	3 ▲	4 ▲	3 --
	Event 1	4	3	4	3
	Event 2	3	3	3	3
	Event 3	4	3	4	--
	Event 4	5	4	5	2

▲ indicates improvement in the variable over time, ▼ Indicates a decline in the variable over time, -- Indicates no change in the variable over time

Trust building received high average ratings in Machubeni, Nqabara and to a lesser extent in Mkhuze because the monthly PASC (Project Advisory and Steering Committee) meetings were considered successful in encouraging dialogue between actors and in dealing with misunderstandings that might otherwise have lead to conflict. In Riemvasmaak low ratings were given on average due to poor attendance of government officials at the PASC meetings, and also because of growing discontent between community elected members of the PASC and the representatives of the Development Trust who sat on the PASC. The Trust members were consistently accused of not communicating with the community at large. This is evident from the following statement made during monitoring exercises focussed on assessing trust building:

“The PASC is doing very well with this, we have PASC gatherings every month about the project. However, if we were to refer to the [Development] Trust on its own, we would give this point a [rating of] 1, they are not fostering trust” (Riemvasmaak, February 2007).

Across all sites, the existence of a common interest within groups received high average ratings and improvements were indicated in all sites except Machubeni. Participants identified the fact that community participants attended the monthly PASC meetings voluntarily, and indeed incurred personal expenses in doing so, as evidence of the common interest. In Machubeni the comparatively low ratings were due to the fact that although there was a common vision and everyone was working toward this vision, they were “not there yet”. The rating of 5 during the second monitoring event was due to optimism following consultations regarding the formation of village land committees as part of the Section 21 Company described in the previous section.

Incentives for collective action received the lowest average ratings across all sites, although positive trends were reported in all sites except Riemvasmaak. A range of reasons were provided for these low ratings, but generally revolved around the fact that members of the PASC's were not paid or compensated for travel costs to attend meetings, despite some having to travel up to twenty kilometres without transport of their own. Other issues related to households who lost access to land or resources during the initiatives. The following statement was typical:

"One wood cutter out of nine in total is compensated [for losing access to the forests] by getting a job [through the SRP initiative]. The rest aren't compensated. The [Development] Trust members do not benefit, in fact they cannot benefit because it is laid down in the constitution" (Nqabara, November 2006).

The positive trends reported in incentives reflect actions taken by the implementing agent toward the end of the initiatives to provide travel stipends, although this did not occur in Riemvasmaak. Tenure security was generally high or improved during the initiatives, except in Riemvasmaak where a negative trend was reported due to the ongoing and increasingly hostile negotiations over access to Melkbosrand (Section 2.3.4, Chapter 2). The high average ratings across all sites reflect the belief that the land belongs to the people rather than an ability to exclude outsiders or enforce rules governing the use of the land, as reflected in the following statements:

"We know that the forests are ours, we are secure in our ownership, but we don't have the power to enforce rules because we never get recognition from DWAF [Department of Water Affairs and Forestry]. We have ownership but we don't have power" (Nqabara, June 2007);

"Once we are legalized [formed a Development Trust] we will have a stronger voice. We don't know what will happen next year but the land belongs to the Inkosi [King] and he cannot use the land as he pleases, he must consult the local leadership" (Mkhuze, December 2006).

The perceived value in sharing information with different stakeholders received high ratings and a general improvement was identified for Mkhuze and Nqabara. The perceived value and willingness of stakeholders to share information and to learn are reflected in the following statements made during monitoring exercises:

"People from outside the community listen more than the locals, but people do also listen locally. For example, even though the rules developed in the management plans have not been formalized or enforced, people are already following them" (Machubeni, March 2007)

"Everyone wants to do this, and tries very hard" (Riemvasmaak, November 2006)

The willingness of stakeholders to engage in collaborative learning and decision making was average to high across all sites except Riemvasmaak, and positive trends were reported across all sites except Mkhuze. Challenges facing collaborative decision making across sites are reflected in the following statements made during monitoring in Machubeni and Riemvasmaak:

“Some consultants do not listen to the community. They do not respect the ideas of the community. There is also a need to build respect between traditional leaders and the community [so that they will listen to each other] (Machubeni, November 2006);

“We have a problem with the municipality, they never attend meetings. But the problem now is within the community, while in the past it was between the community and outsiders. People are no longer listening to one another” (Riemvasmaak, November 2007).

With the exception of Mkhuze, ratings attached to access to long term funding for management were generally high, due in large to the fact that large sums of money had already been allocated to the initiatives, but also due to future planning that was already underway, such as a LandCare grant application that had been developed by the implementing agent for Machubeni. In Mkhuze, the initially positive and then negative trends reported for this indicator were due to initial optimism about the long term commitments made to the community by the municipality and the consultants involved. However, this optimism turned to disillusion when the end of the initiative was in sight and very little training in leadership and other skills had been provided. In Riemvasmaak, the declining trend was similarly due to initial satisfaction with the long term commitment made, which later turned to dissatisfaction with the short term nature of the training provided and the lack of accreditation for this training (see Chapter 5).

Social networks that allow the effective flow of information received average overall ratings and displayed a mixture of positive and negative trends. In Riemvasmaak the negative trend was due once again to dissatisfaction with the Development Trust. In Nqabara, initially low ratings were due to a lack of municipal participation in PASC meetings and the failure of researchers from the university to report back on their findings. Positive trends were due to report backs having taken place, and the election of a ‘social coordinator’ in the community through whom all meetings were arranged by outside actors. In Mkhuze average ratings were given to this variable because although the PASC was functioning, they did not yet feel full information sharing was taking place on the part of the consultant. In Machubeni, average ratings were given because although people were encouraged by the formation of

the PASC, there was a feeling of not being on an equal footing with other stakeholders, as reflected in the following statement:

“Sometimes the agreements are not honoured, people from outside bring changes but don’t keep promises. [For example] the fields that were taken away from some people for [soil] rehabilitation. They never received compensation” (Machubeni, September 2007)

Positive trends in effective leadership were indicated for all sites except Riemvasmaak. The positive trends in Machubeni reflected the growing involvement of traditional and elected leaders in the PASC, while the variable trends in Nqabara reflected the turbulent relationship with the elected councillor described in the previous section. The final rating was high in that site due to the attendance on this councillor at PASC meetings. In Mkhuze the average ratings reflected communication problems within the leadership of traditional structures.

3.4.5 Common factors undermining social learning across sites

Leakages of human capital (skills and experience) out of the system were a feature of all sites, and this occurred in a variety of ways. Firstly, although there was a strong emphasis on formal capacity development in the form of training courses in each of the case studies (see Chapter 5 for the types of skills transferred), in many instances these skills ‘leaked’ out of the communities. In Riemvasmaak, for example, people who are skilled are expected to leave the community and find work in the surrounding centers:

“Our culture tells us that those who are skilled must leave the community and find work elsewhere. They are expected to send money home” (Community member, Riemvasmaak).

In Machubeni, emigration of skilled people was identified as a major challenge facing development their area. Both of the community members employed as local project administrators have subsequently found permanent employment outside of Machubeni.

Skills are also lost through the ways in which democratic structures operate. In Riemvasmaak the Development Trust is re-elected every two years. Those who are elected are frequently unskilled. The result is that every two years the Trust must learn leadership and management skills, financial management skills, and generally require a period of trust building within themselves, and between themselves and local government officials. After two years the cycle restarts. A similar trend seems likely in Machubeni, where the first election process ushered in an entirely new set of leaders with little or no background in land management and collaborative decision making.

High turnovers of government and municipal staff have been identified by project participants as a major leakage of human capital. This high turnover is due, by and large, to national skills shortages, and the lure of major centers such as Cape Town and Johannesburg. Many young professionals who find themselves in local government positions in rural areas aspire to move to these major centres, and those that show skill and motivation tend to move on to other departments.

3.5 Discussion

The value of viewing collaboration through the lens of social learning when monitoring transitions toward adaptive co-management is highlighted by the fact that although all of the case studies followed identical collaborative processes, the learning outcomes varied significantly from site to site. The lens of social learning, where knowledge is considered to be contextual and embedded within local histories, cultures and the ways in which these are experienced by individuals (Ison 2005; Fazey *et al.* 2007), is compatible with that of complexity thinking, which stresses the role of the social-ecological context (Balee 1998; Adger 1999a) and system memory (Folke *et al.* 2003) in influencing outcomes (Figure 1.3, Chapter 1).

The social-ecological context prior to the initiatives certainly influenced the outcomes that were possible in each site, however there appeared to be correspondence between the direction of key variables, and the extent of social learning. Where the key variables for social learning showed mostly positive trends (Table 3.5), social learning and institutional innovation appeared to be more pronounced, such as Machubeni and Nqabara. Conversely, where the key variables such as trust building and incentives for participation were considered to be low, the learning outcomes were less pronounced, such as Mkhuze and Riemvasmaak. These results have two implications. Firstly, they suggest that the conditions necessary for social learning can be externally managed during an initiative, with positive outcomes for learning and innovation, and therefore transitions toward adaptive co-management. Secondly, they suggest that the small set of key variables (*sensu* Walker *et al.* 2006) identified in Section 3.2.2 and Table 3.2, provide a useful starting point for monitoring transitions toward adaptive co-management.

In Machubeni, high levels of careful and well funded facilitation, in addition to conflict, yielded positive conditions for collaboration and learning, and the institutional outcomes

represented shifts in local rule making that were based both on recurring questioning and contestation, and on common norms that were recognised by resource users (Section 3.4.3). This implies that triple loop learning took place during the process (Keen *et al.* 2005b). In Nqabara, by contrast, comparatively less focus was placed on creating the conditions necessary to achieve this, and indeed many collaborative challenges were faced, and yet the monitoring activities identified equally positive learning conditions to Machubeni (Table 3.4). This can be explained through the fact that learning occurs through two parallel processes: the first through formally designed learning interactions (Keen *et al.* 2005b), and the second through experience over time (Ison 2005; Berkes and Turner 2006).

A comparison of the processes followed and the outcomes observed in Machubeni and Nqabara, and Riemvasmaak (Section 3.4.3) demonstrate that facilitation by an honest broker is critical to situated learning (Brown *et al.* 2005; Michael 1995). While Machubeni and Nqabara received dedicated funding and ongoing support from professional facilitators, Riemvasmaak did not and the process was facilitated by a local community member. The absence of an impartial facilitator, against the backdrop of historical distrust evident in that site, offers some explanation for the outcomes observed in that site.

The history of distrust in the Riemvasmaak community, embedded within historical conflicts over land and overlaid with the lack of facilitation in the current initiative, undermined social learning. In Mkhuze, the historical strength of traditional leadership structures meant that questioning the status quo was actively discouraged. Therefore, although the same blueprint approach to collaboration was adopted in all four sites, the ways in which participation actually occurred in the each site varied significantly, as did the learning outcomes. In each case the local context and institutional memory (cf. Berkes and Folke 2002; Folke *et al.* 2003) influenced active questioning of the status quo. Context and memory therefore matter (Fazey *et al.* 2007).

These findings suggest that long term interactions with a core group of individuals to build positive memory should be encouraged during collaborative efforts. There does not appear to be a substitute for experience, but carefully facilitated interactions that are sensitive to the social-ecological context are equally vital.

The community component of the PASC's represented invited spaces (Bawden *et al.* 2007) where all stakeholders were able to take part in collaborative decision making. They hold the potential to foster the creation of communities of practice, since these were the

groups that practiced resource management every day, and would do so in the long term. Situations where the same group of people are trained and involved in learning processes for long periods of time appear to be successful for social learning (Clarke *et al.* 2006). This was witnessed in Nqabara where long term interaction between the same set of individuals was possible, and there is potential for the same in Mkhuze where long term engagement of key individuals is likely to occur due to the dominance of traditional leaders. However, democratic decision making in Machubeni and Riemvasmaak, while essential for transparency and good formal governance, undermined the creation of long term communities of practice in two important ways.

Firstly, people were elected, rather than joining out of a real and shared concern, thereby undermining the principle of self-organization advocated by Olsson *et al.* (2004b) and Innes and Booher (1999). Secondly, rotating election processes effectively removed individuals from the bodies after a certain amount of time. A similar situation has been described in Namibia, where learning was undermined by election cycles (Stuart-Hill *et al.* 2005). In Riemvasmaak, the repeated loss of capacity and skills due to democratic processes for the election of decision makers was a key challenge for ecosystem management (Section 3.4.3).

From a knowledge management perspective, it is counter intuitive to expect community based organizations to function effectively under conventional democratic principles. Thus, while the act of devolving decision making responsibilities to communities illustrates a national and Western desire for a more democratic society, real questions about the appropriateness of this model under resource-poor conditions must be seriously considered. Enforcing more formalized resource management regimes such as those characterised by Section 21 companies and Development Trusts, in addition to democratic principles, on resource-poor communities is a double edged sword that can undermine collaboration and learning in natural resource management. In Machubeni, the very effective ‘_cop’ of the decision making structure by an entirely different set of individuals, after the investment of large amounts of time and money in training and capacity building in the original group, demonstrates this danger.

However, while democratic processes pose a threat to ongoing learning, a lack of broad participation can result in rigidity and vulnerability in decision making structures, as indicated by the cases of Nqabara and Mkhuze. A balance is required between maintaining key individuals within collaborative structures, and allowing new members to join. In

communities of practice, this is referred to as allowing movement from the *‘core’* to the *‘periphery’* and visa versa. An individual might be a core member of one community of practice, in another they might participate peripherally (Lave and Wenger 1991), and individuals are likely to move and in and out of the *‘core’* over time (Wenger 2000). Currently, the very formal legal structures that are being formed to deal with collaboration in resource management do not appear to allow for this kind of self-organising movement. One option for the maintenance of experience and learning within decision making bodies, while allowing for change, is the rotation of only fifty percent of the membership during any given election cycle. In this way, institutional memory and the learning that has taken place can be maintained and shared with new members, ensuring continuity during transitions.

The high turn over of government staff represents a further leakage out of the system that undermines the development of communities of practice. The loss of individuals in whom human capital is stored weakens knowledge networks that have been established over long periods of time, and undermines relationships of trust that have been developed between stakeholders during a shared learning process. Each time a new individual enters the system, new processes of trust building and learning must take place. Other leakages have been created by the prevalence of short term consultants who are employed by implementing agents to implement co-management initiatives. When donors withdraw, so too do the consultants. Since projects are too often *‘parachuted’* into communities by donors or national level departments, when consultants withdraw many of the relationships and collaborative learning that has taken place is lost with them.

The narrative accounts presented in Section 3.4.3 support the suggestion that the dynamics of power and knowledge influence the ways in which collaboration occurs (Wildemeersch 2007), and the subsequent outcomes that are possible during transitions toward adaptive co-management (Figure 1.3, Chapter 1). The challenges facing collaborative efforts across organisational levels often centred on power (Section 3.4.2, Table 3.3), and concur with the work of other scholars who have identified key constraints facing transitions toward adaptive co-management, particularly under resource-poor conditions as inadequate access to information, mistrust and power asymmetries, a lack of communication and differing decision making authority between actors (Plummer and Armitage 2007b; Olsson *et al.* 2007; Balint and Mashinya 2006).

However, the mobilisation of knowledge to both exert power and to respond to power asymmetries has to be considered. This was illustrated in the first instance in the case of

Nqabara when the elected councillor actively withheld access to the municipality from the Development Trust. This individual effectively mobilised his knowledge of how applications for basic services functioned to undermine community level actors. However, members of the Development Trust equally mobilised their collective understanding of the system to bypass this link with the municipality and take their applications directly to the relevant departments. Similarly, in Machubeni, the elected councillor, who felt sidelined by the initiative in that site, mobilised his knowledge of electoral processes to have all but one of the original members of the PASC voted out of the new Section 21 Company.

The fact that power dynamics were experienced and perceived very differently at different levels (Section 3.4.2) points to the need to consider perspectives of challenges at more than simply the scale of operation in adaptive co-management (Armitage 2005), and supports the argument that the selection of the scale for monitoring can lead to one perspective being favoured, and therefore empowered, over another (Lebel *et al.* 2005). The scale at which monitoring takes place, and the knowledge that is privileged during the monitoring process, therefore influences the resulting interpretation of transitions toward adaptive co-management.

3.6 Conclusion

Traditionally, the collaborative literature stresses a change in worldviews and behaviour as positive outcomes of the collaborative process but is not explicit about ‘how’ this might take place, especially under resource poor conditions. Social learning theory sheds light on the ways in which the perceptions, values and beliefs that underpin behaviour and assumptions shift through collaborative processes, and therefore the ways in which innovation occurs. Under resource poor conditions, this innovation is critical to initiating and maintaining transitions toward adaptive co-management.

The results presented here suggest that for learning to be effective under resource poor conditions, a balance needs to be sought between maintaining key individuals within the system, preventing rigidity and vulnerability when this is achieved, and encouraging active participation within communities of practice. Effective facilitation by an ‘honest broker’ is one of the ways in which this can be achieved. A growing interdisciplinary dialogue that particularly incorporates educationalists will contribute substantially toward finding this

balance (Fazey *et al.* 2007). In the chapter that follows, the governance outcomes of the initiatives are explored.

It is also important to note that concepts such as communities of practice and situated learning, sit uncomfortably beside concepts of learning through multi level networks, which is one of the basic assumptions underpinning adaptive co-management. The partners in these networks will seldom have the same stake in locally based natural resource management. This challenge holds the potential to undermine transitions toward adaptive co-management.

Collaborative monitoring created spaces in which collaboration and learning could take place during the initiatives, as evidenced by the quotes from workshop evaluations presented in Section 3.3. Although this represents an obvious challenge to researchers who seek to track change in social-ecological systems because they will themselves become agents of change, this reality of complex systems research also points to the potential role that collaborative monitoring can play in initiating positive transitions.



Plate 3.1: Members of the Nqabara Development Trust



Plate 3.2: The community component of the Riemvasmaak PASC with a toolkit that was developed during collaborative monitoring



Plate 3.3: The community component of the Mkhuze PASC



Plate 3.4: Focus group discussions during process monitoring in Nqabara



Plate 3.5: Focus group discussions during process monitoring in Machubeni

Chapter 4: MONITORING THE CAPACITY FOR GOVERNANCE

This chapter is about defining and monitoring the desired governance outcomes of adaptive co-management (Figure 1.3, Chapter 1). Chapter 3 identified the institutional structures involved in each initiative, and this chapter builds on these results to identify key system attributes and variables that influence long term change in governance, and uses them to develop and test a system to monitor such change.

4.1 Introduction

Attention to governance in natural resource management is part of a shift away from seeking desirable or stable states, and toward a focus on opportunities for transformation in social-ecological systems (Walker *et al.* 2004). Governance is concerned with the social or human context that allows collective action, rule making or institutions for social coordination (Dietz *et al.* 2003). When attempting to monitor transitions toward adaptive co-management (Olsson *et al.* 2006), tracking change in governance is critical because this social context provides the basis for effective management (Folke *et al.* 2005).

The emphasis in adaptive co-management comes to bear on forms of governance that allow for local controls and multi level institutional linkages (Carlsson and Berkes 2005; Folke *et al.* 2005; Olsson *et al.* 2006). Water management in South Africa is one such example of the way in which cross scale linkages can be operationalised for more effective resource management (Bohensky 2008). In this case, the National Water Act (No. 36 of 1998) laid the foundations for devolving management authority to catchment level institutions. These institutions are subordinate to the national ministry, but work with local Catchment Management Committees and stakeholder organizations. These local entities help decide on the desired balance between the protection and use of water resources and help establish a course of action to achieve this (Bohensky 2008). Adaptive co-management typically takes place under similar conditions, because it is intrinsically aimed at bringing together stakeholders from various organisational levels to solve a resource management problem in a specific locality, as described in Chapter 1.

However, in order to monitor governance it is necessary to find a means to measure it, and this is a challenge that has not been adequately addressed in the literature. Not only is

there a well recognised inadequacy of literature dealing with research processes in complex systems research (Campbell *et al.* 2001a), but the tools for evaluating co-management in general have been described as ‘surprisingly blunt’ (Carlsson and Berkes 2005). Monitoring governance is particularly challenging because of the variety of perspectives that influence what is considered to be ‘good governance’ (Abrams *et al.* 2003). In this chapter the intention is not to monitor whether governance is ‘good’ or ‘bad’, but rather to monitor the system attributes and key variables that, in theory, are necessary for self-organising processes that allow for a transition toward adaptive governance.

The objective of this chapter is to identify the governance outcomes of adaptive co-management, and to test a methodology for monitoring these. Key questions toward achieving this objective included:

- i. What are the critical variables that allow for a transition toward adaptive governance?
- ii. How can changes in these variables be monitored?
- iii. How do governance and social learning (Chapter 3) interrelate?

In addressing these questions, minor overlaps with the key variables used in Chapter 3 to monitor social learning were unavoidable; adaptive governance relies on many of the same preconditions that are necessary for collaboration, and adaptive governance is itself founded on the concept of learning (see below). This study seeks robust measures which do not necessarily meet the strict requirements of applied mathematics, but which nevertheless shed light on complexity in a way that is accessible to stakeholders with varying levels of education. The chapter begins by providing the conceptual basis for monitoring governance by identifying system attributes and key variables that can be used for monitoring. This is followed by a description of the methods used to collaboratively monitor these variables. The results section focuses on changes in governance in each site and reflects on the rate of change in key variables. The implications for transitions toward adaptive co-management under resource poor conditions are discussed.

4.2 Theoretical basis for monitoring governance

Analysts have argued that a small set of key variables tend to be dominant in observed system change, and that by identifying this small set of typically no more than five variables important changes in systems can be understood (Walker *et al.* 2006). This study tests this

hypothesis through the development of a conceptual map for monitoring change in governance (sensu Ostrom 2007b) that begins by identifying a number of system attributes that define a governance state, and thereafter a small set of key variables for each attribute. A system attribute is defined as a factor that enables radical or substantial change in social-ecological systems (Walker *et al.* 2006), while key variables refer to those factors that cause change in these system attributes.

Analysts have identified a range of system attributes that influence governance in adaptive co-management, these have included social capital (Pretty 2003), adaptive capacity (Armitage 2005), and self-organisation (Olsson *et al.* 2004a). Others have identified preconditions for the emergence of adaptive governance that are not captured by these attributes (Dietz *et al.* 2003). Each of these attributes, and the preconditions for adaptive governance, are considered in turn below.

4.2.1 Social capital

Social capital refers to the features of social life, such as networks, bonds, norms and trust, that enable participants to act together to pursue shared objectives (Coleman 1988; Putnam 1995). Social capital is particularly important in understanding the ways in which collective action is achieved (Ostrom and Ahn 2003), and is therefore central to self-organisation within social systems (Folke *et al.* 2005). However, this definition of social capital has been criticized for failing to recognize that investing in social capital is not as straight forward as investing in, for example, physical capital such as infrastructure or human capital such as capacity building (Mansuri and Rao 2004). It is thus essential to identify the means by which social capital can be built in order to identify indicators to track progress toward building social capital.

Pretty (2003) identifies four features of social capital that are important for collective action in local resource management, and these provide a starting point for identifying key variables for monitoring social capital, these include: relations of trust, reciprocity, common rules, norms and sanctions, and connectedness in networks and groups. Trust is a core feature of social capital because it enables cooperation. However, although trust takes time to build, it is easily broken, and in situations where distrust is rife collaborative efforts are unlikely to emerge or to succeed (Pretty 2003; See also Chapter 3). Pretty also identifies economic incentives as a means to change behavior and encourage collective action, although this may not result in a change attitudes.

Connectedness in networks and groups is an important potential variable for monitoring social capital and takes three different forms in the theoretical literature: bonding, bridging or linking. Bonding ties refer to those ties that are formed by members of a common ethnic, family or religious group (Pelling and High 2005). Bridging ties refer to social relationships that link people with a common interest or goal, despite having different views, for example communal land management (Pretty 2003). Linking ties refer to ties that enable a group to engage with external agencies. Thus, in monitoring social capital, it is insufficient to monitor only the formation and connectedness of local associations. Vertical connectedness and linkages to external agencies must also be considered (Pretty and Ward 2001). These features of social capital can be regarded as key variables that will influence the governance outcomes of adaptive co-management. The ways in which these key variables can be used to identify outcome indicators for monitoring is illustrated in the Methods section.

4.2.2 Adaptive capacity

Adaptive capacity is one of the core attributes necessary during transitions toward adaptive co-management (Folke *et al.* 2003; Plummer and Armitage 2007b). Adaptive capacity refers to the ability of a system to adapt to change and respond to disturbances (Armitage 2005), or to expand the range of variability within which it can cope (Adger 2003). Adaptive capacity is closely related to the concept of social capital (Adger 2003) because social capital influences the ability of groups to act collectively during a crisis or surprise (*sensu* Gunderson and Holling 2002). In the context of governance, a distinction can be drawn between adaptations that reinforce existing organisations, and adaptation that creates flexible institutions, thereby increasing resilience (Pelling and High 2005). Attributes of systems that support innovation should be favoured over attributes that maintain the status quo (Armitage 2005).

Measuring adaptive capacity is however a challenge. Armitage (2005) has suggested that adaptive capacity depends on the characteristics of individuals, institutions and organizations that foster learning in the context of change and uncertainty. These characteristics can be understood as key variables for monitoring adaptive capacity, and include; the willingness to learn from mistakes, the willingness to engage in collaborative decision making, and the extent to which institutional diversity and redundancy is

encouraged or accepted. The ways in which these key variables can be used to identify outcome indicators for monitoring is illustrated in the Methods section.

4.2.3 Self-organization

Adaptive co-management is often described as a self-organising process for problem solving (Olsson *et al.* 2004a). Self-organising governance systems rely upon social capital and adaptive capacity (Folke *et al.* 2005), and have been described as emergent properties of complex system dynamics (Ruitenbeek and Cartier 2001).

Creating conditions under which self-organisation can occur is not well understood, although some analysts have suggested essential features for self-organisation (Olsson *et al.* 2004a). These features can be interpreted as key variables necessary for the emergence of self-organisation in adaptive co-management; i) enabling legislation that creates social space for ecosystem management; ii) funds for responding to environmental feedback and remedial action; iii) the ability to monitor and respond to environmental feedbacks; iv) information flow and social networks; v) combining various sources of information for sense making; and vi) arenas of collaborative learning. Leadership also appears to be essential for self-organising processes (Olsson *et al.* 2004a; Cash *et al.* 2006; Olsson *et al.* 2007). The ways in which these key variables can be used to identify outcome indicators for monitoring is illustrated in the Methods section.

4.2.4 Preconditions for adaptive governance

Dietz *et al.* (2003) have identified five requirements necessary for successful adaptive governance of common pool resources within complex systems that are not overtly captured in the variables identified for social capital, adaptive capacity and self-organisation. Firstly, there has to be access to information about the resource being managed. The information must be trustworthy, and at an appropriate scale for the level of management. The flow of this information must meet decision makers' needs in terms of timing, content and form of presentation. Secondly, conflict resolution mechanisms must be in place to deal with power inequalities, and differences in values, interests and perspectives. Thirdly, rule compliance and enforcement must be effective. Rules and enforcement may be either formal or informal, but those in charge of enforcement must be seen as legitimate by the resource users. Fourthly, sufficient infrastructure must be in place, as this determines the degree to which the commons can be exploited or managed. Infrastructure might include fences for grazing land and roads for transporting goods, or

technology necessary to monitor natural resources. Fifthly, Dietz *et al.* (2003) identify the need for people and organizations to be prepared for change, in the same way that Olsson *et al.* (2006) described. As understanding of conditions change, so the rules governing their use and even the design of institutions might change.

These requirements are understood as the key variables that are necessary for adaptive governance, and adaptive governance is therefore considered a system attribute for the purposes of monitoring. The ways in which outcome indicators were developed for these key variables is illustrated in the Methods section.

This leads to the question: how can these system attributes (social capital, adaptive capacity and self-organisation, adaptive governance), and the key variables that underpin these attributes, be converted into a practicable monitoring programme?

4.3 Methods

4.3.1 Field methods and data collection

Monitoring activities took place over the course of eighteen months between June 2006 and December 2007, and involved the decision making bodies in each of the four study sites. In all cases, these bodies had already been formed prior to the research (see Chapter 3), and therefore did not need to be re-selected for this purpose. In all cases except Mkhuze, these bodies stressed equal representation of women and men, and of the youth and the elders, which was a requirement of the SRP funding that made the initiatives possible.

These bodies were engaged, together with the researcher, in evaluating; i) the relevance of pre-identified indicators to their context, and ii) their progress toward realizing these as goals within the initiatives. The methodology was thus one of collaboration and mutual learning, where scientific knowledge was shared and its applicability debated, rather than purely participatory research where communities design their own governance outcomes and monitor these (Section 1.3.3, Chapter 1, Abrams *et al.* 2003). Four monitoring events took place in each community except Riemvasmaak where the third event had to be cancelled due to organisation failure within the community. In this case three monitoring events took place. Monitoring events took place on roughly a four-monthly basis in each of the communities.

The strengths and weaknesses of participatory methods (Section 3.3, Chapter 3) and particularly collaborative monitoring (Section 1.3.3, Chapter 1) have been elaborated upon previously and are discussed more fully in Chapter 6. The common theme in participatory research is the participation of people in the process of identifying their needs and opportunities, and in the action required to address them (IIED 2003). This approach does however pose some difficulties in inferring causality in the context of monitoring. The key challenge is that the act of collaborative monitoring itself builds capacity for adaptive governance and creates learning processes, which makes it difficult to tease apart where the observed outcomes are a result of the initiative being monitored, or monitoring itself. This trade-off between the ability to objectively measure change in social processes, and accepting that the researcher is part of the change that is observed, was regarded as necessary precondition for coming to terms with change in complex systems. This issue is explored further in the discussion section of this chapter.

A combination of research techniques was used, including focus group workshops (Borrini-Feyerabend 1997), and semi-structured interviews with key informants (Pretty *et al.* 1995).

Key informant interviews - (refer to Section 3.3.2, Chapter 3 for a description of this method) served to highlight alternative interpretations of the reasons behind observed trends in governance, and to understand the broader political context within which adaptive co-management was being implemented. Key informants outside of the community included: municipal managers, private sector partners, local economic development officers, tourism officers, development and planning managers, members of farming co-operatives, community development officers, forestry officers, project managers, and consultants involved in the implementation of the initiatives.

Focus group workshops – (refer to Section 3.3.1, Chapter 3 for a description of this method) were used for monitoring activities, which took the form of rating systems that were administered during focus group workshops. The key variables identified for social capital, adaptive capacity, self-organisation and adaptive governance in Section 4.2 were converted into ‘outcome indicators’ using simple statements in the language of each community concerned (Table 4.1). In some cases these outcome indicators revealed outcomes for more than one attribute. For example the statement *“All actors, from outside and inside the community, listen to each other and are willing to change what they are doing in response”* had implications for adaptive capacity, self-organisation and adaptive governance (Table 4.1). This was unavoidable because although in theory it makes sense to divide the world

into attributes, key variables and outcome indicators, in reality these features are tightly coupled in social-ecological systems. The statements were rated four times during the monitoring period at each site (Except for Riemvasmaak, where indicators were rated three times), each corresponding to a monitoring event. For each statement, a rating of 1 (minimum, strongly disagree) to 5 (maximum, strongly agree) was agreed upon by the group, and an explanation was provided. An action that could be taken by the participants to improve the situation (where necessary and if deemed appropriate) was then identified by participants that suited the local context (refer to Table 3.2, Chapter 3 for an example of the monitoring tool that was used).

Decision making bodies used the statements in Table 4.1 to evaluate changes over the preceding months. The group divided into smaller groups with mixed gender and age classes wherever possible (Plate 4.1), and then reported back to the whole group on ratings applied to each statement (Plates 4.2 – 4.4). Debates then ensued over the appropriate rating for a given statement within the larger group. An important goal of the monitoring exercises was to elicit and discuss points of contention, and to grapple with differing interpretations of how far we've come. The statements were necessarily broad because one of the core goals was to generate discussion and air different perspectives.

The actions, identified after a rating and explanation had been given for an outcome indicator, then became the way forward at the end of a meeting. At the start of the next monitoring meeting the way forward was revisited and discussions took place about whether or not the actions that were identified previously had been taken. This capacity to self-organize was an important indicator of the ability of decision making bodies to adapt to feedbacks through monitoring (see Table 4.1).

Table 4.1: Key variables and outcome indicators for collaborative governance monitoring (Adapted from Pretty 2003, Armitage 2005, Olsson *et al.* 2004a; Dietz *et al.* 2003)

Attribute	Key variable	Outcome indicator
Social Capital	Trust building	<i>Trust building is taking place between the groups involved in collaborative decision making</i> - Decision making is perceived as open and fair. Information is shared and understood by all participants.
	Common rules and norms	See „Rule compliance’ (Adaptive governance, below)
	There are groups of common interest	<i>There is a common interest and shared vision</i> - Participants jointly identify and agree on the problems to be solved, and what the future should look like. It is clear to all participants why a decision making body is needed. Participants agree on what the major problems are, and what the benefits might be of resolving these problems.
	Financial and capacity support from higher levels	<i>A long term investment has been made</i> - The state or its partners are committed to making a substantial and long-term financial investment in the project. Long term skills and leadership development programmes are in place, and planning and decision making support is offered.
	Security of tenure over the resources of concern	<i>Security of access to resources</i> - There is long term security of access to resources. The decision making body is confident that they are/will be able to prevent outsiders from using the resources.
	Economic or other incentives for collective action	<i>Incentives</i> : People who contribute more are rewarded, and people who loose ways of earning a living because of the project should be compensated.

Attribute	Key variable	Outcome indicator
Adaptive capacity	Willingness to learn from mistakes	<i>All actors, from outside and inside the community, listen to each other and are willing to change what they are doing in response</i> - The organization or committee involved in initiative is made up of people from the community and from outside the community. These actors respect one another and listen to each others points of view.
	Willingness to engage in collaborative decision making	<i>All participants are willing to engage in collaborative learning and decision making</i> - Participants recognize the value of sharing information between actors. <u>Experts</u> are willing to learn from resource users, and resource users are open to alternative ways of doing things. The project is viewed as a learning process by everyone involved.
	Willingness to accept or the existence of a diversity of institutions	<i>Diversity of institutions</i> - Participants understand that it is unlikely that one institution will be able to manage the entire ecosystem. While a broad institution should be established to provide vision and overall coordination, members of this institution are aware that smaller groups may be formed to deal with specific issues.
	Maintaining options for adaptation (eg diversity of ecosystems, livelihoods, institutions etc)	<i>Maintaining options</i> - Projects can bring a lot of benefits, but they can't solve all the problems. For example, it should be understood that not everyone can be employed on the project. People understand this, and are continuing doing their work as usual. Over time the projects will provide some new opportunities
Self-organisation	Enabling legislation is in place, is accessible and is understood	<i>Enabling legislation</i> - Legislation is in place that allows people to form legal entities to manage natural resources. Project participants have access to and an understanding of the legislation.
	Funds are available for adaptive management	See <u>A long term investment has been made</u> (Social Capital, above)

Attribute	Key variable	Outcome indicator
Self-organisation	Information flow and social networks	<i>Networks are established that connect the local decision making body with other institutions- Outside partners, such as government officials, researchers and NGO's are involved and are willing to devolve decision making powers. Other, relevant, local decision making bodies are consulted and included in decision making. The roles of these different actors are clearly defined.</i>
	Various sources of information are combined for sense making	<i>Information flow - There is good communication between everyone involved. People are informed about what is happening, and their views and opinions are listened to</i>
	Arenas of collaborative learning	<i>See „All actors, from outside and inside the community, listen to each other and are willing to change what they are doing in response’ (Adaptive capacity, above) and „All participants are willing to engage in collaborative learning and decision making’ (Adaptive capacity, above)</i>
	Leadership	<i>Leadership is effective and is recognized - The leaders of the initiative care about more than just their own interests. The leaders are trusted and acknowledged by all actors</i>
Preconditions for adaptive governance	Access to accurate and relevant knowledge/information	<i>Combination of <u>Enabling legislation</u>’ (Self-organisation) and <u>Networks are established that connect the local decision making body with other institutions</u>’ (Self-organisation)</i>
	Conflict resolution mechanisms	<i>Conflict resolution mechanisms are in place – Participants are aware that there will be conflict. The decision making body is prepared for this, and solves problems before they become very serious. People are kept informed, and their complaints and problems are listened to.</i>

Attribute	Key variable	Outcome indicator
Preconditions for adaptive governance	Compliance with rules and regulations	<i>Rule compliance</i> - There is a management plan and rules for the use of natural resources, especially those that people depend on for their livelihoods. Resource users respect and adhere to the rules.
	Being prepared for change	<i>Being prepared for change</i> – a combination of <i>All actors, from outside and inside the community, listen to each other and are willing to change what they are doing in response</i> ’ (Adaptive capacity, above), and <i>Conflict resolution mechanisms are in place</i> ’ (Adaptive governance)

Government officials, consultants and project managers were always invited to attend the workshops, and in some cases they did attend. At times this led to some inhibition on the part the community members however, who were unwilling to speak about conflicts or grievances, and at times felt out of place raising opinions amongst people who they perceived to be more knowledgeable than themselves. Therefore, the monitoring exercises were coupled with key informant interviews with consultants and government officials involved in each initiative (as discussed previously). This was deemed more effective and desirable by most parties.

The *tool* developed for collaborative governance monitoring was included in the monitoring toolkit that was developed for participants during the research process (refer to Section 3.3, Chapter 3).

4.3.2 Data analysis

Since outcomes, rather than processes, are the key focus of this chapter (Figure 1.3, Chapter 1) it was necessary to develop data analysis techniques that would allow inferences regarding the *extent* of the change that was observed in key variables, and therefore system attributes such as social capital, adaptive capacity, self-organisation and adaptive governance. Data analysis in this chapter therefore differs from Chapter 3, and involved a number of steps:

Step 1: Determining positive or negative change in key variables (refer to Table 4.2)

Where the first and the final rating for an outcome indicator were equal, a score of 0 was attached to the variable, indicating no change. Where the final rating was higher than the initial rating, a score of 1 was assigned. Where the final rating was less than the initial rating, a score of -1 was assigned, indicating negative change.

Total scores for each key variable (TS_v) across sites were then calculated as follows:

$$TS_v = \sum S_{s1v1} \dots S_{snv1}$$

Where TS_v is the total score (TS) for a variable (v) and S_{s1v1} is the score (S) for key variable 1(v1) at site 1(s1) and n is the number of sites.

Step 2: Determining positive or negative change in system attributes

Total scores for each system attribute (TS_{sa}) in each site were calculated as follows:

$$TS_{sas1} = \sum S_{s1v1} \dots S_{s1vn}$$

Where TS_{sas1} is the total score (TS) for a system attribute (sa) in site 1 (s1) and S_{s1v1} is the score (S) at site 1 (s1) for key variable 1(v1) and n is the number of key variables relevant to a specific attribute (for example there are 6 variables relevant to social capital, and 4 relevant to adaptive capacity, refer to Tables 4.1 and 4.2).

A *percentage increase* or decrease was then calculated for *each site* as follows:

$$\% \text{ increase} = TS_{sa} / T_{max} * 100$$

Where TS_{sa} is the total score (TS) for a system attribute (sa) and T_{max} is the maximum possible score obtainable for that system attribute.

Furthermore, a *percentage increase* or decrease for each system attribute over all sites was calculated as follows:

$$\% \text{ increase} = \sum \% \text{ increase} / n$$

Where n = number of sites

Step 3: The nature of change in each site

The above data analysis techniques do not give an indication of the ‘quantity’ of a particular attribute in the system. For example, if a site provided a rating of 1 out of a possible 5 for an indicator in the first monitoring event, and provided a rating of 2 in the final monitoring event, according to the above analysis, a positive change would be identified, but the fact

that the indicator is low in that site would not be discerned. The nature of change in each site was therefore determined by focussing on the actual ratings applied to indicators.

The nature of change was calculated by first defining the maximum possible rating (R_{max}) obtainable during a single monitoring exercise for a given system attribute. For example, the maximum rating for any indicator was 5, and because there are 6 variables relevant to social capital, the R_{max} for that attribute was 30. The R_{max} for all attributes was calculated as follows:

$$R_{max} = N_v * 5$$

Where N_v is the number (N) of key variables (v) relevant to each system attribute.

The sum of the initial and final ratings for each Sa as a percentage of the R_{max} was calculated for comparison as follows:

$$Sa_{initial} = (\sum R_{v1initial} \dots R_{vninitial}) / R_{max} * 100 \quad \text{and}$$

$$Sa_{final} = (\sum R_{v1final} \dots R_{vnfinal}) / R_{max} * 100$$

Where $R_{v1initial}$ was the rating attached to the first key variable of a total of n key variables for a specific attribute at the first monitoring event while $R_{v1final}$ was the rating attached to the first key variable of a total of n key variables for a specific attribute at the last monitoring event.

The percentage values of the initial and final monitoring events thus obtained were used to develop radar graphs using Microsoft Excel to illustrate change in system attributes simultaneously in each site, where the axes represented a range from 0 to 100 % of the R_{max} .

4.4 Results

4.4.1 Change in key variables

Across all sites, negative trends were reported for support from higher levels, maintaining options for adaptation, access to and an understanding of enabling legislation, the presence of long term funding support for management, and access to accurate information for decision making (Table 4.2). Overall positive trends were reported for the development of common rules and norms, common interest and a shared understanding of environmental problems, the willingness of stakeholders to learn from mistakes and engage in

collaborative decision making, conflict resolution and compliance with rules and regulations (Table 4.2). The results for each system attribute are discussed in turn below.

Table 4.2: Change in key variables and system attributes (Numbers refer to scores calculated using equations presented in Section 4.3.1)

System attribute	Key variable	Machu-beni	Mkhuze	Nqabara	Riemvas-maak	Total score
Social Capital	Trust building	1	-1	1	0	1
	Common rules/norms	0	1	1	1	3
	Common interest	1	1	1	1	4
	Support from above	0	-1	1	-1	-1
	Tenure security	0	1	0	-1	0
	Incentives	1	1	1	0	3
	Total score	3/6	2/6	5/6	0/6	10/24
	Percentage change	+50 %	+33 %	+83 %	0 %	+42 %
	Willingness to learn	0	0	1	1	2
	Collaborative decision making	1	-1	1	1	2
Adaptive capacity	Diversity of institutions	-1	1	1	-1	0
	Maintaining options	0	-1	1	-1	-1
	Total score	0/4	-1/4	4/4	0/4	3/16
	Percentage change	0 %	-25 %	+100 %	0 %	+19 %

Self organ- isation	Enabling legislation	0	0	-1	-1	-2
	Funding	0	-1	1	-1	-1
	Social networks/info flow	0	0	1	-1	0
	Arenas for collaborative learning	-1	1	0	0	0
	Leadership	1	1	1	0	3
	Total score	0/5	1/5	2/5	-3/-5	0/20
Percentage change		0 %	20 %	40 %	-60 %	0 %
Adaptive gover- nance	Access to information	1	-1	-1	-1	-2
	Conflict resolution	1	0	1	1	3
	Compliance with rules and regulations	1	1	1	0	3
	Prepared for change	1	-1	1	0	1
	Total score	4/4	-1/-4	2/4	0/4	5/16
Percentage change		100 %	-25 %	50 %	0 %	31 %

4.4.1.1 Key variables affecting social capital

Social capital displayed the most positive overall percentage change when compared to other system attributes (Table 4.2). Across all sites, support from above in the form of cross scale networks was the only key variable for this attribute that received a negative total

score. Machubeni, where a great deal of emphasis was placed on trust building and facilitation (Section 3.4.3, Chapter 3), reported improvements in all aspects of social capital except support from above, which remained the same. Nqabara also reported overall positive trends, except with tenure security, which remained the same due in large to on-going negotiations with government departments over the management of state forests (Section 2.3.2, Chapter 2, and Section 3.4.3, Chapter 3). Mkhuze reported improvements in most aspects of social capital, although trust building and confidence in financial and capacity support from above declined during the initiative, due in large to uncertainty about future funding possibilities. Riemvasmaak, where conflicts and distrust emerged during the initiative both within the community and between the community and outside actors (Section 3.4.3, Chapter 3), reported no overall change in social capital, with negative change in confidence in support from outside actors and in tenure security.

4.4.1.2 Key variables affecting adaptive capacity

Although an overall positive percentage change of 19 % was reported for adaptive capacity (Table 4.2), this was heavily influenced by the large change of 100 % for Nqabara which was the only site that showed a positive change in this system attribute. Reasons for positive trends were the long tenureship of committee members (Nqabara, Section 3.4.3, Chapter 3), while negative trends were due an unwillingness to accept a diversity of institutions (Riemvasmaak, Section 3.4.3, Chapter 3) and the perception that community members were not maintaining options because they were placing too much store in the temporary employment opportunities offered through the poverty relief initiative, rather than seeking to take advantage of long term self-employment possibilities (Riemvasmaak and Mkhuze, See Chapter 5), as reflected in the following statements made during monitoring workshops:

The community depends too much on the project. Everyone wants to be involved, and [those who are not involved] don't understand why they can't be involved (Riemvasmaak, November 2007)

Most people know [about maintaining options], but there are those that just sit and wait for jobs to land on their laps (Machubeni, March 2007)

4.4.1.3 Key variables affecting self-organisation

Self-organisation was the only system attribute for which no overall change was reported (Table 4.2). This outcome was influenced by the particularly low score from Riemvasmaak, since no overall change was reported in Machubeni, and Mkhuze and Nqabara reported

slight improvements. Across all sites, negative trends were reported for access to and an understanding of enabling legislation (Nqabara and Riemvasmaak), and access to long term funding support (Mkhuze and Riemvasmaak). The reasons behind these trends included the fact that the initiatives were generally regarded by community members as being driven by the sub-contracted consultants, and at the municipal level there was a pervasive frustration with what one official called ‘projects that are parachuted in from national level’. The perceived danger was that neither the community nor local government had access to the necessary information, and that once the funding ended and the consultants withdrew, the information would be lost with them. Positive trends were reported for the development of effective leadership (Machubeni, Mkhuze and Nqabara).

4.4.1.4 Preconditions for adaptive governance

An overall positive percentage change of 31 % was reported in the key variables for adaptive governance (Table 4.2), but this was influenced by the large change of 100 % in Machubeni, where careful facilitation took place. Nqabara, where there was a great deal of experience within the committee, also reported positive improvements overall for this system attribute. Access to reliable information, which was inferred by combining the indicators for access to legislation and the effectiveness of social networks, both of which included aspects of access to information in their outcome indicators (Table 4.1), indicated the most negative trends (Mkhuze, Nqabara and Riemvasmaak). These negative trends were caused by different factors in the different sites. In Riemvasmaak, the negative assessment was due to growing discontent with the Development Trust, their failure to share information with the community and the lack of knowledge within the community about how to hold the Trust accountable. In Nqabara, initial assessments were high but growing frustration over the failure of the implementing agent to assist with awareness raising campaigns that would help share information within the community lead to negative ratings toward the end of the monitoring period. In Mkhuze on the other hand, initial optimism and the level of information sharing that was taking place through the PASC meetings, which were novel, lead later to a feeling that the local consultant in charge of implementation was not sharing information about negotiations for the establishment of the game reserve (Section 3.4.3, Chapter 3). In Machubeni the positive assessment was due to the training taking place for the creation of the Section 21 Company (Section 3.4.3, Chapter 3).

Conflict resolution changed positively in all sites except Mkhuze, where it stayed the same. In Mkhuze, no change was reported because the traditional leadership felt that they had always had the capacity to resolve conflicts. In Riemvasmaak, participants felt that their experience of conflicts during the land claim process had taught them how to deal with conflict:

“Riemvasmaak has had to deal with a lot of conflict resolution in the past due to the land claims and the different communities involved. The project started with a road show to explain the money issue to everyone, and this has helped a lot” (Riemvasmaak, November 2006)

In Nqabara, specific training had been provided previously to the Development Trust members:

“We have received training in conflict management and resolution. We foresee conflict between the Trust and certain people. We are ready for it. We are aware that there are problems with conflicts, but to the best of our knowledge we are dealing with them as they arise” (Nqabara, November 2006)

Although compliance with rules and regulations indicated positive change across all sites except Riemvasmaak, in every case problems with rule enforcement were identified throughout the monitoring period. Positive assessments were generally due to the development of management plans, although these management plans were not yet enforced in any of the cases by the end of the monitoring period, as reflected in the following explanations given for ratings attached to this indicator:

“Rules exist, but they are not implemented. People know what they are and are not supposed to do, but the rules are not enforced” (Riemvasmaak, November 2006)

“We have a plan and we have rules. However, the [community] rangers don’t have identity cards so people don’t believe them. The rules are not signed by DWAF [Department of Water Affairs and Forestry] and so are not seen as legitimate. Some people survive by cutting wood [to sell], so it is difficult to tell them that they can’t do that” (Nqabara, November 2006)

“Things have not changed, some people are aware of the rules, others aren’t. The major challenge is the support from the traditional leaders, if they won’t support the rules then we can’t enforce them (Machubeni, March 2007, prior to the creation of the Section 21 Company that included traditional leaders at all levels, see Section 3.4.3, Chapter 3)

4.4.2 The nature of change in each site

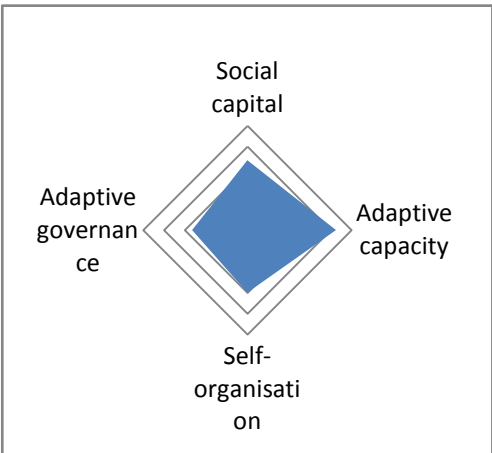
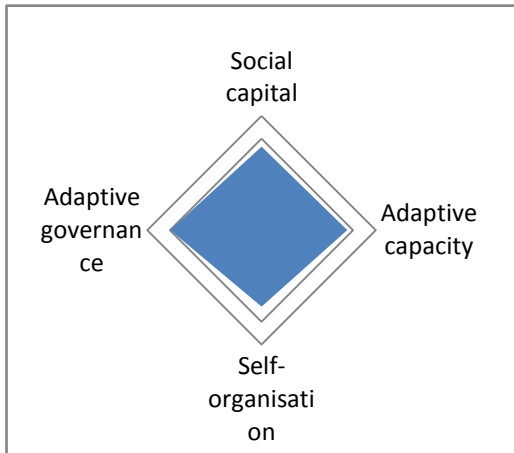
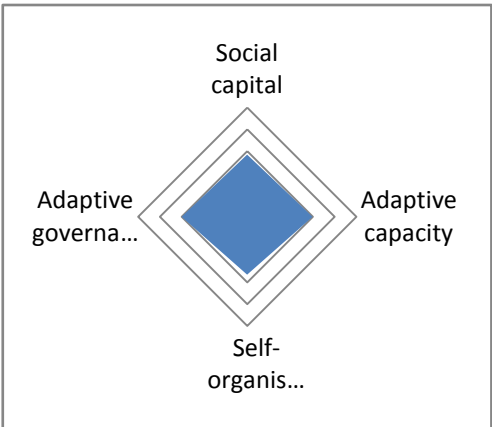
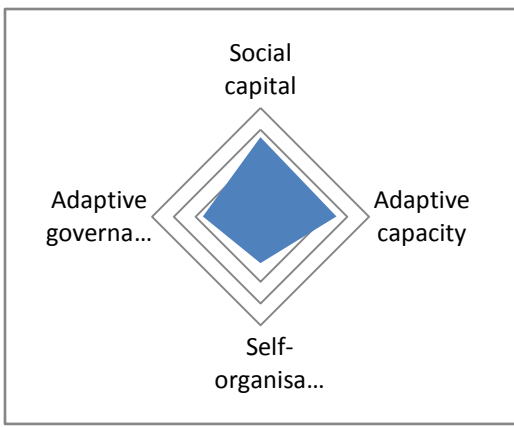
The radar graphs presented in Table 4.3 reflect the actual ratings applied to indicators (see Section 4.3.2), rather than the scores presented in Table 4.2, and therefore indicate the quantity of a particular attribute in the system relative to other attributes and other sites.

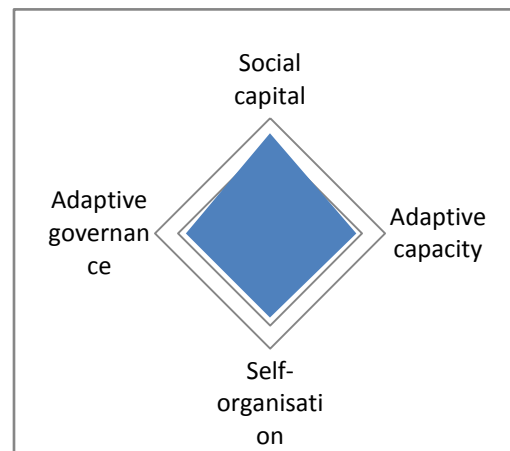
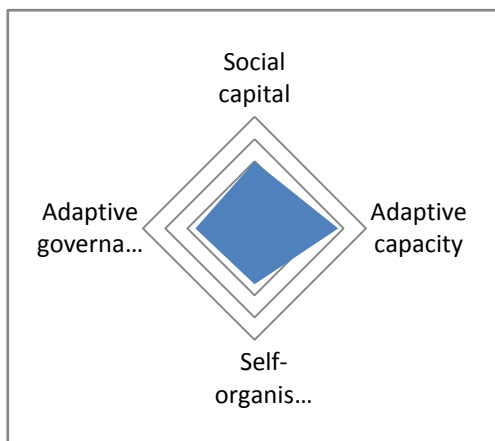
Machubeni and Nqabara displayed similar patterns of accumulation in the amount of social capital, adaptive capacity, self-organisation and pre-requisites for adaptive governance in the early and later stages of the initiatives (Table 4.3). In both sites, adaptive capacity was given the highest ratings initially, potentially because the key variables that were used to monitor this attribute referred largely to the 'willingness' of stakeholders to learn, to engage in collaborative decision making and to accept a diversity of institutions. In the later stages however all other attributes had increased. In Machubeni the pre-requisites for adaptive governance had increased most dramatically, whilst in Nqabara an increase in all attributes was indicated.

Self-organisation was lowest in Mkhuze and Riemvasmaak. In Mkhuze, conservative ratings were given to all variables in the initial stages, although the ratings attached to variables relevant to social capital and adaptive capacity did increase during the later stages. This graph provides a good example of why it is worthwhile to consider 'positive or negative' change in variables (Table 4.2), alongside the actual ratings given to those variables (Table 4.3). Although adaptive capacity was shown to have declined in Table 4.2, the actual ratings given to the variables for this attribute were on average higher than, for example, self-organisation, but this is not reflected in Table 4.2.

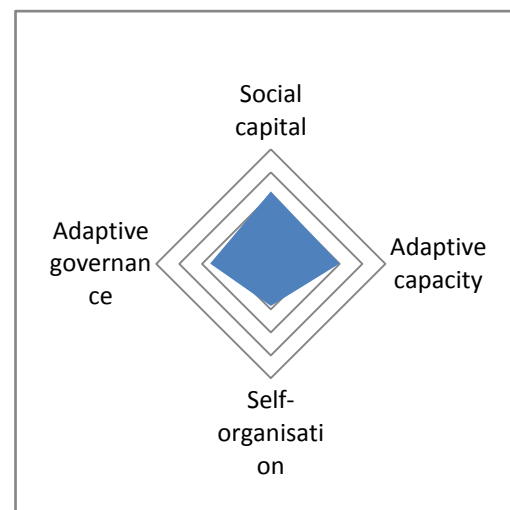
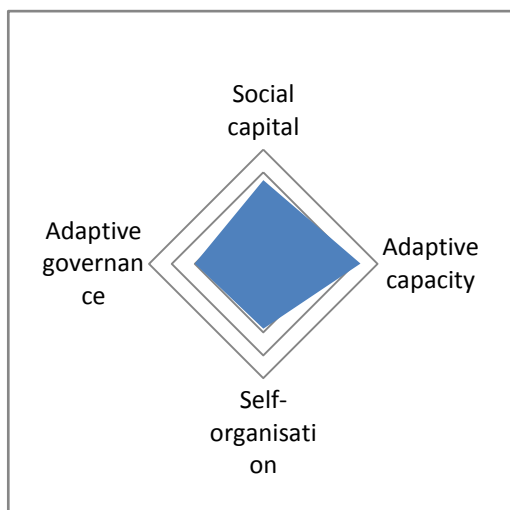
In Riemvasmaak, unlike the other sites, ratings attached to key variables were generally higher in the initial stages, and indeed ratings attached to all system attributes were on average lower in the later stages (Table 4.3). Particularly low ratings were given to the variables affecting self organisation (see also Table 4.2).

Table 4.3: The nature of change in each case study. Calculated as the sum of the ratings applied to variables relevant to each system attribute, divided by the maximum possible ratings that could have been assigned to those variables. Axes represent a range from 0 to 100 %

Case study	Early stage system attributes	Late stage system attributes	Relationship to process
Machubeni			Implementation process characterised by careful facilitation, social learning and institutional innovation (Chapter 3).
			

Nqabara

Implementation process characterised by long term facilitation and long term tenureship of committee members, adaptation to challenges and social learning (Chapter 3).

**Riemvas-
maak**

Implementation process characterised by conflict and a lack of impartial facilitation or innovation (Chapter 3).

4.4.3 The rate of change

Tables 4.2 and 4.3 indicate differences in system attributes only between the first and the last monitoring events. However, the rate with which the key variables for each attribute changed over time varied significantly, both between variables, and between sites. Figures 4.1 – 4.4 illustrate the rapidity with which the variables that demonstrated the most obvious changes across all sites fluctuated over time and between sites during the four monitoring events.

Figure 4.1 indicates that key fluctuations in the existence of groups of common interest are masked by ‘before and after’ measures; Machubeni and Mkhuze received positive scores for the existence of a common interest (Table 4.2), for example, but this masks the fact that common interest was at one stage very high in both sites due to the optimism that surrounded early discussions about the formation of legal entities. In Machubeni, this indicator was very low a few months later due to the infighting that took place immediately prior to the formation of the Section 21 Company in that site (Section 3.4.3, Chapter 3), and in Mkhuze this optimism similarly declined following the initial optimism.

A similar situation is demonstrated in Figure 4.2, where rule compliance was reported to have changed positively, almost uniformly across sites, and yet all sites except Machubeni experienced both decreases and increases in this indicator over the monitoring period. In Nqabara, the on-going failure of DWAF to provide the Development Trust with recognised powers of rule enforcement (Section 3.4.3, Chapter 3) lead to negative ratings during the third monitoring event, but four months later, during the final monitoring exercise, dialogue had resumed between the Trust and DWAF, which resulted in optimism that the rules governing resource use would be complied with. ‘Before and after’ measures fail to demonstrate the extent of the fluctuations.

Figure 4.3 indicates that Machubeni and Nqabara experienced sustained and significant improvements in the incentives for collective action, and yet their ‘before and after’ scores indicated a similar improvement to that experienced in Mkhuze, where change was less drastic. Conversely, other outcome indicators, such as a conflict resolution (Table 4.2.), were more consistent and not subject to wide fluctuations (Figure 4.4), and this was similarly not captured using ‘before’ and ‘after’ measures.

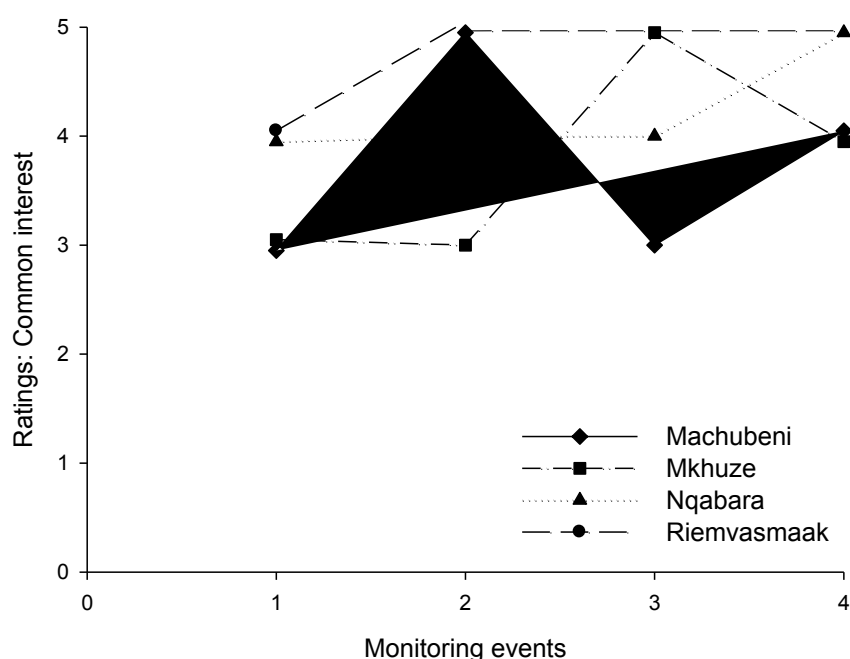


Figure 4.1: Ratings applied to the outcome indicator: "Common interest" during four consecutive monitoring events in all sites over the course of eighteen months

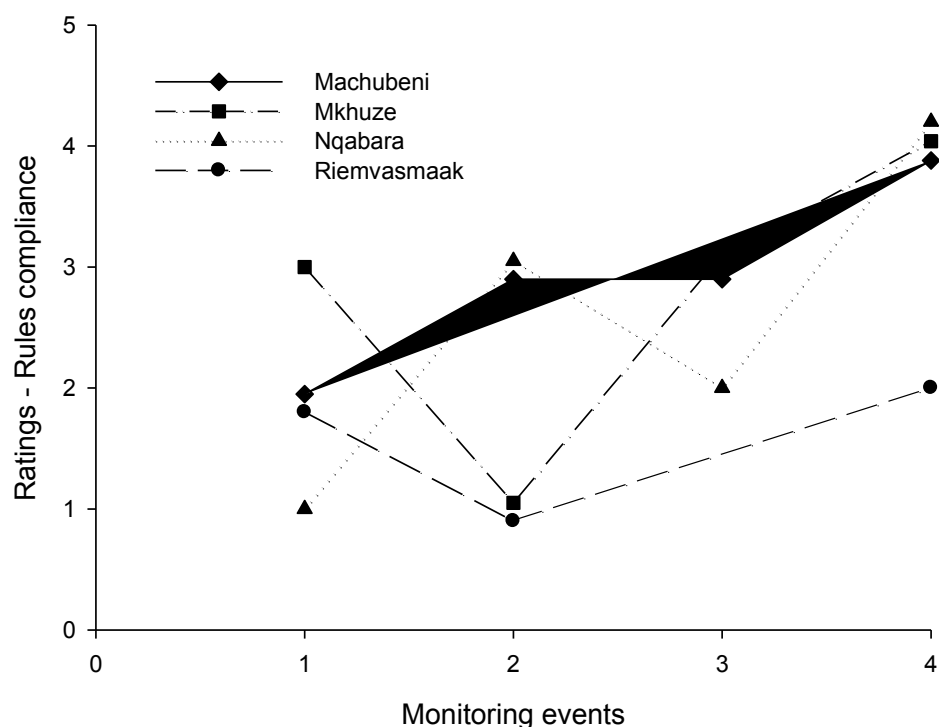


Figure 4.2: Ratings applied to the outcome indicator: "Rule compliance" during four consecutive monitoring events in all sites over the course of eighteen months

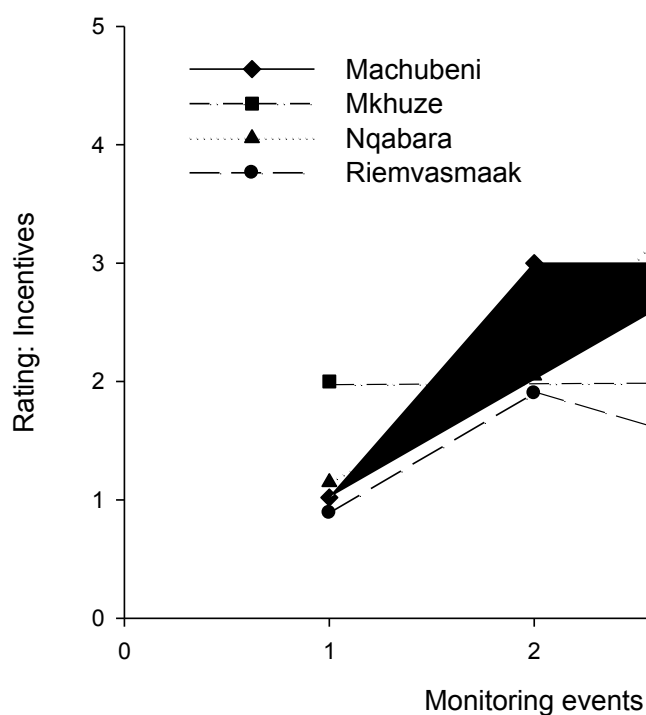


Figure 4.3: Ratings applied to the outcome indicator: “Incentives” during four consecutive monitoring events in all sites over the course of eighteen months

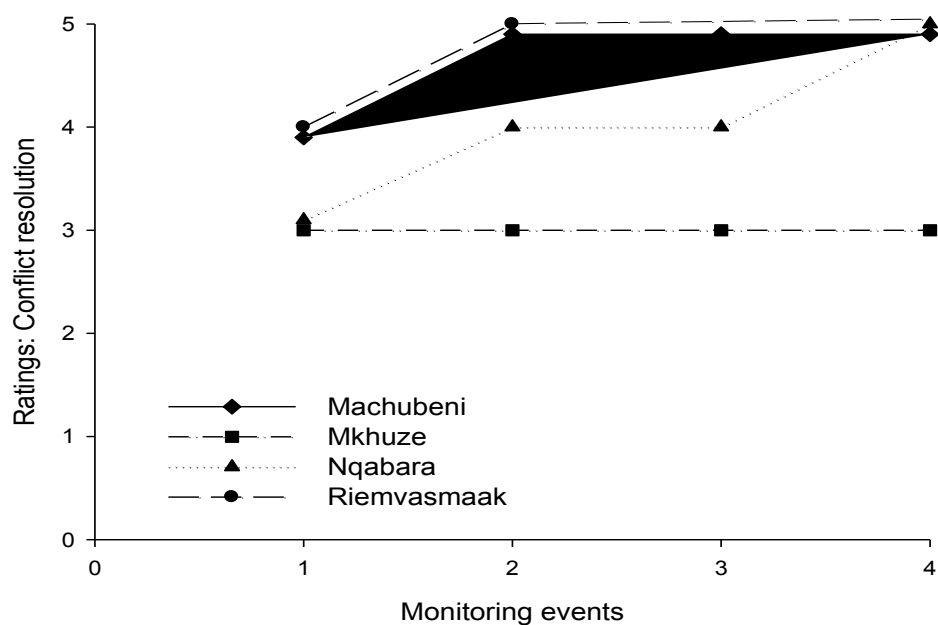


Figure 4.4: Ratings applied to the outcome indicator: “Conflict resolution” during four consecutive monitoring events in all sites over the course of eighteen months

4.5 Discussion

While phases in transformations toward adaptive governance have been described by other scholars (Olsson *et al.* 2006), this study has identified system attributes that can be monitored to track transitions through these phases. These system attributes might be considered the ‘state variables’ described by Walker *et al.* (2006) to determine whether a transformation is likely to occur. Under resource poor conditions, creating the conditions that facilitate self-organisation appears to be the major challenge facing transformations toward adaptive governance.

With the exception of self-organisation, the results of collaborative monitoring indicate that the initiatives have led to overall improvements in the system attributes that are necessary for a transformation toward adaptive governance (Tables 4.2 and 4.3). While this outcome appears to bode well for adaptive co-management under resource poor conditions, the exception of self-organisation is critical: this system attribute is fundamental to initiating and maintaining transitions in social-ecological systems (Folke *et al.* 2003; Olsson *et al.* 2004a; Olsson *et al.* 2004b; Olsson *et al.* 2006). Necessary steps toward creating conditions that are conducive to self-organisation in contexts where adaptive co-management is being implemented rather than ‘emerging’ (sensu Ruitenbeek and Cartier 2001), include securing long term funding commitments to provide a sense of confidence in current activities, raising awareness about legal options, facilitating the sharing of information within social networks and assisting communities with ensuring compliance with rules and regulations.

The observed governance outcomes of the initiatives were heavily influenced by the implementation processes and the resultant learning outcomes in each site (Table 4.3). Since adaptive governance is one of the core goals of adaptive co-management (Olsson *et al.* 2006), these findings support the argument made in Chapter 1 (Figure 1.3) that initiating transitions toward adaptive co-management in general, and adaptive governance in particular, is heavily reliant on the social learning processes described in Chapter 3.

In addition, the results presented here point to the need for far greater emphasis on the social-ecological context in which transitions toward adaptive governance play out. ‘New institutionalist’ interpretations of the governance outcomes of initiatives, particularly in customary common property institutions, stress the role played by existing institutional structures and their underlying values in determining observed outcomes (Clarke *et al.* 2006; Paavola 2006; Agrawal and Chhatre 2007). For example, the strong position of the

traditional leaders in Mkhuze described in Chapter 2 influenced the space available for institutional innovation described in Chapter 3, and therefore the outcomes that were possible for the system attributes necessary for adaptive governance in this chapter (Figure 1.4, Chapter 1), as evidenced by the negative score received for the key variable of willingness to engage in collaborative decision making and the positive scores recorded for tenure security, common rules, norms and interests (Table 4.2).

Efforts to evaluate governance have been criticized for a heavy emphasis on notions of the linear development of institutions, rather than considering context, history and political economy (Mehta *et al.* 1999). An emphasis on transitions in social-ecological systems, and the associated implication that monitoring should track ‘improvements’ over time, faces similar challenges. Indeed, in this study changes in key variables were neither linear through time nor uniform across sites (Figures 4.1 – 4.4). Contextual issues provided crucial information need to understand these differences. For example the strong emphasis on facilitation in Machubeni, and the long tenureship of the Development Trust in Nqabara, and conversely the lack of these two factors in Riemvasmaak, help explain observed variation between the case studies, despite the initiatives following the identical collaborative process described in Section 3.4.1 (Chapter 3).

However, the theoretical literature offers an additional explanation for the observed trends in Riemvasmaak. The development of social capital can have potentially negative consequences, such as coercion, corruption and capture by local elites (Pretty 2003). The different forms of social capital were outlined in the introduction. While bonding ties are essential for collective action and trust, they may negatively impact on collaborative efforts if they are too tightly connected and lead to a reduction in wider social trust and interaction, preventing the flow of information, increasing inequality and therefore undermining collective action (Pelling and High 2005). This dynamic was evident in Riemvasmaak, where community members tended to be distrustful of outsiders, and even within the community two separate ‘communities’ have formed along ethnic lines (Chapters 2 and 3). Indeed, Riemvasmaak was the only site that reported negative trends in the flow of information within social networks, and in social capital in general. The creation of these bonding ties is perhaps due in part to the community’s past experience of forced removal, and the subsequent battle to return to the land (Chapter 2). This supports the work of other scholars who have suggested that social capital manifests in context specific ways, often

tightly connected with the ways in which power is distributed and experienced (Mansuri and Rao 2004).

The positive change observed in social capital in all sites other than Riemvasmaak (Table 4.2) may bode well for the long term development of adaptive capacity. Adaptation is a social process that is determined at least in part by the ability of people to mobilise collectively around a common problem (Adger 2003); social capital is a necessary precondition for collective action, and therefore adaptive capacity (Armitage 2005). Scholars have suggested that adaptive capacity is a slow-changing attribute that is dependant upon experiential learning (Berkes *et al.* 2000). Anticipating positive change in both social capital and adaptive capacity simultaneously may be overly optimistic. Indeed, initiatives aimed at initialising transitions toward adaptive governance may do well to focus initial attention on building social capital and the conditions necessary to enable self-organisation, rather than focussing on adaptive capacity as an initial outcome.

The consistent failure of local government to perform the bridging role expected of it in multi level governance networks (Olsson *et al.* 2004b) was raised frequently during collaborative monitoring and reflected in the low scores given to information flow in social networks, support from above and access to relevant information (Table 4.2). One of the reasons for this failure was the fact that the initiatives were funded by national government, spear headed by an international development agency, and implemented by a local consultant. Local government had no clear role in the implementation phases of the initiatives, other than being invited to PASC meetings as one of many stakeholders. Government officers identified a lack of resources and training to engage in the complex social facilitation process required for adaptive governance (see Section 3.4.2, Chapter 3). The involvement of these ‘middlemen’ is critical in the long term, but is only likely to be effective if local government officials are interested, and receive the required financial and capacity support to carry out their new mandate for environmental governance (Andersson *et al.* 2006).

4.5.1 Methodological observations

The characteristics of collaborative monitoring processes, such as capacity building, improving cooperation and social capital, and awareness raising (Becker *et al.* 2005; Andrianandrasana *et al.* 2005; Uychiaoco *et al.* 2005; Poulsen and Luanglath 2005), pose challenges when attempting to explain the reasons behind observed changes in governance. The fact that collaborative monitoring and evaluation builds capacity for

adaptive governance makes it difficult to differentiate those outcomes that are a direct result of an initiative, from those that are a result of monitoring. For example, collaborative monitoring and the accompanying facilitation of the monitoring process might be one of the factors that lead to the positive assessment of indicators such as trust building and the willingness to learn in this study.

However, definitions of ‘good research’ can no longer rest solely on the foundations of traditional scientific rationality. In Africa, Kates and Dasgupta (2007) have identified a scientific ‘responsibility’ to advance sustainable development, and in Southern Africa in particular, Burns and Weaver (2008) have called for flexible research approaches that are co-developed with participants and that deploy knowledge that is appropriate to the context. Indeed, sustainability in resource management is subject to a continual value-dependant, political and social negotiation process in which the goal is increasing human capacity to solve problems and adapt to changing conditions (Sayer and Campbell 2004). Scientists are therefore compelled to navigate trade-offs between confronting uncertainty in complex systems and therefore allowing for more participatory research approaches, and simple data, which might lend its self more readily to defence in scientific arenas, but which is not necessarily ‘more’ accurate. These trade offs are discussed in more depth in Chapter 6.

Data analysis exposed further methodological challenges for monitoring transitions toward adaptive governance. Firstly, interpreting ‘before’ and ‘after’ measures tended to mask variation over time, the extent of the change, and the rate of change over time. Adaptive co-management is an on-going process (Carlsson and Berkes 2005) rather than an initiative with clear inputs and identifiable outputs. This highlights the value of including multiple monitoring events, rather than a single evaluation phase at the end of an initiative, and of conducting this monitoring in a number of different sites.

Variation in the rate of change in key variables highlights the need to match the tempo of monitoring activities to the rate of change. However, although this is obviously critical, it is also problematic in collaborative monitoring because of the need to set dates for future meetings to ensure attendance. This requirement makes collaborative monitoring systems less adaptable and less likely to identify stochastic events as they occur, and points to the need to be flexible about dates for monitoring intervals.

4.6 Conclusions

This chapter has identified a number of system attributes that can be used to monitor the governance outcomes of transitions toward adaptive co-management. Monitoring methods were simple, and made the conceptual basis for monitoring governance accessible to participants, while at the same time allowing the researcher to test the conceptual underpinnings of adaptive co-management.

The critical success factors that influenced the governance outcomes in the case studies appear to be tightly coupled with the process of implementation described in Chapter 3, particularly careful social facilitation and the length of time that the individuals concerned have been involved in collaborative decision making. Across all system attributes, variables that undermined the governance outcomes in the case studies, and therefore factors requiring greater attention in efforts to initiate adaptive co-management, include community perceptions of support from outside agencies, access to long term funding for adaptive management, and access to reliable information.

Transitions toward adaptive co-management are fundamentally founded on the concept of cross-scale linkages, but the cases that are used to illustrate how this might work are almost invariably drawn from developed country experiences (see for example Olsson *et al.* 2006). Under resource poor conditions, especially in cases where resource users have experienced significant and sustained outside interference into natural resource management, cross scale institutional linkages, far from constituting the greatest promise for effective ecosystem governance as the proponents of adaptive co-management suggest, rather constitute the fundamental challenge faced when attempting to initialise a transition under resource poor conditions. Creating a supportive environment for developing the self-organising capabilities of role players in adaptive co-management is critical, and should include raising awareness about legal options, securing long term funding commitments to provide a sense of confidence in current activities, actively creating arenas for learning, sharing information and fostering effective local leadership.



Plate 4.1: Focus group discussions during governance monitoring in Machubeni



Plate 4.2: Group report back during governance monitoring in Ngabara



Plate 4.3: The chairperson of the Riemvasmaak Development Trust giving a group report back during governance monitoring



Plate 4.4: Group report back during governance monitoring in Riemvasmaak

Chapter 5: MONITORING LIVELIHOOD OUTCOMES

This chapter is about the livelihood outcomes of the efforts to initialise transitions toward adaptive co-management explored throughout this thesis. These livelihood outcomes are of direct relevance for the long term learning processes and governance outcomes discussed in Chapters 3 and 4 because poverty can manifest as an inability to assert rights and take part in governance (Sen 1999), and livelihood enhancement holds the potential to provide economic incentives for self-organisation, regarded as so critical during transitions toward adaptive co-management.

5.1 Introduction

Adaptive co-management is situated within global environment and development discourses that emphasise, amongst others, improving the livelihoods of the rural poor through community benefits from conservation (Carney 1998a; Berkes 2004; Fabricius 2004; Jones and Carswell 2004; Carlsson and Berkes 2005; Taylor 2007). It is therefore assumed that the approach can be evaluated based, at least in part, on its ability to promote ecologically sustainable livelihood outcomes for local stakeholders (Turner 2004; Plummer and Armitage 2007b). Livelihood outcomes such as income generation, vulnerability reduction, increased well-being and food security (DFID 1999) are expected to be achieved in multiple ways, including the creation of economic opportunities, building various forms of capital and reducing vulnerability to shocks and surprises through the creation of alternative opportunities (Jones 2004). Indeed, transformability in social-ecological systems has been described as the development of a fundamentally new way of making a living' (Walker *et al.* 2006). However, evidence of improvements in livelihoods as a result of interventions is proving elusive (Frost *et al.* 2007). The assumption that transitions toward adaptive co-management will lead to improved livelihood outcomes has not been explicitly tested, and since baseline assessments are uncommon prior to implementation, our understanding of the outcomes for rural households is qualitative and often based on anecdotal evidence (Arntzen *et al.* 2007).

Monitoring and evaluating the extent to which livelihoods are enhanced as an outcome of adaptive co-management interventions is therefore crucial (Ashley and Carney 1999; Plummer and Armitage 2007b). While the collaborative monitoring approach explored in

Chapters 3 and 4 was focussed on a small group of decision makers within communities involved in adaptive co-management, this chapter makes use of more inclusive sampling procedures and explores perceptions and outcomes at the household level as a means to come to terms with the incentives for participation and collective action (Pretty 2003), a variable considered vital to transitions toward adaptive co-management and raised in the previous chapter.

In South Africa, expanded public works programmes are receiving increasing attention as means to promote the production of ecosystem services, encourage payments for these ecosystem services, while at the same time alleviating poverty (Turpie 2004; Turpie *et al.* 2008). While evidence suggests that this model has demonstrably improved the production of ecosystem services such as water (Marais and Wannenburgh 2008; Blanchard and Holmes 2008), the long term outcomes for households are less well understood. All of the case studies explored here received funding through DEAT's Social Responsibility Program (SRP, Sections 2.2 and 2.3, Chapter 2) focuses on using government expenditure to provide employment opportunities and skills development to the unemployed (see <http://www.deatsrp.co.za> for a description). This program emphasises labour-based methods as a means to achieve the objectives of initiatives, and therefore promotes an approach to the creation of livelihood opportunities that emphasises extensive but temporary and low paid employment at the local level. Ninety percent of temporary jobs created through an initiative must go to local people, and 60 percent of the temporary and permanent jobs should be reserved for women. Ten percent of the budget for temporary employment is reserved for training, and this training is expected to enhance the ability of the trainees to eventually either operate the funded project or to find other available employment (see the official website: www.environment.gov.za).

The objective of this chapter is to identify the livelihood outcomes for households involved in adaptive co-management, and to explore the ways in which these outcomes can be monitored. Key questions toward achieving this goal included:

- i. What measures are appropriate for monitoring the livelihood outcomes of adaptive co-management?
- ii. What methods can be used to collaboratively monitor livelihood outcomes?
- iii. What are the livelihood outcomes for households involved in the SRP initiatives, and how are these likely to influence transitions toward adaptive co-management?

The chapter begins by outlining the theoretical basis for monitoring the livelihood outcomes of adaptive co-management, drawing attention to the synergies between complexity thinking, resilience and rural livelihood approaches. The methods used to monitor livelihood outcomes in the case studies are then discussed. This is followed by the results of the research, specifically focussing on livelihood diversity and income before and during the initiatives, as well as future changes anticipated by respondents. The formal training received during the initiatives is discussed, as are the ways in which households planned to use these skills in the future. This is followed by a general discussion and a reflection on the effectiveness of the approach used.

5.2 Theoretical basis for monitoring livelihood outcomes

The livelihood approach (*sensu* Carney 1998b) offers an analytical structure and a means to identify the parameters for monitoring and evaluating the socio-economic impacts of interventions (Ashley and Hussein 2000; Campbell *et al.* 2001b), and has been proposed as a useful organising framework to understand the opportunities and the constraints that influence livelihood outcomes as a result of adaptive co-management (Plummer and Armitage 2007b). However, monitoring and evaluating changes in rural livelihoods is problematic because of the need to focus on the ‘non-income’ aspects of livelihoods, such as activities and assets (Ashley and Carney 1999). As a result, traditional livelihood assessment approaches have tended to depend on complicated indices (see for example Lindenberg 2002) that exclude community involvement in the identification of indicators that are meaningful to them and relevant to the local context. Indicator selection for monitoring and evaluating rural livelihoods should form part of a negotiation process that involves local stakeholders (Ashley and Carney 1999). In this chapter an approach to monitoring livelihoods is presented that seeks to combine the strengths of the livelihoods approach with insights from complexity thinking and social learning (Sections 1.2.1 and 1.2.3, Chapter 1).

The sustainable livelihoods approach combines a focus on assets, referred to as ‘capital’, with a focus on institutions and policies, referred to as the ‘vulnerability context’. The different forms of capital (natural, physical, human, financial and social) form the basis on which people construct their livelihoods, while the vulnerability context refers to the structures and processes that define people’s livelihood options and their ability to mobilise these assets to meet livelihood objectives (Carney 1998b).

However, the approach often fails to emphasise the adaptive nature of the cross-scale relationship between people and ecosystems, and has been widely criticised for failing to deal with issues of power and broader social relationships (Moser *et al.* 2001; Conway *et al.* 2002). Investing in diversity, as is often advocated by the proponents of sustainable livelihoods (Ellis 1998b; Ellis 2000; Ellis and Allison 2004), for example, can be interpreted as an attempt to buffer households against shocks and surprises at various scales, and thereby foster resilience (Marschke and Berkes 2006), and ‘livelihood strategies’ can be regarded as adaptations. The approach also explicitly addresses vulnerability, a corollary of resilience (Adger 2006; Nelson *et al.* 2007). The links between resilience, vulnerability and livelihood diversification are however not straightforward, as discussed in the section that follows.

5.2.1 Livelihood diversification and resilience

The lens of livelihood diversification has been identified as an important means to understand the design of community based management initiatives (Ellis and Allison 2004). When faced with uncertainty, surprise and crises, managing risk by investing in diversity is regarded as a key adaptive strategy that builds resilience in social-ecological systems (Colding *et al.* 2003; Folke and Colding 2001; Folke *et al.* 2003). Indeed, spreading risk is regarded within the resilience literature as a form of ‘insurance’ that enables systems in the re-organisation phase of an adaptive cycle to recover and persist following a disturbance (Folke *et al.* 2003).

This emphasis on diversity is equally common in the livelihoods literature, where rural people are widely considered to pursue multiple activities to secure their livelihoods (Wolmer and Scoones 2003). Livelihood diversification refers to a continual adaptive process by which rural households add new activities, maintain existing ones and drop others, in order to survive and improve their standards of living (Ellis 1998a; Ellis and Allison 2004). However, the livelihoods literature takes a slightly more nuanced view of the role of diversity in livelihood systems; people diversify their livelihoods for a range of different reasons, and Ellis (1998b) makes a distinction between diversification for reasons of necessity and diversification for reasons of choice, but highlights that there are a continuum of reasons for household livelihood diversification.

The distinction between different reasons for diversification is critical in developing world contexts, where mental models that refer to dependency, ‘downward spirals’, and crises have long governed interpretations of human-environment interactions in rural areas, particularly in Africa (see for example Raynaut 1977; FAO 1982; Wiggins 1995; Ford and

Thomas-Slayter 2001). Local people do not respond only to crises; responses to change differ according to the type of perturbation (*sensu* Berkes and Folke 1998) to which people are exposed, i.e. whether they are long-term trends or short-term disturbances (Gunderson and Holling 2002). Thus, diversification of livelihood activities may be part of an adaptive response aimed at reducing vulnerability (Niehof 2004; de Sherbinin *et al.* 2008), recently referred to as ‘transformative change’ (Nelson *et al.* 2007) or may take place as a means of coping with risk in situations that offer few alternatives (Ashley *et al.* 2003). The former is referred to as ‘pull’ diversification, whilst the latter is referred to as ‘push’ or negative diversification (Barrett *et al.* 2001). Adaptive co-management interventions are conducted in contexts where ‘push’ and ‘pull’ processes influence livelihood diversification at various scales. Therefore, although desirable from a resilience perspective, diversification is a problematic measurement of ‘success’ or ‘failure’ in interventions: the small scale of each livelihood strategy means that investment in any one option may reduce access to other options (Frost *et al.* 2007). Diversification measures must therefore be combined with a number of other measures, which are discussed in the next section.

5.2.2 Capturing diversification patterns

There are a lack of generally agreed upon conventions for the collection and analysis of data relating to diversification, or on the indicators that are best suited to capture diversification patterns (Barrett *et al.* 2001). This is especially so when attempting to reflect on current well-being and future long term capabilities, or make inferences regarding the causes of change (Carter and May 1997). Income, assets and activities are complementary measures to study livelihood diversification. However, none of these variables are complete in themselves, and therefore multiple indicators are necessary to validate and test inferences regarding the causes of change between them (Barrett *et al.* 2001).

Income is of direct interest when monitoring transitions toward adaptive co-management because it allows inferences regarding household welfare (Barrett *et al.* 2001). This income might be either intra-household (for example sales of produce or self employment) or extra-household (for example wage employment in nearby centres). Diversification studies in rural Africa tend to limit the definition of diversification to extra-household income (Reardon 1997), while ignoring intra-household and other forms of diversification (Niehof 2004). Although income is an important indicator of diversification, of necessity it must be combined with measures that consider income generating opportunities that are available to

individuals and households, and the structural barriers that might enable or prevent them from taking advantage of these (Du Toit 2007). In a typology of livelihood strategies, Shackleton *et al* (2008) identify the spreading of risk through diversification as a proactive strategy that can be either supplementary, where household income is intermediate, or integrated where household income is low. Thus, by integrating household income and other background household information when monitoring livelihood diversity, inferences can potentially be made regarding positive or negative changes as a result of attempts to initialise adaptive co-management. Therefore, income monitoring should be conducted in conjunction with the income generating skills that people gain through the process, the ways in which they intend to use these skills, and the obstacles that they encounter in doing so. In addition, both extra- and intra-household diversification must be considered, since adaptive co-management presumably seeks to provide opportunities in situ, rather than encouraging out-migration at the expense of local development.

Assets offer a measure of the store of wealth, and also provide the means to create an income in many instances (Barrett *et al.* 2001). Asset-based approaches offer insight into persistent and chronic poverty that is transferred from generation to generation (Carter and Barrett 2006). However, the livelihoods approach has been criticised for focussing too heavily on the asset base (Wolmer and Scoones 2003), which has led to overly econometric measures to measure and understand livelihoods (Du Toit 2005). This has occurred at the expense of understanding the institutional context. This context determines what options are available to people, and highlights structural obstacles that either prevent or enable people to shift livelihood strategies (Wolmer and Scoones 2003; Du Toit 2007). Assets are also notoriously difficult to measure or value in remote areas, partly due to second-hand markets and the variable returns that households can expect from given assets, for example tractors and other agricultural equipment (Barrett *et al.* 2001).

Activities that have been identified in livelihood diversification studies in South Africa include: agriculture, small and micro enterprises, wage labour, claiming against the state, and claiming against community members (Carter and May 1997). All of these can be further broken down, for example agriculture includes field cultivation, home gardens and livestock ownership. Wage labour might be either temporary or permanent, and claiming against the state might be in the form of pensions, child or disability grants. This list also ignores the contribution of natural resources to rural livelihoods, which is well documented

(Shackleton *et al.* 2000b; Shackleton *et al.* 2000a; Shackleton *et al.* 2001; Campbell *et al.* 2002; Frost *et al.* 2007).

The diversity of livelihood activities is not just about the number of activities, but also about *the degree* to which households rely on a number of different activities (Ashley *et al.* 2003). Thus, monitoring the diversity of activities should be combined with a weighted measure of the most and least important activities, or people's livelihood priorities (Ashley and Hussein 2000). In order to achieve this, it is necessary to consider the question most important for what? In this study the ability to provide food for the household was used as the focus of questions regarding the degree to which households relied on specific activities. Activities can be difficult to value, and since they are independent of income, do not provide a useful measure of livelihood diversification when considered alone (Barrett *et al.* 2001). Therefore, in this study the diversity of activities, combined with the weighted measure of most and least important activities, is considered alongside household income and skills transfer as a measure of diversity and therefore resilience within households. The ways in which this approach was implemented during the research phase is discussed in the section that follows.

5.3 Methods

In keeping with the approach adopted throughout this thesis, the approach to variable and indicator selection in this portion of the study was both collaborative and theory-driven (sensu Vincent 2007b): conceptual insights were sought alongside the collaborative goals of information sharing and ensuring context sensitivity and relevance (Section 1.3.3, Chapter 1). A comparative case study focus is important in order to understand the processes and structures that enable or prevent people from shifting livelihood activities (Ellis and Allison 2004). The household is defined as a family-based co-residential unit that takes care of resource management and the primary needs of its members (Niehof 2004). Members of the household who were resident outside of the homestead but who sent remittances to the household, or received income or in-kind contributions from the household, were considered as household members.

Several variables were combined in order to capture diversification and other patterns (Barrett *et al.* 2001). Key variables and outcome indicators used to monitor these are summarised in Table 5.1. Outcome indicators for livelihood diversity and income were

assessed for the periods before (based on household recall) and during the initiatives, and also the anticipated future (based on household predictions) as a means to identify the direction of change.

Table 5.1: Key variables and outcome indicators for monitoring livelihood change

Key variables	Outcome indicators
Livelihood diversity	The number, nature and relative importance of livelihood activities before (recall) and during the initiative
Household income	Household cash income before (recall) and during the initiative
Skills transfer	The skills being transferred during initiative
Forward looking capacity	Anticipated future livelihood strategies and income
Opportunities and constraints	The ways in which individuals intended to use the skills, or the obstacles to using them

Activities were ranked by respondents in order of importance for ensuring there was enough food within households. This gave an indication of which of the activities the household could not afford to lose. Data were collected through the administration of household surveys, and analysis was conducted through a combination of statistical methods and focus group discussion, both of which are discussed below.

5.3.1 Questionnaire design

To support livelihood monitoring, a questionnaire was designed and administered in a collaborative manner in the following way: the indicators listed previously (activities, income, skills, future plans and constraints) were pre-identified based on the theoretical literature, and the specific relevance of these was then discussed at length during focus group workshops with the community decision making bodies in each study site (refer to Section 3.3, Chapter 3). Community members were engaged in identifying lists of livelihood activities and the different kinds of training being conducted in each site. The questionnaire itself was then designed by the researcher based on a combination of the theoretical literature and the insights from the workshops (Table 5.2), and introduced once again during focus group workshops. The definition of livelihood activities included any activity

that helped to provide for the basic needs of the household, including food and clothing. The definition of income included own income from businesses or the sale of produce, and also remittances from employed family members and government transfers through pensions and other grants. Income classes were generated based on the data gathered, categories eventually selected based on the distribution of data were; less than R100⁴ per month, between R100-R500 per month, between R500-R1000 per month, and over R1000 per month. Income categories over R1000 per month were not included because less than 10 percent of households earned over R1000 per month.

In all cases, the SRP initiatives were already under way when livelihood monitoring commenced. As a result, the baseline (before measures) had to be created based on recall by household members. The projected future measures were based on what households predicted they would be doing after the initiative, since the initiatives were still on-going at the close of the fieldwork phase of this study.

5.3.2 The sample

The total sample size was 232 households in four localities. The survey was targeted at individuals who were directly involved in the adaptive co-management initiative, in the form of temporary employment and training activities. In some cases, for example Nqabara (N = 33) and Mkhuze (N = 55), where the affected population was small, a 100 percent sample was conducted. In Machubeni (n = 110) and Riemvasmaak (n = 34), an approximately 50 percent sample was collected.

⁴ The exchange rate between ZAR and US\$ at the time of writing is R6.8/US\$1

Table 5.2: Contents of the household survey

Type of data collected at all sites
Background information on individual employed on initiative (age, gender, education, marital status)
Background information on household (size, age and gender composition, number of members employed outside of initiative)
Livelihood activities before (recall) and during the initiative, and the anticipated future
Most important livelihood activities before (recall) and during the initiative, and the anticipated future
Income before (recall) and during the initiative, and the anticipated future
The skills being transferred during initiative
The ways in which individuals intended using the skills, or the obstacles to using them

5.3.3 Data collection

Data were collected through random surveys of households with family members employed during the initiative in each case study or complete surveys in the case of Nqabara and Mkhuze. Household surveys, when conducted on a random basis, are a well-known technique that enables the researcher to make inferences regarding the population in question (Christiaensen *et al.*, 2001). Community lead surveys involve community members conducting the interviews and making observations (Chambers, 1992) and therefore community members were trained to conduct the surveys. Training was conducted by facilitators and the researcher, and the essential elements of the questionnaire were explained and data collectors tested their understanding of the survey during a pilot phase. This technique is useful in getting local groups involved, for example the Youth Forum volunteered to conduct the surveys in Machubeni, in exchange for survey training. Volunteers benefited by developing their translation and survey skills, while the research team gained through a random and often larger sample size that was less time consuming to collect. In all case studies, the decision making bodies were involved in on-going

discussions about indicator selection during monitoring workshops prior to the surveys being conducted. The key features of the surveys and key variables and outcome indicators for monitoring livelihoods (Tables 5.1 and 5.2) were discussed at length during four monitoring workshops in each site both before and after the surveys were conducted.

5.3.4 Data analysis

Statistical analysis

All statistical tests were performed using Statistica 7.1 for Windows (StatSoft Inc. 2005), while Microsoft Excel was used for descriptive statistics (Microsoft Office 2007). Data were tested for homogeneity of variance and normal distribution of residuals using Levene's test and the Shapiro-Wilks W test respectively. Parametric one-way ANOVAs and Tukey's HSD *post-hoc* tests were employed to test for differences in dependent variables (for example livelihood diversity) in categorical predictors such as village and income groups where data were normally distributed and variances homogenous (significance level $p \leq 0.05$). Where variances were not homogenous, the non-parametric Kruskal-Wallis ANOVA alternative was employed.

After tests for normality, t-tests for dependent samples were conducted to determine whether there was a significant difference between the diversity of activities per household before and during the initiatives, and to determine whether there was a significant difference in household income before and during the initiative (significance level $p \leq 0.05$). After testing for normality and homogeneity of variances, the Wilcoxon Matched Pairs test was employed to test whether there was a significant change in income predicted by respondents before and during the initiatives. Correlation analysis using a scatterplot was used to explore correlations between diversity and household size.

Collaborative analysis

Microsoft Excel was used to generate simple bar graphs and pie charts, which were used to present the outcomes of the survey to the decision making bodies in each community. Pre-designed 'templates' for bar graphs that could be completed by community members were also designed and tested. Where results were unexpected or confusing, discussion was encouraged to try and explain them. This process was useful in illuminating local opportunities and constraints that influenced the observed livelihood outcomes of adaptive co-management.

Assumptions and pitfalls

Surveys were conducted in winter (between May and August), and this may have influenced the types of activities that people identified as ‘most important’. Since the baseline (before) data relied on people’s memory, this might be inaccurate. Similarly, people were asked what activities they anticipated being involved in after the initiatives, and their anticipated income from these activities, and this too might have been either wishful thinking or deliberately exaggerated.

5.4 Results

5.4.1 Respondent and household profiles

Across all sites, 44 percent of respondents were male and 55 percent were female (n = 232). This reflected household demographics in the sample population, where approximately 57 percent of household members across all study sites were female. Of these, equal numbers fell between the ages of 20 - 40 and 41-60 years of age. A third of respondents identified themselves as either a widow or a spinster, however in Machubeni the percentage was much higher than in other sites, with 48 percent of respondents identifying themselves as having lost a partner. Education levels were low, with 11 percent having received no schooling whatsoever and 42 percent having some high school education. Seven percent had completed high school, and 3 percent were in possession of a tertiary qualification.

The average household size across all sites was 6.9 ± 4.9 individuals, although larger households were reported in Nqabara and Mkhuze compared with Machubeni and Riemvasmaak (Table 5.3). In all sites except Riemvasmaak household composition was skewed toward members under 19 years of age, suggesting high levels of dependency within households.

Table 5.3: Mean household size across all sites

	Mean household size
Machubeni (N = 110)	5.1±2.9
Mkhuze (N = 55)	9.6±6.0
Nqabara (N = 33)	9.7±6.0
Riemvasmaak (N = 34)	5.1±4.0
Total	6.9±4.9

Values are given as the mean ± standard deviation

Overall, 26 percent of households had at least one member of the household that was permanently employed elsewhere, not due to the SRP initiatives. This varied across sites however, with Nqabara reporting the highest levels (56 percent), followed by Machubeni (25 percent), Mkhuze (21 percent) and Riemvasmaak (12 percent). As will be discussed later, the remittances sent by these family members were not identified as amongst the most important sources of household income either before or during the initiatives (Figure 5.3).

5.4.2 Livelihood diversity

Across all sites, households engaged in up to seven livelihood activities (Table 5.4). The mean number of activities changed from 2.4 before the initiative with a mode of 3, to 2 during the initiative with a mode of 2, indicating a decline in the diversity of activities pursued. Activities most frequently abandoned during the initiatives included relying on social networks (reciprocity), small businesses, collecting wild resources, cultivated fields and home gardens (Table 5.5). After the initiative, it was anticipated that the mean number of activities would be 2.3 with a mode of 1, suggesting that in some cases households did not anticipate carrying on with activities that had been abandoned during the initiative.

Table 5.4: Total household activities before and during initiatives (n = 213)

	Before	During	Anticipated future ⁵
Mean	2.4±1.3	2.0±1.3	2.3±1.3
Max	7	7	7
Min	0	1	0
Mode	3	2	1
Frequency of mode	60	62	66

Values are given as the mean ± standard deviation

Table 5.5: Livelihood activities most frequently abandoned during the initiatives in each site⁶

Ranking	Machubeni	Mkhuze	Nqabara	Riemvasmaak
1	Collecting wild resources (100 %)	Small businesses (67 %)	Social networks (69 %)	Social networks (83 %)
2	Fields (21 %)	Fields (36 %)	Small businesses (35 %)	Social grants (45 %)
3	Small businesses (15 %)	Social grants (12 %)	Remittances (27 %)	Collecting wild resources (14 %)
4	Home gardens	Social	Fields	Small businesses

⁵ This data is included primarily to note the ways in which respondents anticipated their livelihoods changing as a result of the interventions. The data is not used for interpretive purposes because it was open to manipulation by respondents who potentially had a vested interest in describing the future in negative terms in the hope of further poverty relief funding.

⁶ Percentages refer to the percentage of households that pursued these activities before the intervention and abandoned them during the intervention

(14 %)	networks	(19 %)	(11 %)
	(10 %)		

There was a significant difference in the mean number of livelihood activities between the different case study sites (Levene's homogeneity of variances, $p = 0.002679$, $n = 213$). Nqabara reported the highest levels of livelihood diversity both before and during the initiatives, whilst Mkhuze and Riemvasmaak reported the lowest levels (Figure 5.1). All sites except Riemvasmaak anticipated being engaged in fewer activities after the initiatives than before. The overall difference in the number of activities pursued before and during the initiatives was significant in all sites and for the total sample (T-test, Table 5.6). A significant number of households anticipated a reduction in the number of activities they would engage in after the SRP initiatives (T-test, $p = 0.002319$, $n = 213$).

No significant correlation existed between household size and the diversity of activities ($r = 0.36568$, $p > 0.1$). In addition, no significant difference existed in the diversity of activities between income classes (ANOVA, $p = 0.16760$), or in household size between income classes (Kruskal Wallis ANOVA, $p = 0.2002$).

Social grants, small businesses and home gardens were the most important livelihood activities for the majority of households before the initiatives (Figure 5.2). During the initiatives, all other livelihood activities became less important relative to the poverty relief initiative, with just under 50 % of all households ($n = 207$) identifying poverty relief as the single most important livelihood activity. Own businesses, social grants, home gardens and fields were expected to increase in importance after the initiatives, whilst reliance on social networks, remittances from permanently employed family members and wild products were expected to decline in importance in future.

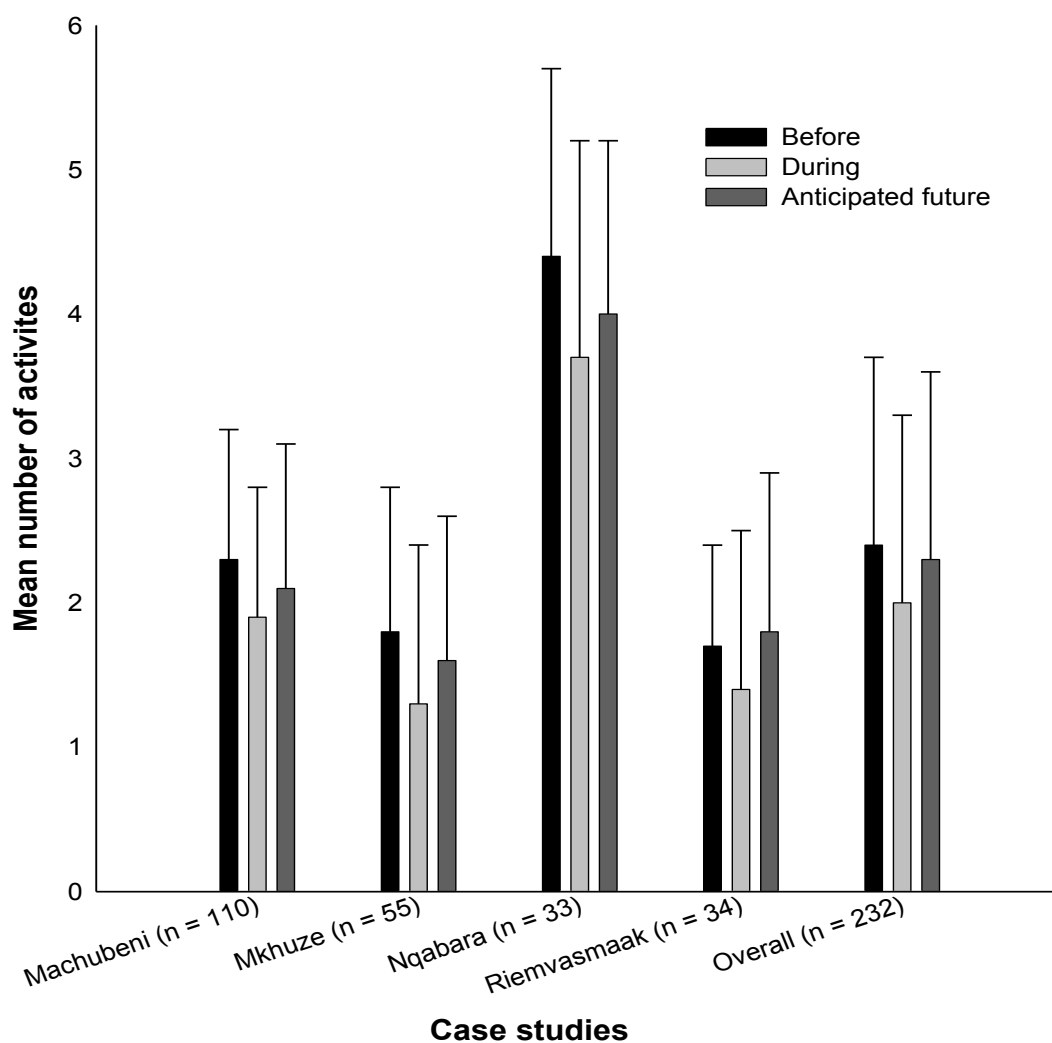


Figure 5.1: Livelihood diversity before and during the initiatives, and the anticipated diversity after the initiatives. Error bars are included to illustrate the degree of variation in responses.

Table 5.6: T-tests for differences in livelihood diversity before and during the initiatives

		Mean	N	Diff.	STD. Dv. Diff.	t	df	p
Overall	Before	2.4±1.3						
	During	2± 1.3	213	0.4	0.8	7.96	212	0.000000
Machubeni	Before	2.3±0.9						
	During	1.9±0.9	110	0.3	0.6	5.3	109	0.000001
Mkhuze	Before	1.9±1.0						
	During	1.3±1.1	37	0.594595	0.956250	3.782250	36	0.000566
Nqabara	Before	4.4±1.3						
	During	3.7±1.5	33	0.757576	0.936426	4.647394	32	0.000055
Riemvasmaak	Before	1.7±1.7						
	During	1.4±1.1	33	0.272727	0.761279	2.057983	32	0.047814

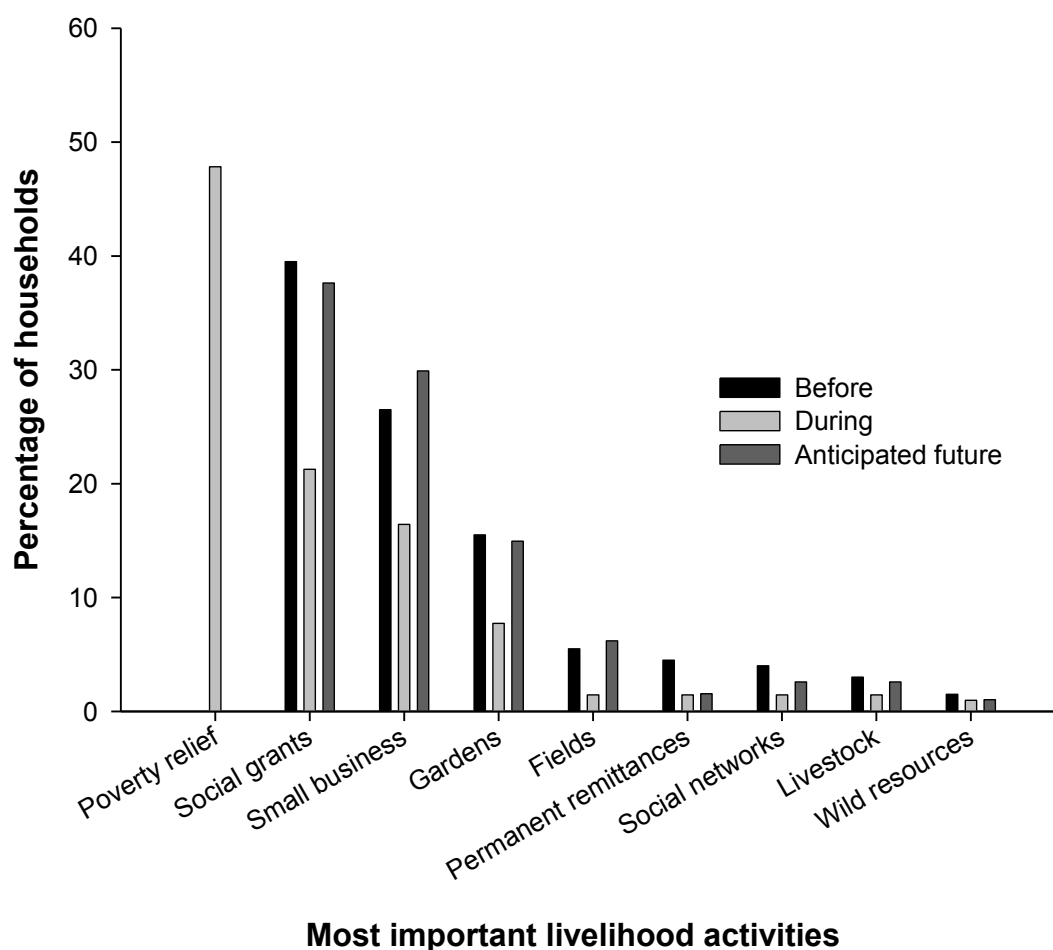


Figure 5.2: Livelihood activities identified as most important relative to other activities before and during the initiatives, and the activities anticipated to be most important after the initiatives

5.4.3 Household income

Considerable changes in income occurred during the initiatives. Differences in the frequency distribution of households in different income categories before and during the initiatives were significant (Wilcoxon Matched Pairs, $p = 0.00000$, valid $n = 172$). Before the initiatives the majority of households earned between R100 and R500 per month, with the second largest category earning between R500 – R1000 per month. During the initiatives, household income increased, with 15 percent and 25 percent moving into the R500 – R1000 and R1000+ categories respectively (Table 5.7). Most respondents anticipated that income would return to pre-intervention levels after the initiatives.

Table 5.7: Monthly income per household before and during initiative

	Before (% of respondents)	During (% of respondents)	Anticipated future (% of respondents)
< R100	18.13	0.59	20.67
R100 - R500	44.51	21.76	45.33
R500 - R1000	28.57	43.53	24.67
R1000+	8.79	34.12	9.33

The types of livelihood activities pursued by households varied according to income group (Figure 5.3), highlighting the importance of exploring the nature of activities, and not simply diversity. For example, in the lowest income group (<R100 per month), the three most common activities were social grants, home gardens and social networks (such as relying on neighbours and family). In the upper income category (R1000+ per month), the most common activities were social grants, home gardens and small businesses. Remittances from family members who were permanently employed were more common in higher income groups, and non-existent in the lowest income group. Reliance on wild resources, such as edible plants, fishing and hunting was pursued by all income groups.

Despite the anticipated decrease in diversity after the initiatives, the majority of respondents (56 percent) felt that the initiatives would help them to diversify their livelihoods in the future. This did however differ between sites, with 43 percent expecting this in Machubeni, and 100 percent in Nqabara. The reasons given for these responses are discussed in the section that follows.

5.4.4 Training and anticipated livelihood opportunities

The initiatives offered a range of skills through formal training (Plates 5.1 and 5.2). Table 5.8 summarises the range of skills developed at the four sites during the initiatives, and the percentage of participants who received this training across all sites. Land management skills, in the form of erosion control, drawing up management plans and learning about management, and very basic technical skills such as putting up fences, digging holes and building erosion control structures were the most frequently offered skills.

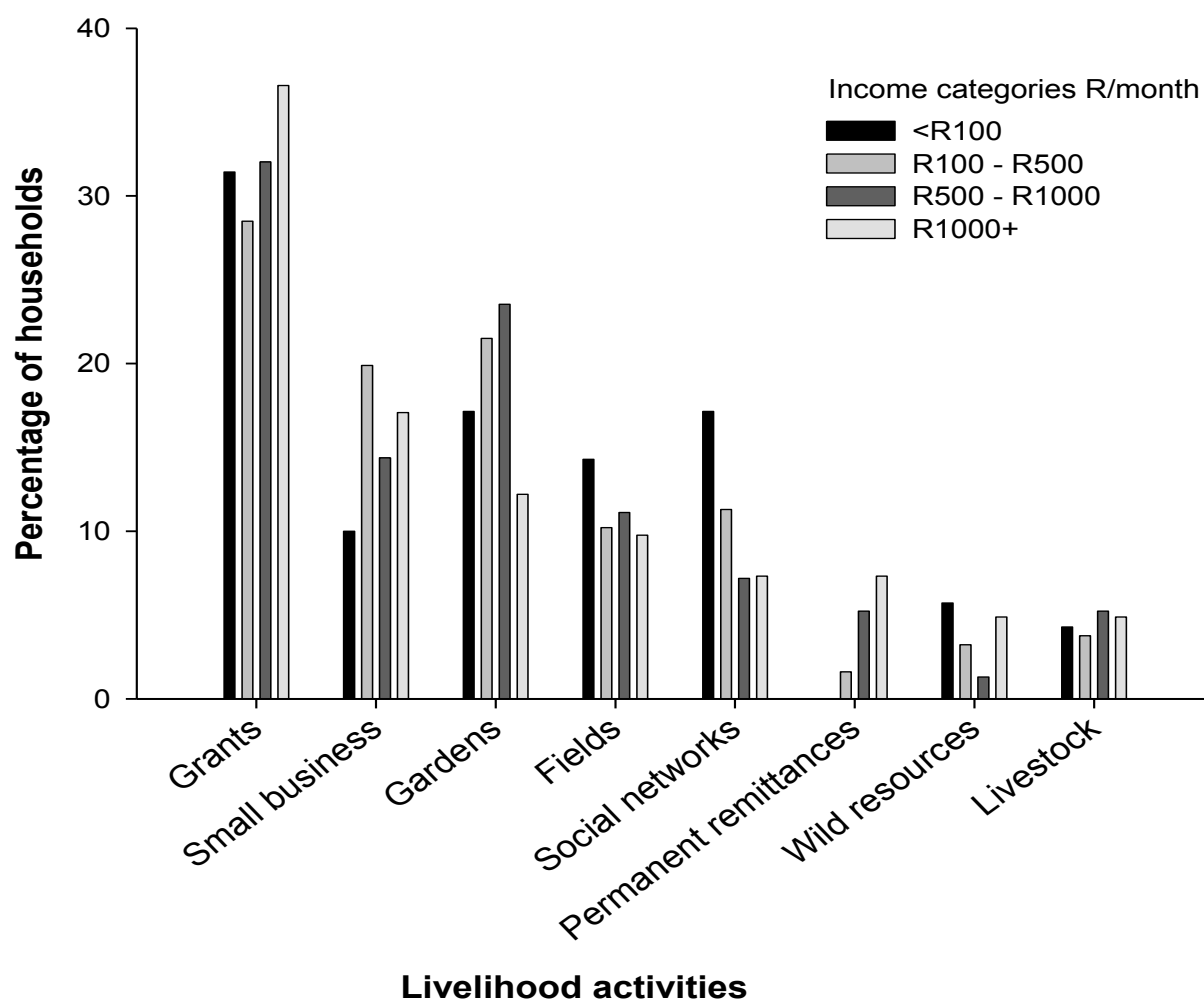


Figure 5.3: The percentage of households engaged in livelihood activities according to income category (n = 180)

Respondents who did not feel that the initiatives would create options for them in the future identified the lack of job opportunities in their areas and the lack of support in the form of credit, materials or equipment as major barriers preventing their use of the skills offered during the initiatives (Table 5.9). Others identified the fact that the skills did not relate to farming, which is a first priority for many households. Many others identified the temporary nature of adaptive co-management, as a project; the skills were perceived as useful only in projects rather than every day life.

Table 5.8: Percentage of respondents involved in different forms of training during initiatives

Formal training received	Percentage of respondents
Land Management	49
Technical (Basic, e.g. fencing, hole digging)	43
Construction	15
Leadership	13
Health and Safety	12
First Aid	4
Financial Management	3
Tourism	0.5

Table 5.9: Explanations given by those who did and those who did not feel that the initiatives would create new livelihood options for them in the future

Reasons why initiatives would help create options in the future, cited by 56% of respondents	Reasons why initiatives would not help create options in the future, cited by 44% of respondents
The money I earned will help me to start a business I am using the money to educate my children, so that life will be better in the future The skills I learned will help me to find work I will not have to ask the neighbours for food anymore I will be able to plan better, and to save money I will be able to manage my fields and garden better, and increase production to sell to others It will only benefit me in the future if the project makes me a permanent employee	There are no job opportunities for these new skills, they are only useful for 'projects' There are no job opportunities in the area There is no local support to get jobs, use our skills and earn a living I don't have the money, materials or equipment to do this work on my own (e.g. herbicides, vehicle) Land management is not related to my line of business We rely on our land to survive, so farming is my first priority This is only a temporary project, when it is finished I'll just look for another job Because I was just a labourer, these are not skills

5.5 Discussion

The SRP approach to livelihood enhancement sits somewhat uncomfortably beside the philosophy of adaptive co-management, where the aim is an on-going process of learning and collaboration that builds the capacity of people to adapt to social-ecological change (Folke *et al.* 2003; Carlsson and Berkes 2005). The SRP initiatives, on the other hand, aimed to build various forms of capital, including human (Table 5.8), financial (Table 5.7), physical and natural capital (Table 2.2, Chapter 2), through a model of livelihood enhancement that focussed on local scale, temporary and low skilled job creation at minimum wage. The tightly controlled time frames and highly bureaucratised ways in which

funding was managed through national government departments (see Table 3. 4, Chapter 3) undermined the possibility for collaboration and learning in the livelihood component of the initiatives. The potential limits of these scale specific, technical and highly bureaucratic interventions in dealing with complex systems, of which livelihoods are part, have been highlighted by other scholars (Plummer and Armitage 2007b: 69). Indeed, the lack of community ownership of this component of the initiatives is evidenced in Table 5.9, where respondents stated that the initiatives would only benefit them if they were made permanent employees, which demonstrates a lack of clarity on the goals of the initiatives (Table 2.2, Chapter 2).

The assumption that households will pursue a variety of livelihood outcomes, including income generation, vulnerability reduction and increased well-being is fundamental to monitoring and evaluating the outcomes of adaptive co-management (Plummer and Armitage 2007b). The individuals employed during the initiatives came from vulnerable households, with high levels of dependency, low levels of education and high levels of mortality indicated by the fact that a third of all individuals involved identified themselves as having lost a partner. The immediate outcomes of the SRP initiatives indicated reduced livelihood diversity, increased income and a shift in the importance attached to ‘safety net’ activities such as relying in social networks and collecting wild sources of food (Paumgarten 2005). The long term changes hinted at by the ‘anticipated future’ projections of diversity and income, and the challenges and opportunities identified by respondents (Table 5.9) suggest that the initiatives failed to deal with the structural barriers that prevent households from diversifying or intensifying livelihood activities. This failure holds potential to undermine the long term viability of a transition toward adaptive co-management. Each of these issues is discussed in the sections that follow.

5.5.1 Immediate livelihood outcomes

The diversification patterns observed in this study appear to be related to ‘push’ diversification (Barrett *et al.* 2001). The fact that diversity decreased significantly across all sites during the SRP initiatives suggests that people were diversifying as a means to cope with risk in situations that offer few alternatives (Ashley *et al.* 2003), and when a less risky alternative, such as poverty relief, presented itself they took advantage of it at the expense of other activities. This supports the suggestion that a diversified livelihood strategy does

not necessarily reflect an abundance of opportunities, but may rather reflect a lack of opportunities to specialise (Frost *et al.* 2007: 1970).

Shifts in labour allocation and changes in market relationships, for example reciprocal or local resource exchanges, have been identified as short term coping strategies (Ruben *et al.* 2001). The importance attached to poverty relief as a livelihood activity during the SRP initiatives, at the expense of a reliance on social networks, small businesses and garden and field cultivation (Table 5.5 and Figure 5.2), suggest short term coping strategies aimed at risk aversion. Adaptive strategies, on the other hand, refer to the ways in which local people change their local rules and institutions to secure livelihoods in response to slower changing trends in the long term (Berkes and Jolly, 2001). Examples of these long-term adaptive strategies include ensuring mobility and flexibility (Berkes and Jolly, 2001). The distinction between short term coping strategies and long term adaptive strategies is vital, and is linked to the issue of identifying the appropriate temporal scale for analysis (Adger, 1999a). An emphasis on short term coping strategies in response to poverty relief alone may lead to the conclusion that local people are reactive rather than proactive.

For example, the reduction in diversity due to the decrease in reliance on social networks (see also Campbell *et al.* 2002), collecting wild resources (See also Paumgarten 2006) and field cultivation may form part of long term adaptive responses to broader scale social, economic and political changes taking place in the case study areas over many decades (Berkes and Jolly 2001). The possibility that field cultivation, for example, is a potentially risky activity that is abandoned when more favourable opportunities present themselves is supported by studies of crop production in communal areas in other areas of Southern Africa (see Andrew *et al.* 2003 for a review), which suggest that crop production in communal areas has been negatively influenced by forced populations removals and betterment planning (see Chapter 2), resulting in a wide-spread phenomenon of field abandonment and ‘under-farming’, especially in the Eastern Cape and Kwa-Zulu Natal (see also Andrew 1992; Manona 1998; Andrew and Fox 2004). All three sites that reported field abandonment in this study fall within these two provinces.

Therefore, the abandonment of risk-prone activities in favour of alternative opportunities, such as poverty relief, appears to reflect an emphasis on flexibility within livelihood activities. Ensuring flexibility (see also Ainslie 1999), rather than diversity, may therefore be the key strategy employed by households in these sites. Adaptability and flexibility are considered key to building resilience (Berkes *et al.* 2003), particularly in the re-organisation

phase of adaptive cycles (Folke *et al.* 2003). In consequence, interventions that develop the ability of households to use their available resources flexibly should form a core part of the livelihood objectives of attempts to initialise transitions toward adaptive co-management (Ellis and Allison 2004), at least under resource poor conditions.

5.5.2 Promoting flexibility: multi-scale constraints

The perceived ability of households to diversify their livelihoods as a result of the initiatives was dependent on both the assets that a household owned or had access to, for example a vehicle and agricultural equipment, and on broader socio-economic constraints such as access to markets and opportunities for work (Table 5.9). Despite almost one hundred percent of respondents in this study receiving new skills during the initiatives, the livelihood activities expected to be ‘most important’ after the initiatives (Figure 5.2) did not relate to these new skills, indicating that people would integrate the options created into their already diversified portfolios. On the one hand, the responses given indicate that in some instances the skills were not appropriate for the context. The fact that respondents stated that the skills were not related to their ‘line of business’ or to farming, indicates a reluctance to take advantage of opportunities. On the other hand, local constraints such as a lack of access to supportive services such as credit and equipment were expected to inhibit the ability of individuals to make use of skills and opportunities. Other structural constraints were the lack of opportunities for employment in the local areas, all of which are relatively remote (Chapter 2).

It is therefore critical to consider the multi-scale barriers and opportunities that shape people’s livelihood options and choices (Carter and May 1997, Du Toit 2007), as these are likely to influence transitions in social-ecological systems. However, a consideration of these structural issues must be combined with an understanding of the ways in which individuals and households respond and adapt to these dynamics (Berkes and Folke 1998; Scherr 2000; Lam 2001; Snel and Staring 2001). For example, the most significant expected change in livelihood strategies was the anticipated increase in the importance of own businesses relative to other strategies (Figure 5.2). Efforts to initialise adaptive co-management therefore need to aim to help households to overcome these constraints at multiple scales, particularly the lack of access to capital and credit. The poverty relief model is based on local scale interventions that were overseen by a highly bureaucratised national government department, the time frames and budgets were therefore inflexible

(see Table 3.3, Chapter 3), and this undermines the ability of either communities or implementing agents to adapt initiatives to deal with the livelihood constraints that are specific to the local context. The heavy focus on skills development and income generation, at the expense of dealing with existing constraints, undermined the ability of these initiatives to harness the latent livelihood flexibility of the households involved.

5.5.3 Anticipating change

The ability of resource users to think creatively about the future plays an important role in determining future trajectories in social-ecological systems (Walker *et al.* 2002) because they are potentially drivers of system change through the livelihood decisions and choices that they make (MA 2003). In the long term, it is likely that a transition toward adaptive co-management in the case studies explored here will be undermined by the widespread perception of many respondents that the initiatives were short term projects (Table 5.9). This perception is linked to the nature of SRP initiatives, with their emphasis on temporary employment. While the formal decision making bodies described in Chapters 3 and 4 may have developed a fairly nuanced understanding about the direction in which the communities are heading, it appears from the livelihood surveys that this understanding has not reached the average household.

It is important to note however that the perception of conservation interventions as projects is deep seated in South Africa's communal areas, where decades of state lead interventions into natural resource management (Table 2.1, Chapter 2) have taken a similar form. Examples include soil conservation works aimed at tackling erosion (Beinart 1989), and irrigation schemes aimed at creating employment and development in the former homeland areas (Ainslie 1999).

However, this tendency does not imply that households do not use the opportunities presented to them to secure their own futures. Despite the challenges posed by the SRP approach, evidence from other studies suggest that people do take advantage of opportunities as they arise, and use these opportunities to generate cash to achieve objectives, such as the desire to educate children (Ellis 1998b; Ellis 1998a). This was evidenced in the responses summarised in Table 5.9, where one of the reasons for believing life would improve in the future was the ability to educate children.

These responses suggest that the temporal dimension of livelihood diversification is an important consideration. Indeed analysts have suggested that diversification may not be

immediately achievable within households, but may be a long term process that relies on the accumulation of sufficient financial and physical capital (Niehof 2004). Therefore, monitoring the immediate outcomes of initiatives such as these may hold the potential to mask long term livelihood diversification and responses that may play a key role in transitions toward adaptive co-management. Exploring the ways in which income is invested holds potential to offer significant insight into the long term outcomes for households, and is more likely to yield reliable data than short term monitoring linked to project cycles.

5.5.4 Methodological observations

The survey developed for livelihood monitoring was effective in raising awareness within the decision making bodies of each community, and it was sensitive enough to show significant changes before and during the initiatives. When combined with a resilience perspective, a livelihood approach to monitoring transitions toward adaptive co-management holds the potential to cast light on the design and implementation of initiatives (Plummer and Armitage 2007b), which are often sectoral in conception, whilst livelihoods are fundamentally cross-sectoral (Ellis and Allison 2004). The livelihoods approach is useful when combined with a focus on future projections and the ways in which people deal with uncertainty through long term adaptive strategies.

A focus on income ignores the ways in which households make use of social support networks to ensure food security and survival (Carter and May 1997). Income also ignores the ‘in kind’ contributions of intra-household activities, such as fields, home gardens and livestock, and the focus here on activities in conjunction with income attended to this difficulty to some degree. This research suggests that diversity may be a useful indicator when assessing livelihood change because the diversity of activities appears to be independent of both the size of the household, and the income class into which a household falls (Section 5.4.2). This finding is supported by studies conducted elsewhere (Ellis and Allison 2004; Ellis and Freeman 2004; Frost *et al.* 2007), and highlights the importance of exploring the nature of activities, and not simply diversity when monitoring rural livelihood change (Ashley and Hussein 2000).

Therefore diversification patterns, when combined with household income data and weighted measures of the most and least important livelihood activities, provide a useful measure of whether livelihood outcomes such as income generation, vulnerability reduction,

increased well-being and food security (DFID 1999) have been achieved. A focus on diversification is also readily integrated into collaborative monitoring approaches. The concept of diversity as a measure of household vulnerability was understood by participants because the majority of households engaged in a diversity of activities in order to secure their livelihoods.

Collaborative analysis helped to identify possible pit-falls in the data, and to explain the reasons for investment in different activities. For example in Mkhuze community members were able to explain the heavy reliance of households on neighbours as a cultural practice rather than an indicator of poverty per se. Similarly, surveys in Machubeni revealed that households were expecting home garden cultivation to reduce significantly after the intervention. During the discussion it was indicated that the project was expected to end in winter, when people would be less likely to cultivate. Therefore, when asking respondents about future changes, one needs to be very explicit about the time frame that is being discussed.

Ideally, follow up surveys should be conducted in order to determine true changes in livelihoods as a result of the initiatives. This was not possible in this study due to funding and time shortages, and indeed this shortfall reflects the challenges facing attempts to monitor complex systems in general. The time scales over which sustained and significant changes occur in social-ecological systems often exceed the time and funding available during conventional research projects. This issue is returned to in the chapter that follows.

5.6 Conclusions

Linking poverty relief to conservation initiatives is becoming increasingly common in developing and especially newly democratised states such as South Africa that have large areas that can be described as resource poor. In South Africa the national imperative to redress past injustice, demonstrate tangible poverty relief to the poor, and to increase the benefits of conservation to the rural poor, have resulted in an uncomfortable marriage that simultaneously presents itself as the answer to funding adaptive co-management initiatives country wide, while at the same time threatening to undermine many of the basic principles that underpin the approach.

The ways in which money is spent within SRP type programmes can seldom be based on locally defined needs, and the tight time frames attached to these initiatives (2-3 years)

constrain learning and flexibility (Chapter 3). Indeed, the lack of ownership of the initiatives by the communities involved is evidenced in Table 5.9, where respondents stated that the initiatives would only benefit them if they are made permanent employees, which demonstrates a lack of clarity on the goals of the initiatives.

Efforts aimed at enhancing livelihoods as part of broader strategies to initiate transitions toward adaptive co-management require integrated, multi-scale and long term interventions that expand economic opportunities and empower people to drive their own development (Ellis and Allison 2004; Armitage 2007; Frost *et al.* 2007). This research suggests that aiming to promote flexibility in the ability of households to switch between livelihood options is of critical importance. Removing structural constraints is fundamental to promoting this flexibility; constraints such as access to capital and markets require far greater attention in livelihood interventions in general, and adaptive co-management in particular.

Capturing these processes as part of monitoring and evaluation points to the need for long term monitoring. Although immediate changes were evident during monitoring, and the majority of respondents hoped that the initiatives would create opportunities for them in the future (Table 5.9), all indications point to a return to pre-intervention livelihood strategies (Tables 5.3 and 5.8, Figure 5.2). Indeed, livelihoods appear to be a slow changing variable in adaptive co-management that require a long term view of the ways in which households invest their capital and plan for future livelihood security. The investment of capital in children's education is one example that demonstrates the need for this type of approach. This does not mean that short term changes are unimportant. Indeed opportunism was a significant feature of the individuals who were employed in the initiatives.

The livelihood monitoring framework developed in this study was able to capture significant changes in diversity and household income as a result of interventions. The use of diversity and resilience as a starting point for monitoring change in livelihoods therefore appears to hold promise for future research.



Plate 5.1: Women receiving training in landscaping in Nqabara



Plate 5.2: A group receiving training in landscaping in Nqabara

Chapter 6: CONCLUSIONS AND RECOMMENDATIONS

Under resource poor conditions finding ways to initiate and maintain positive transitions toward more effective resource management is critical. This study has sought to shift the focus from the descriptive to the analytical in adaptive co-management, and has identified a wide range of system components, key variables and outcome indicators that can be used to both monitor transitions toward adaptive co-management, and to guide interventions that seek to initiate such transitions. In so doing, a number of conceptual and empirical knowledge gaps have been addressed.

Firstly, a conceptual and methodological framework was developed for monitoring transitions toward adaptive co-management (Chapter 1). This broad framework was then expanded upon in the chapters that followed. A conceptual and practical approach to monitoring the processes of collaboration and learning was developed and tested (Chapter 3). Key variables and outcome indicators for monitoring shifts toward adaptive governance were developed and tested (Chapter 4), and key variables and outcome indicators for monitoring change in rural livelihoods as a result of adaptive co-management interventions were identified and a method for monitoring them tested (Chapter 5). In so doing, the learning, governance and livelihood outcomes of adaptive co-management have been evaluated. This study has therefore expanded on the work of other scholars who have identified key factors that encourage re-organisation in the back loop of the adaptive cycle (Folke *et al.* 2003), key system attributes that enable transformation in social-ecological systems (Walker *et al.* 2006), and who have sought to describe transformations in local governance systems (Olsson *et al.* 2004b; Olsson *et al.* 2006).

This study offers insight into Olsson *et al.*'s (2006) descriptive analysis of phases in the transformation toward adaptive governance, which the authors identify as necessary for transformations toward adaptive co-management. Since monitoring took place over the course of one year, inferences can only reliably be made regarding the —preparing for change” phase identified by those authors. Under resource poor conditions, preparing a system for change requires more than simply building knowledge, networking and leadership, as that study suggested. In the long term, initiating transitions toward adaptive co-management requires carefully facilitated learning processes that encourage innovation, that focus on the key challenges facing the development of multi level networks, and that

foster flexibility in livelihood strategies (Table 6.1). The key conclusions regarding each of these issues are discussed below.

Table 6.1: Preparing systems for change under resource poor conditions

Learning: social facilitation and innovation	Situating and engaging – engage with key actors in a way that is sensitive to the local context and their past experiences
	Awareness raising – recognise and challenge frames of reference, jointly identify the problem to be solved
	Co-creating and visioning – imagine <u>what</u> could be' based on shared frames of reference
	Action and experimentation – take shared actions and test their applicability to the problem
	Reflection – assess the degree to which problems have been addressed, and whether frames of reference are still appropriate to the problem
Governance: building networks	Acknowledge historical context of interactions between the state and local resource users
	Actively build trust
	Secure long term financial and capacity support for local actors
	Improve access to reliable information, raise awareness about legal options
	Foster and maintain key individuals, knowledge holders and effective leadership within networks but avoid rigidity and vulnerability
Livelihoods: fostering flexibility	Ensure that conflict resolution mechanisms are in place
	Enhance opportunities to specialise in situ
	Actively deal with structural constraints such as access to markets and credit

A change in cross scale linkages is one of the defining features of transformations in social-ecological systems (Walker *et al.* 2006), and a necessary precondition for self-organisation (Olsson *et al.* 2004b). This study has identified a number of key variables that are currently undermining such linkages in systems that are re-organising following disturbance, these include; perceptions of long term capacity support from agencies outside of the local context, access to long term funding for adaptive decision making, and access to reliable information about such varied issues as in the resource base and legal options for resource management. Differences in access to support, funding and reliable information reveal the potential role of power asymmetries to undermine long term change (Figure 1.3, Chapter 1), and point to the need to consider the role of power, knowledge and access to information

far more carefully when arguing for nested institutional structures (Dietz *et al.* 2003) that rely on networks and linkages (Olsson *et al.* 2007). The potential danger of these power asymmetries has been highlighted by other scholars (Adger *et al.* 2006).

The capacity for self-organisation is however just one of a number of system attributes that can be used to monitor transitions toward adaptive governance. Indeed, the initiatives explored here have led to overall improvements in the other system attributes necessary for adaptive governance. This positive outcome suggests that adaptive co-management may be achievable in the long term under resource poor conditions. Indeed, the key variables used to monitor social capital improved significantly during the eighteen months that monitoring took place, and social capital is a necessary precondition for collective action, and therefore adaptive capacity (Adger 2003; Armitage 2005). This suggests that in the long term positive change in self-organisation and adaptive capacity can be expected, and points to the need for long term monitoring in order to come to terms with the governance outcomes of initiatives.

There is a pervasive assumption in the adaptive co-management literature that cross scale linkages between multiple actors and organisations will lead to shared learning and decision making at more appropriate scales for the resources in question (Folke *et al.* 2005; Olsson *et al.* 2006; Olsson *et al.* 2007). The lens of social learning suggests that this assumption is an over simplification. Stakeholders in such networks will seldom have the same stake in resource management, and since the development of communities of practice is fundamentally about shared practice, it is not a given that models that emphasise cross scale networks will engender learning, innovation and therefore positive transitions. This study has shown that initiating and maintaining such transitions under resource poor conditions is reliant on high levels of social facilitation that encourages innovation through a process of awareness raising, visioning, experimentation and reflection on the ways in which frames of reference, such as values and norms, have been questioned during the process (Wals 2007; Keen *et al.* 2005b).

Maintaining key individuals and knowledge holders within networks is crucial, as demonstrated by the frequent loss of capacity from the Development Trust in Riemvasmaak as a result of democratic elections, and the major turn over of individuals experienced in the first election in Machubeni. However, this study has also highlighted the danger of allowing rigidity and therefore vulnerability to develop within communities of practice. Maintaining the same set of individuals within communities of practice for long periods can undermine

innovation and make decision making structures increasingly vulnerable to surprise and collapse, a situation that currently threatens the highly skilled Development Trust in Nqabara.

Adaptive co-management has become increasingly tied to national development and poverty alleviation agendas throughout the Southern African region (Blaikie 2006). This study has however highlighted the challenges inherent in attempting to initiate transitions by enhancing livelihoods and building various forms of capital through the model of expanded public works programmes. Paying individuals to manage natural resources, and then withdrawing that funding and expecting collective action on a voluntary basis, amid the already strong tendency toward rural-urban migration and remittance that characterises South Africa's communal areas, holds the potential to undermine any gains made through facilitated social learning processes. Providing land-based opportunities in situ is vital to promoting flexibility and opportunities to specialise, however if attempts to initiate positive transitions do not deal with the social and economic constraints that already undermine people's ability make a living, then very little long term change can be anticipated.

6.1 Challenges to monitoring transitions toward adaptive co-management in complex systems

A number of fundamental challenges have faced this attempt to monitor transitions in complex social-ecological systems. The inadequacy of literature dealing with research processes in complex systems research (Campbell 2002) meant that a number of trade-offs had to be made throughout this research process. Each of these challenges are discussed below, as are the ways in which they were addressed in this study, and the trade-offs that resulted from the decisions that were taken.

Firstly, the ability to measure long term change in complex systems, especially in the re-organisation phase of the adaptive cycle, is undermined by the time frames attached to conventional research projects, of typically two to three years. These time frames make it tempting to focus attention on fast changing variables, at the expense of slower changing variables that, in the long term, are likely to have a significant impact on the direction of change because of path dependency in complex systems (Scheffer *et al.* 2001). Examples of slow changing variables that are difficult to monitor but have a major bearing on the future direction of change include the values and norms that underpin institutions, adaptive capacity and self-organisation. Secondly, working across disciplines is indispensable when

dealing with complex systems. The concept of adaptive co-management is the product a multi-disciplinary dialogue that has taken place over many years. Attempting to measure ‘success’ or ‘failure’ when faced with such varied disciplinary, conceptual and practical roots means that researchers must become transdisciplinary in their approach to monitoring. Thirdly, the variety of conceptual and methodological knowledge gaps that currently exist in both the monitoring and the adaptive co-management literature meant that many of the methods used, and even the approach to answering key questions was experimental.

This study attempted to overcome, or at least acknowledge, these challenges in a variety of ways. The first step was to develop conceptual and methodological frameworks that reflected the variety of perspectives that had a bearing on transitions toward adaptive co-management (Figures 1.3 and 1.5, Chapter 1). The second step was to acknowledge that monitoring is not an objective process – decisions about what is important, what is measured, and therefore what is left out are subjective decisions (Abbot and Guijt 1998). In an effort to deal with this, multiple conceptual tiers were incorporated into the design of the study (Ostrom 2007b). By identifying broad system components (Figure 1.3), key variables and outcome indicators (Tables 3.2, 4.1 and 5.1), space was created in the lower tiers for adaptation by research participants based on the local context. In this way, while in the higher tiers there was clear direction in the monitoring program, as provided by Figure 1.3, practically there was space for innovation and change in the research design itself, and the implications of this approach are discussed in the next section.

These attempts to overcome the challenges brought with them a number of trade-offs, these trade-offs related to; i) the use of pre-designed frameworks, vs. the loss of alternative perspectives on human-environment relationships, ii) the inclusiveness of an interdisciplinary approach, vs. superficial research outcomes, and iii) the confrontation of uncertainty through the incorporation of more integrated and broad-based information that is more difficult to disaggregate and test statistically, vs simple data that is easy to quantify and analyse. Each of these trade-offs is discussed in turn below.

Pre-designed frameworks, vs. alternative perspectives - This study incorporated local knowledge predominantly from a natural resource management perspective, as opposed to ethical or ontological perspectives. This approach proved useful in the identification of the underlying causes of change, adaptive processes at the local level, as well as non-linear relationships between project inputs and the observed outcomes. The use of scientifically accepted frameworks also improved the legitimacy and validity of monitoring processes in

the eyes of scientists and decision makers. However, these frameworks represent particular worldviews, developed outside of the local context to identify variables deemed important for understanding adaptive co-management in general. Therefore, the researcher had to compromise between utilising local knowledge to understand impacts, and the *a priori* identification of processes relevant to the scientific arena, in the form of pre-determined variables for monitoring. The negative trade-off was that the process was less participatory than that advocated by the proponents of community based conservation, and possibly less legitimate than true ‘bottom-up’ monitoring in the eyes of local people.

Inclusiveness vs. superficiality - Working across disciplines is indispensable when dealing with complex systems. Local management systems and resource use patterns know no disciplinary boundaries, and the drivers of social-ecological change are ecological, biophysical, geographical, historical, political and economic. Therefore, an interdisciplinary approach allowed an appreciation of the multitude of factors that influenced observed outcomes of adaptive co-management. The negative trade-off, however, was superficiality, because a more detailed understanding of key processes was sacrificed.

Confronting uncertainty, vs. simplification - This study sought to acknowledge uncertainty as an inherent property of both complex systems, and of research that incorporates local knowledge. However, results obtained in this way are often difficult to validate through traditional scientific methods. Thus, a significant trade-off was made between simple data that lends itself to validation, and more integrated and broad-based information that is more difficult to disaggregate and test statistically, but which provides a more realistic reflection of the relationships between drivers of change across scales, and realities on the ground. Although scientific rigour is a significant trade-off in participatory studies, various methods can be combined to deal with the uncertainty thus created (cf Chapters 3, 4 and 5). This process of validation also has the positive effect of encouraging deliberative and reflexive learning as local participants are encouraged to debate responses and opinions.

6.2 Challenges to collaborative monitoring and evaluation

Collaborative monitoring and evaluation is a cyclical process that seeks on the one hand to explore collaboration, learning and adaptive governance, but at the same time creates arenas within which these processes can take place. Throughout, this a-priori trade-off between the ability to objectively measure change in social processes, and accepting that the researcher is part of the change that is observed, has been accepted as part of a

scientific responsibility to advance sustainable development in Africa (Kates and Dasgupta 2007), and also as a necessary precondition for coming to terms with complex system dynamics. Indeed, it was ethically incumbent on the researcher to share information and skills with the research participants, who faced challenges on a daily basis in decision making and the management of their resources. At an individual level, adaptive capacity is enhanced through deliberate and frequent practice, effective reflection, and the acceptance of different perspectives (Fazey *et al.* 2005). Collaborative monitoring therefore creates the space to reflect on the process of implementation, and can influence the outcomes that are observed.

A shift in perceptions and attitudes have been identified as a positive outcome of collaborative monitoring (Becker *et al.* 2005; Danielsen *et al.* 2005a; Poulsen and Luanglath 2005; Uychiaoco *et al.* 2005; van Rijsoort and Jinfeng 2005). This suggestion was supported during workshop evaluations in this study (Section 3.3.1, Chapter 3). Collaborative monitoring and evaluation can also lead to increased levels of social capital, transparency, sharing of information, an increase in co-operation between actors, and the ability to feed information directly into management decisions, thereby tightening the adaptive management cycle (Gray and Kalpers 2005; Andrianandrasana *et al.* 2005; Becker *et al.* 2005; Uychiaoco *et al.* 2005; Poulsen and Luanglath 2005). Collaborative monitoring and evaluation therefore goes well beyond the data that is produced (Becker *et al.* 2005; Innes and Booher 1999; Conley and Moote 2003), and addresses the criticism that participatory approaches focus too heavily on knowledge production at the expense of action and awareness raising (Brock 2002). This too was demonstrated during workshop evaluations:

“Monitoring opens our eyes to see forthcoming crises, so that when those crises arrive we are not surprised”
(Machubeni, September 2007)

“The governance and process monitoring exercises make things clear and show us the light. The information from the exercises remains within the community, we appreciate that” (Nqabara, June 2007)

Knowledge sharing is an essential first step in the collaborative monitoring process. In this study, capacity building and information sharing did lead to individuals becoming increasingly confident in multi-stakeholder forums and more able to effectively make and implement decisions. Adaptive capacity and social capital increased over time as a result of practice, knowledge sharing and the development of new knowledge, awareness raising, action and reflection (Figure 6.2). These steps are not consecutive but are part of social

learning and monitoring cycles. As a result, knowledge sharing in some instances lead to a jump directly to appropriate action, and action lead to the development of new knowledge through reflection. Throughout, monitoring provided an arena in which social learning could occur:

“Monitoring opens up a space for us to talk, and to voice our fears. The future is uncertain to us now, and monitoring gives us the space and time to talk about this uncertainty” (Machubeni September 2007)

This learning process involved multiple actors, who brought with them different interpretations of cause and effect relationships in social-ecological systems. Awareness raising was a critical component of the learning process during monitoring because local ecological knowledge, particularly that pertaining to the underlying causes of change in ecosystems, can be unevenly spread within communities, and is often held by individuals rather than groups (Chalmers and Fabricius 2007). To achieve social learning in the sense of a change in a widely held set of beliefs, values and norms (Sayer and Campbell 2004; Keen *et al.* 2005b), awareness of the social and ecological consequences of actions must be developed. Monitoring is a potentially effective means of raising awareness for those involved in the process, especially when participants are encouraged to reflect on the social and ecological outcomes of their actions, values and beliefs on an on-going basis.

Appropriate action refers to management actions that are ecologically and socially appropriate for the given context. Reflection is an on-going process that takes place throughout the collaborative monitoring process. Reflection is indicated by the feedback loops between the various steps illustrated in Figure 6.1.

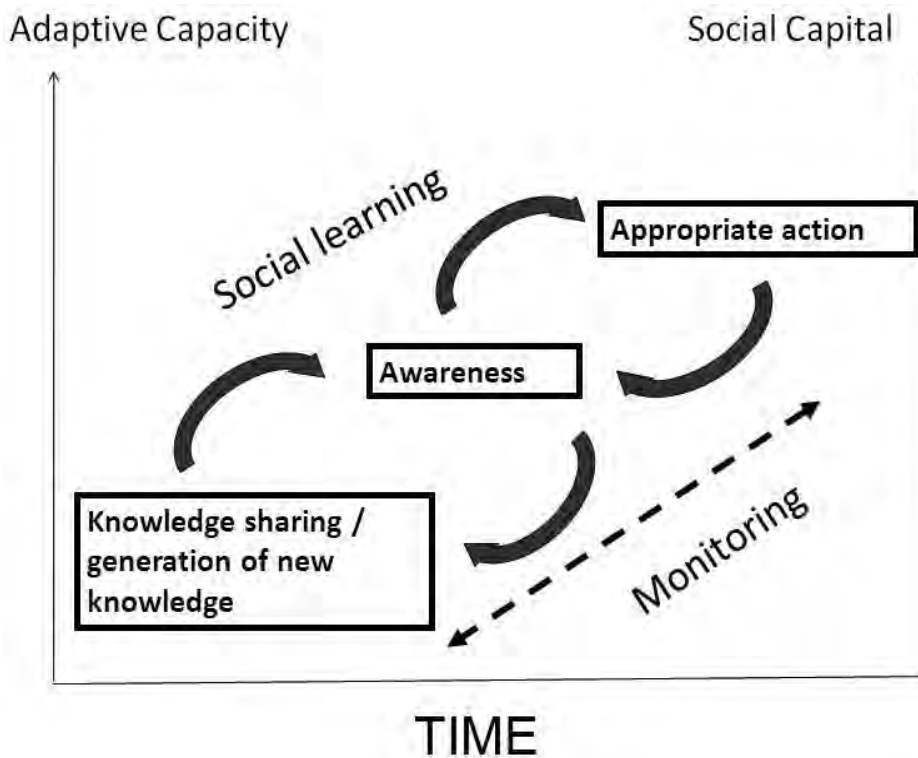


Figure 6.1: The outcomes of a social learning approach to monitoring

Monitoring was however less effective in discerning subtle changes at broader time scales that influenced project implementation. For example, the political election processes that fundamentally influenced the learning process in Machubeni were not picked up during the periodic monitoring events. The outcomes of a monitoring program will be influenced by dynamic interactions between actors and processes operating at scales above and below the operational scale of adaptive co-management (Armitage 2005), and therefore assumptions about the 'corect' scale at which to address and monitor processes poses difficulties (Cash *et al.* 2006). The selection of an appropriate scale for monitoring can be an exercise of power, since the selection may favour the ability of one set of actors to influence decision making, while disempowering others (Lebel *et al.* 2005). This was experienced in this research when monitoring effectively took place at the scale of community decision making bodies, and in some cases government officials did not take part due to either conflicts between community members and government officials, or because role players would not talk openly in the presence of other role players. As a result, the community perspective was privileged over other stakeholders during the monitoring process, and key processes operating outside of the local context were not discerned. This raises the issue of participation within monitoring programmes: who should be involved, and when?

The level of participation in monitoring depends largely on the purpose of the monitoring activity. In adaptive co-management, monitoring and evaluation holds two purposes; on the one hand the intention is to understand complexity, report project progress to donors and to draw general lessons relevant to other sites. This type of monitoring is often conducted by outside ‘experts’ and can be referred to as technical monitoring (Figure 6.2). In adaptive co-management however, the intention is to build partnerships that promote adaptive capacity. In this sense, the goal is to engage in an active and collaborative learning process between multiple knowledge holders, with the end result being a strong decision making body that is able to manage adaptively. This type of monitoring can be referred to as collaborative monitoring. On the other hand, resource users do monitor and evaluate initiatives based on locally developed sets of objectives that define desired outcomes, and often have already entrenched decision making processes that are locally accepted and appropriate. This type of monitoring is generally conducted by resource users and managers and can be referred to as participatory monitoring. In this thesis the predominant concern has been with collaborative monitoring.

Impact monitoring



Process monitoring

Figure 6.2: A continuum of participation in monitoring

Collaborative monitoring and evaluation comes with a number of challenges. The first is ensuring that simpler methods are able to detect trends and changes outside of the local context, as already discussed. The long term sustainability of collaborative monitoring is another challenge and is influenced by incentives for resource users to participate in monitoring and evaluation (Hockley *et al.* 2005; Topp-Jørgenson *et al.* 2005; Topp-Jørgenson *et al.* 2005; Poulsen and Luanglath 2005). This is particularly important in developing countries, where trade-offs are often necessary between precision and sustainability (Brashares and Sam 2005; Uychiaoco *et al.* 2005). Evidence from Laos suggests that monitoring may cease when funding disappears (Poulsen and Luanglath 2005), and analysts suggest that collaborative monitoring cannot be sustained unless obvious benefits accrue to local people (Noss *et al.* 2005; Stuart-Hill *et al.* 2005). While some argue that collaborative monitoring approaches are cheaper (Uychiaoco *et al.* 2005; Brashares and Sam 2005), others warn that collaborative approaches come with considerable costs because of the time needed to facilitate a learning process between many actors (Mutimukuru *et al.* 2006). Certainly, the experiences of training decision making bodies in monitoring activities for this research was time consuming and expensive because of the travel costs involved in reaching remote sites. Legal structures that enable rule enforcement and also articulate the roles of different actors were vital to the success of monitoring activities, as was the involvement and support of local government.

6.3 Where to next

This study has been a largely experimental one. Both the conceptual framework and the methods used to implement this framework can be improved in many ways. Capturing fast and slow changing variables simultaneously during monitoring requires a great deal more attention. Refining the key variables and outcome indicators identified in this study, distilling those that are most sensitive to change, and using these to develop an ‘early warning system’ of impending crisis or a change in direction for stakeholders engaged in adaptive co-management should be major area of future research.

Our understanding of the ways in which adaptive co-management develops, and the success or failure of transitions under different conditions, needs to move away from the descriptive and toward more rigorous and pro-active monitoring and evaluation of the outcomes for people and ecosystems. Multiple case study comparisons are vital in order to achieve this.

In Africa, and indeed in all contexts where historical legacies have created resource poor conditions, there is a moral responsibility on scientists to test development and resource management models that are based on first world case studies. In so doing, scientists should take seriously the need to reinvent their role in society, and to make the trade-offs that will allow this to happen.

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