Managing Relationships, Learning and Demands in Protected Areas

A Social Systems Analysis

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ABSTRACT

This thesis seeks to contribute to the improved understanding of social systems analysis in management effectiveness research on protected areas. It develops and applies propositions for incorporating the analysis of social systems into management effectiveness research. The propositions are designed as theoretical constructs which represent some aspects of social reality in protected area management. They signify an organized way of thinking about the social domain of protected area management. It is argued that an analysis of management effectiveness must recognize the need to take into account the inherent interactive nature of the connections among three variables, relationships, learning and demands. It is suggested that the three variables do not exist in isolation, but are interconnected and exert influence on each other. The interactions among the variables provide this study with a conceptual structure for analyzing the social domain of protected area management.

The thesis conceives the management of relationships as a behavioral process in which protected area management agencies influence the decisions and actions of other parties, and vice versa, over a period of time in order to advance shared interests. The effectiveness of relationship management depends on integrated learning, a collective process of managing information in a timely manner so as to enhance the responsiveness of social actors involved with protected areas. Demand management is viewed as a social process in which protected area management agencies develop timely and defensible responses to current and emerging demands from stakeholders. The management of demands is expressed through relationship management and integrated learning. Important in this context is the capability of social actors to cope with complexity, change and surprises.

The thesis should be seen as a theoretical premise that focuses on the learning competence of social actors by aligning and fostering their ability to respond timely to the ever-changing demands on protected areas through the effective management of relationships. It should be viewed as making a contribution to the move in protected area

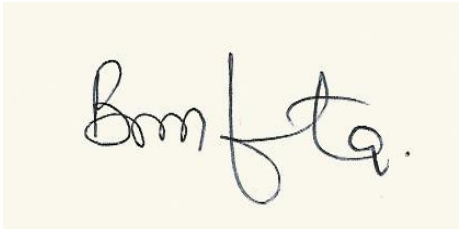
management towards developing learning organizations and institutions through a systems approach. This should be interpreted as enhancing learning about the human dimensions of protected area management. And more specifically, effective learning generates timely responses in the management of demands and relationships. The implications of failure to respond quickly enough are epitomized in a number of South African examples such as rivers that stop flowing and conflicts over resource use.

The thesis makes a contribution to management effectiveness research by examining in some important ways why research should not be determined solely by biophysical components, but should be extended to the broader social issues that define the nature and quality of management. It is argued that a deep appreciation of management effectiveness requires an understanding of relationships, learning and demands to provide a foundation for systemic social analyses. The thesis illustrates why a behavioral approach to relationships theory provides a foundation for resilient social relationships in collaborative processes. It shows why the establishment and maintenance of an integrated learning system take place in a complex context which links elements of governance learning and management learning. It also evinces why protected area management agencies have to incorporate mental models into adaptive management of demands. These insights imply that the opportunities for effective protected area management are largely contingent on systemic insights into the underlying social structures and processes responsible for emergent problems. By exposing the insights, research on management effectiveness is poised to take new direction.

DECLARATION

The work described in this thesis was carried out in the Centre for Environment, Agriculture and Development, University of KwaZulu-Natal, Pietermaritzburg from August 2004 to November 2007 under the supervision of Professors Charles Breen and Rob Fincham. The thesis consists of a series of chapters that have been published in, or prepared for submission to, a range of scientific journals. As a result, formatting styles differ and overlap may occur to secure publishable entities.

I hereby declare that this is an authentic record of work and has not in its entirety nor in part, previously formed the basis for the award of any degree of this or any other University. Wherever use is made of other's work, it is duly acknowledged in the text.



30TH MARCH 2008

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Signed **Date**

BIMO ABRAHAM NKHATA

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Social Systems Analysis and Management Effectiveness Research on Protected Areas: Research Propositions

INTRODUCTION

In this thesis I seek to contribute to the improved understanding of social systems analysis in management effectiveness research on protected areas. I intend to develop and apply propositions for incorporating the analysis of social systems into management effectiveness research, with special reference to adaptive management. For over two decades, there has been interest in research on the management effectiveness of protected areas (Bell 1984, MacKinnon et al. 1986, Hocking et al. 2000, Pomeroy et al. 2004). Although the philosophy of management effectiveness is not new (Deshler 1982), research has been confined to issues strongly related to the management effectiveness of biophysical systems. Notwithstanding a few exceptions, such as the works of Lee (1993), Berkes and Folke (1998), Gunderson and Holling (2002) and Manfredo et al. (2004), the social dimension has received little attention. In savannah protected areas, for example, the focus has been largely on large mammals and their concomitant habitats (see Bell 1984, du Toit et al. 2003, Wilshusen et al. 2003). Despite years of concern with the management effectiveness of protected areas (Deshler 1982), we have little solid understanding of the associated underlying social systems. The concern here is not with stable-state social systems but with the analysis of processes located in the changing structures and functions of social systems over time (Pettigrew 1973, 1990). The acknowledgement of complex dynamic variability in social systems leaves the way open for a systemic analysis of management effectiveness. This understanding suggests that management effectiveness theories should not be determined solely by biophysical attributes, but should be extended to broader social issues and concerns through a more holistic systems approach.

This introductory chapter serves as a context by providing an overview of the research background as well as the main theoretical frameworks on which this thesis is premised, namely relationships, learning, and demand management. The first section provides a definition of management effectiveness in general as well as its connection to protected areas. The second section describes the nature of the social environments of protected areas and its implications for management effectiveness. The third section discusses the role of a behavioral approach to relationships theory in analyzing collaborative processes. This is followed by a section on integrated learning systems. The fifth section examines adaptive management theory as a management effectiveness approach for understanding and managing the demands on protected areas. The sixth section discusses social systems analysis as the main research methodology used in this study. Finally, the chapter presents the research propositions, objectives, and thesis structure.

DEFINING MANAGEMENT EFFECTIVENESS

To begin with, it is important that I provide some definition of management effectiveness. There are, of course, as many definitions as there are researchers. One common approach, however, is to view management effectiveness as a concept that connotes a process of producing an intended result (Checkland 1985, Hocking et al. 2000). Smit and de Cronje (1997), using the basic principles of management, argue that in simple terms the concept implies a desire for the right thing to be done. They contend that this definition distinguished the concept from the related notion of management efficiency, which implies doing something right. Deshler (1982: 8) provides a definition that attempts to bring the two concepts together. He states that management effectiveness involves the "efficient and orderly use of human and material resources on a planned basis directed to achieve management objectives." Thus, in the context of protected areas, a typical assessment of management effectiveness would include design issues relating to protected area systems, appropriateness of management systems and processes, and delivery of protected area objectives (Hockings et al. 2000, Salafsky et al. 2001, Biggs and Rogers 2003, Hockings 2003).

It is important to recognize that the debates surrounding the concept of management effectiveness go to as far back as the 1950s, particularly in management science (Checkland 1985). These debates have largely centered on the concept's core characteristic, that of goal seeking. Opponents have accused the notion of goal seeking of being too idealistic to be applied to real-world problems (Checkland 1985, Walker et al. 2002). They argue that in real life goals change all the time, and as such, have no real value when applied to messy, ill-structured, real-world problems. On the other hand, proponents have argued that, since the essence of management is to produce results, it is only reasonable to use goals as a measure of those results (Coleman 1990). Whilst acknowledging that goals change from time to time, proponents contend that the notion of goal seeking is still useful particularly for analytical purposes (Smit and de Cronje 1997). In sum, I contend that the two perspectives illustrate the multi-dimensional character of management, an attribute that is inevitable given the complex nature of reality. Also, the two perspectives suggest that the concept is inherently ambivalent.

In this thesis I adopt a more holistic and pragmatic approach by transcending the implicit dichotomy in the two perspectives. I proceed by searching for a unifying framework in which one perspective incorporates the most important insights of both arguments. In that regard, I use a two-dimensional definition as used by Walker et al. (2002) and Anderies et al. (2004). Accordingly, I conceive effectiveness from two dimensions: productivity and robustness. Productivity is an aspect of effectiveness that refers to the capacity of a system to exploit, grow and produce outcomes (Walker et al. 2002). According to Walker et al. (2002), productivity is similar to the concept of maximizing income in investment portfolios. On the other hand, robustness refers to the capacity of a system to maintain desirable system characteristics in spite of fluctuations in the behavior of its component parts or its environment (Anderies et al. 2004). For Anderies et al. (2004), this aspect of effectiveness is particularly important in the context of social systems in which some components are consciously designed, such as a protected area agency and its management systems. Such a system characteristic, for example, would enable a protected area agency to adapt and learn following changes in its system environment (Anderies et al. 2004). For the purposes of this study, this conception of management

effectiveness provides a useful lens for examining the social environments of protected areas.

MANAGEMENT EFFECTIVENESS AND THE SOCIAL ENVIRONMENTS OF PROTECTED AREAS

Contemporary social theorists argue that a realistic description of the social environments shows that they largely consist of relationships among social actors (Wood and Gray 1991, Phillips et al. 2000, Manfredo et al. 2004). These theorists contend that such environments are deeply entrenched with social relationships to the extent that any study that underemphasizes them limits the analytic leverage of social science. Wilshusen et al. (2003), for example, explain that no contemporary protected area agency exists in isolation in social environments. Each is locked into a complex network of relationships with other social actors. Elsewhere writers have argued that the management of protected areas is predominantly a social process, rather than an ecological one (Wilshusen et al. 2003, Manfredo et al. 2004, Pomeroy et al. 2004). Bailey (1984) describes protected area management as necessarily a social process that defines and seeks to attain socially acceptable use of natural resources. For Berkes and Folke (1998), park management is people management. In that context, protected area management by definition is a complex social process that requires effective interactions between agencies, resources users and society members as a whole.

Despite the institutionalization of management effectiveness in protected areas (Pomeroy et al. 2004), social relationships involving agencies have proved to be difficult to manage compared to other types of relationships in the conservation sector. On one hand this could be attributed to inadequate appreciation of the nature of social environments as dynamic complex systems (Berkes and Folke 1998). On the other hand this is due to the inherent mutual interdependences on scarce natural resources among multiple social actors with divergent expectations and aspirations. The challenge of mutual interdependences is compounded by the ever-changing societal demands on protected areas (Rao 2003), which are in themselves constantly changing over time and space

(Salafsky et al. 2001), a situation that contributes to the complexity of social environments (Salafsky et al. 2001). The management of competing societal demands on protected areas is usually associated with perpetual conflicts which have far-reaching consequences for management effectiveness (Stankey and McCool 2004, Anne-Marie and Chimere 2006). As such, these insights provide this study with some understanding of the social dynamics that influence the management effectiveness of protected areas.

A structured approach to the study of management effectiveness requires an understanding of social systems that can help explain and assess management effectiveness from an holistic perspective (Lee 1993, Berkes and Folke 1998, Folke et al. 2002). Yet, it is surprising that management effectiveness research has concentrated mostly on the biophysical system perspective. One could indeed ask the question as to why research has adopted a systems approach to the biophysical and not to the social systems. Although this focus has in some instances incorporated some aspects of social analysis, such as the assessment of socio-economic variables that can help protected area managers to monitor stakeholder concerns and interests (Pomeroy et al. 2004), little attention has been given to the analysis of social systems. Whilst it could be argued that there are exceptions to this trend, such as the works of Holling (1973), Lee (1993), Manfredo et al. (2004) and the Resilience Alliance (www.ecologyandsociety.org), most studies have not explicitly and specifically analyzed the processes located in the changing structures of social systems over time. As such, I propose that analysis of social attributes through a systems approach is central to the study of the management effectiveness of protected areas.

SOCIAL RELATIONSHIPS AND COLLABORATION

For some time, there has been interest in research on collaboration in the management of social-ecological systems (Folke et al. 2002, Walker et al. 2002, Berkes et al. 2003). This interest has been partly premised on the need for social actors to work together to enhance the management effectiveness of protected areas (Pinkerton 1999). Although the concept of collaboration is not necessarily viewed as a panacea for all protected area

problems (Hardy and Phillips 1998, Imperial 2004), researchers generally agree on why studies of collaboration are necessary. Firstly, it is believed that collaboration is real and has an existence in the real world (Huxham 1986). Social actors throughout the world are voluntarily and involuntarily establishing collaborative schemes. The fact that collaboration is happening directs research to understand the nature of this phenomenon. Secondly, it is assumed that collaboration generates desirable benefits (Imperial 2004). Collaborative arrangements are seen as a means of achieving goals that would be difficult for individual social actors to attain. Also, in the context of protected area management, collaborative behaviors are viewed as an important means for managing societal differences (Brunner 2002). The inherent societal values of collaboration necessitate scientific enquiry. Thirdly, it is understood that collaborative schemes are difficult to manage (Pinkerton 1999, Brunner 2002). Collaborative schemes often involve actors with multiple interests and perceptions, which render collaboration a potential arena for conflict (Ostrom 1998). The inherent managerial challenges of conflict in collaboration justify calls for studies.

The third reason is of particular importance to this study. This is because evidence has shown how the management of collaborative behaviors is presently one of the major challenges facing the management effectiveness of protected areas. MacKinnon et al. (1986), for example, demonstrate how the management of behaviors in tourism concessions in national parks has in most cases failed to meet the goals of collaboration between conservation agencies and private business organizations. Brunner (2002) shows how community-based schemes involving multiple government agencies and interest groups usually result in conflicts of interests and perspectives in the protection of endangered species in protected areas. Turton et al. (2005) show how the management of partnerships associated with rivers is still a significant social dilemma for protected areas. Selin (2004) illustrates how institutional barriers continue to hinder the widespread adoption and support of collaboration between protected area agencies and their constituencies. The evidence presented by these and other authors generally points to the fact that collaborative behaviors have proved to be challenging to the management effectiveness of protected areas.

Notwithstanding the increasing appreciation and complexity of collaboration, little attention has been given to the application of relationships theory in management effectiveness research on collaboration. Particularly, most studies have not been taking sufficient account of the need for dynamic long-term relationships that underlie collaborative schemes. Despite a few notable exceptions (such as Ostrom 1990, Imperial and Kauneckis 2003), few scientific enquiries have explicitly given attention to the changing nature of long-term relationships. Most commonly, relationships theory has been evidenced by implication rather than through specific and explicit application. Arguably, collaborative schemes in protected areas are founded on complex long-term social relationships that involve multiple interest groups with divergent perceptions, expectations and experiences (Brunner 2002). These relationships are usually characterized by behavioral processes through which interest groups influence each others' behaviors over a period of time in order to advance individual and shared goals (Imperial 2004). Ostrom (1998) contends that the behavioral processes underlying such relationships are important in determining the effectiveness of collaboration. Not surprisingly, perhaps, most studies on collaboration have not been taking sufficient account of the behavioral processes that underlie long-term relationships.

A behavioral approach provides a useful perspective for examining the relationships that underlie collaborative schemes (Hardy and Phillips 1998, Phillips et al. 2000, Kinnaman and Bleich 2004, Selin 2004). Such a perspective offers a useful lens for examining the effects of long-term relationships on collaborative initiatives. Of fundamental significance to this study, however, the perspective facilitates understanding of how to better manage relationships in collaboration schemes through human behavioral processes (Knoke 1990, Hutchison 2003). Not only can such a perspective enhance the integration of behavioral science into management effectiveness research (Kinnaman and Bleich 2004), but also it can help us better understand the behavioral processes required for effective management of protected areas. Therefore, I propose that research on the role of a behavioral approach to relationships theory is necessary for analyzing collaborative processes.

INTEGRATED LEARNING SYSTEMS

Learning is increasingly becoming a key prerequisite for the management effectiveness of protected areas (Berkes and Folke 1998, Johnson 1999, Gunderson and Holling 2002, Folke et al. 2005). In the context of protected areas, learning is particularly necessitated by the dynamic nature of these areas, which are susceptible to discontinuous change that leads to greater uncertainty (Rogers 2003). To maintain the competence to cope with uncertainty, collaborative actors have to engender ongoing knowledge creation processes (Berkes et al. 2003, Biggs and Rogers 2003). By definition, learning entails a collective process of building, upgrading and enriching the knowledge and skills of parties to a collaborative relationship (Allee 1997, Johnson et al. 2004). It focuses on the parties' learned ways of behaving in collaborative relationships by aligning and fostering their competences to deal with emergent issues and problems (Ireland et al. 2002). The extent to which parties collaboratively learn how to realize the benefits they desire is essential to the management effectiveness of protected areas (Folke et al. 2005). In so doing, parties behave in ways that enhance the effectiveness of collaboration.

The establishment and maintenance of an integrated learning system for protected areas requires an understanding of governance learning and management learning (Folke et al. 2005). The strongly coupled connections between the two subsystems influence the performance of an integrated learning system. It is important that performance indicators of an integrated learning system reflect the effectiveness of the two subsystems (Bossel 2001). The derivation of such indicators must acknowledge that the creation of knowledge through governance learning and management learning occurs in a dynamic context of information flows which link multiple actors in an integrated learning system (Nonako 2004). Thus, the degree to which social actors are connected in an integrated learning system provides the premise on which those actors share information to create the knowledge required for effective protected area governance and management.

While some aspects of adaptive governance (Olsson et al. 2004, Folke et al. 2005) and adaptive management (Rogers 1998, Johnson 1999, du Toit et al. 2003) have been discussed in literature, the link between governance learning and management learning has remained largely unattended. Little attention has been explicitly given to the functional linkage between governance learning and management learning. Yet an integrated perspective provides a potentially useful framework for explaining and improving knowledge creation processes around which the concept of adaptability is structured and implemented (Biggs and Rogers 2003). To enhance such processes, we need to understand that successful adaptability for protected areas largely depends on the effectiveness of the efforts to integrate governance learning and management learning. Accordingly, I propose that research on integrated learning systems is essential if we are to successfully promote learning as a fundamental component of the governance and management of protected areas.

ADAPTIVE MANAGEMENT OF DEMANDS ON PROTECTED AREAS

Adaptive management is one of the main management effectiveness approaches for protected areas (Hockings et al. 2000). Others include limits of acceptable change, recreation opportunity spectrum, goal-oriented planning, management-by-objectives, logical framework, visitor impact assessment, environmental impact assessment and strategic planning process, just to mention a few (Holling 1978, Bell 1984, Brown 1984, Hocking et al. 2000, Salafsky et al. 2001, Biggs and Rogers 2003, McCool et al. 2007). The use of adaptive management began in the 1970s as a response to the challenges surrounding complexity, change and uncertainty as they relate to the use and management of natural resources (Holling 1973, 1978). While adaptive management is not necessarily the 'best' approach, it provides a useful systems approach for coordinating and harmonizing the activities of protected areas agencies (Berkes and Folke 1998, Johnson 1999, Gunderson and Holling 2002, Folke et al. 2005). It is basically premised on the need for agencies to develop organizational competences needed to adapt to the complex, ever-changing and uncertain conditions of protected areas. It does this by integrating design, monitoring and evaluation in protected area

management processes to systematically test assumptions in order to adapt and learn (Salafsky et al. 2001, Rogers 2003).

Adaptive management is premised on the principles of collaboration, whereby it attempts to incorporate the views and knowledge of interested and affected parties in the decision-making processes of protected areas (Berkes and Folke 1998, Johnson 1999, Folke et al. 2005). Given the nature of ever-changing competing demands on protected areas, agencies are encouraged to find better ways in which to work collectively with other social actors. However, it is acknowledged that management must proceed even with limited information and understanding about key determinant variables (Salafsky et al. 2001). In this way adaptive management is not only viewed as a collective decision-making process for protected areas, but also as a means for creating knowledge (Johnson 1999). The creation of knowledge in protected area management is thus viewed as a key attribute of adaptive management (Rogers 2003). This understanding stems from the perspective that management actions have to be treated as experiments (Holling 1995). Protected area agencies are encouraged to treat management plans as hypotheses to be tested in practice. Such plans have to be continuously refined, corrected or rejected depending on the outcomes of particular management interventions, and in so doing 'learning by doing' becomes the means of management effectiveness for protected areas (Salafsky et al. 2001).

In general, protected areas are established in response to demands expressed by society over time and space (Bell 1984, Brown 1984, Brechin et al. 2003, Child 2004). However, despite the potential significance of adaptive management, systemic social analyses of demand management processes in protected areas have largely been missing in management effectiveness research. Most studies have not been taking sufficient account of how agencies manage competing societal demands on protected areas through adaptive management processes. Little attention has been explicitly given to the changing nature of competing societal demands (Wilshusen et al. 2003). And as a consequence, demand management has been typically assumed to be based on fixed technical instruments, such as quota setting exercises and carrying capacity assessments, as if demands were not

affected by changes in the social environment of protected areas (MacKinnon et al. 1986). This assumption has entailed improving the accuracy of demand forecasts and the use of the biophysical characteristics of demands to determine inventory and capacity requirements for protected areas agencies. Hence, research on societal demands has been reduced to a technical assessment of values and associated benefits, with relatively little attention being given to the social implications for management effectiveness (Anne-Marie and Chimere 2006). I therefore propose that research on adaptive management theory is necessary for understanding and effectively managing demands on protected areas.

SOCIAL SYSTEMS ANALYSIS

In this thesis I present concepts and principles which build on the new developments in systems thinking. The approach of systems thinking is essentially premised on the basic assumption that life on earth is governed by the laws of systems (Senge 1990). It could be argued that protected area agencies deal with systems, be it consciously or unconsciously, when managing in social environments. They do not merely deal with single social components. This is more the reason why the social environments of protected areas are associated with multiple actors, multiple relationships, and multiple demands (Wilshusen et al. 2003). Dynamic interconnections between such social variables could lead to greater uncertainty and limited predictability. In order to effectively deal with multiple social variables and their interconnections, systems thinking encourages us to use multiple perspectives and scales when analyzing and intervening in the social environments of protected areas (Nina-Marie and Kay 1999).

The philosophy of systems thinking suggests that the competent management of real-world problems requires an appreciation of real-world system complexity, change and uncertainty (Bossel 2001). Senge (1990: 69) attributes global system complexity, change and uncertainty to the fact that "humankind has the capacity to create far more information than anyone can absorb, to foster far greater interdependency than anyone can manage, and to accelerate change far faster than anyone's ability to keep pace." As

such, the philosophy of systems thinking is increasingly being applied in various disciplines such as ecological studies, ecological economics, integrated natural resources management, business management, post-normal science, and resilience analysis (Checkland 1985, Senge 1990, Walker et al. 2002). Similarly, research on the management effectiveness of protected areas needs to grapple with system complexity, change, and uncertainties. Such research should come to terms with the understanding that the world is increasingly becoming more complex and generating more change and uncertainty.

It is essential for research on the management effectiveness of protected areas to improve understanding of the dynamics that underlie complexity, change and uncertainty in the social environment of protected areas. Research needs to deal with problems that emerge from real-world system complexity, change and uncertainty. These problems are inherently multi-scale and involve interactions across different variables (Walker et al. 2002). Such a research agenda can only be adequately advanced by attending to social systems analysis. Studies on management effectiveness, however, have not been giving explicit attention to social systems analysis. Particularly, social systems analysis has rarely been used to examine processes located in the changing structures of social systems over time As such, the research methodology adopted for this study is social systems analysis. It is envisaged that this methodology, with its emphasis on a systems-based approach, will be used to reorient the study of management effectiveness into social environments.

RESEARCH PROPOSITIONS, OBJECTIVES AND THESIS STRUCTURE

It is in the light of the above discourse that the research issue addressed in this study was how to improve the understanding of social systems analysis in management effectiveness research on protected areas. To explore this issue, I derived four key propositions which provided an analytical framework for this study;

- analysis of social attributes through a systems approach is central to the study of the management effectiveness of protected areas;
- research on the role of a behavioral approach to relationships theory is necessary for analyzing collaborative processes;
- research on integrated learning systems is essential if we are to successfully promote learning as a fundamental component of the governance and management of protected areas; and
- research on adaptive management theory is necessary for understanding and effectively managing demands on protected areas.

The main objective of this research was to contribute to the improved understanding of social systems analysis in management effectiveness research on protected areas, with special reference to adaptive management. Its specific objectives were to:

- develop propositions for incorporating the analysis of social systems into management effectiveness research;
- examine the role of a behavioral approach to relationships theory in analyzing collaborative processes;
- analyze the connection between governance learning and management learning as a fundamental component of integrated learning systems;
- explore adaptive management theory as a management effectiveness approach for understanding and managing demands; and
- synthesize the propositions to explore the challenges and opportunities of applying them at a broader scale in management effectiveness research.

This thesis consists of a series of papers that have been published in, or prepared for submission to, a range of scientific journals. Whilst I have led the development of the papers, I have acknowledged the contribution of others where appropriate. The paper presented in Chapter 2 articulates a social relationships perspective of collaboration in the management of social-ecological systems. It provides a conceptual premise for understanding the dynamics of social relationships that underlie collaborative processes.

A framework based on resilience and social relationships theories is developed for analyzing effective collaboration. The elements of a behavioral approach to relationships theory are discussed as a foundation for resilient social relationships. The paper demonstrates that an analysis of resilient social relationships for effective collaborative management of social-ecological systems requires an understanding of the complexity and extent of relational change. By incorporating the models of Holling (1995) and Cousins (2002) into a behavioral approach to relationships theory, the paper proposes a conceptual framework that can be used to determine the potential for relational change based on relational capital and the degree of relational connectedness in the social relationships that underlie collaborative processes.

The paper presented in Chapter 3 illustrates that the strongly coupled connections between the two governance learning and management learning subsystems influence the performance of an integrated learning system. Performance indicators of an integrated learning system need to reflect the effectiveness of the two subsystems. The derivation of such indicators must acknowledge that the creation of knowledge through governance learning and management learning occurs in a dynamic context of information flows which link multiple actors in an integrated learning system. As such, I suggest that the degree to which social actors are connected in an integrated learning system provides the premise on which those actors share information to create the knowledge required for effective protected area governance and management.

In Chapter 4, I present a paper that illustrates that protected areas are established in response to demands expressed by society over time and space. These demands are varied and commonly involve protection of natural and cultural heritage so that society can continue to enjoy them into the future. As the demands placed on protected areas continue to evolve and expand, so do their expressions which are expected to be reflected in the form of mental models in management planning processes. Accordingly, I argue that much of society's perception of successful protected area management is determined by how management agencies understand, respond to and manage demands. Hence, for

protected area management to be effective, agencies must incorporate mental models into adaptive management of demands.

In Chapter 5, I provide an analysis of the collaborative arrangements in fire and water management in Kruger National Park. The analysis is conducted in the context of strategic adaptive management (SAM). The SAM approach was developed for the park to support and facilitate adaptive management in the rapidly evolving, multidimensional world of protected area management decision making. It focuses on pragmatic, goal-orientated adaptive management to emphasize its orientation towards management effectiveness. The SAM approach draws largely on the broader philosophy of adaptive management, whereby it affirms that the effective management of protected areas requires an appreciation of complexity, change and uncertainty. Therefore, SAM responds to the challenges and opportunities posed by the three phenomena by highlighting the need for protected area agencies to develop and maintain their competences to learn and adapt.

In Chapter 6, I synthesize the propositions by exploring the challenges and opportunities of applying them at a broader scale in management effectiveness research. These propositions are developed in Chapter 1 for incorporating the analysis of social systems into management effectiveness research. The propositions are applied in Chapters 2 to 5 to systematically analyze the main theoretical frameworks on which this thesis is premised. The application of the propositions provides useful insights into social systems analysis and management effectiveness research.

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2

Resilient Social Relationships and Collaboration in the Management of Social-Ecological Systems*

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INTRODUCTION

Collaborative strategies are increasingly being promoted as a means of addressing problems associated with the management of social-ecological systems (SESs) (Folke et al. 2002, Walker et al. 2002, Berkes et al. 2003). Whilst the concept of collaboration is not necessarily viewed as a panacea for all social-ecological problems (Hardy and Phillips 1998, Imperial 2005), the need for social actors to work together to enhance the capacity of SESs to cope with intermittent shocks has continued to receive enthusiastic attention (Berkes and Folke 1998, Blumenthal and Jannink 2000, Tompkins and Adger 2004, Newman and Dale 2005). Notwithstanding a growing appreciation of the importance of collaboration, little attention has been explicitly given to the dynamic long-term social relationships that underlie collaborative schemes in the management of SESs. Despite a few notable exceptions (such as Ostrom 1990, Imperial and Kauneckis 2003), most studies have not been giving explicit attention to the changing nature of long-term social relationships. These relationships are usually characterized by processes through which collaborative actors influence each others' behaviors over a period of time to advance individual and shared goals (Axelrod 1984, Ostrom 1998). To understand such relationships, we need to understand the behavioral processes through which collaborative schemes evolve over time. Not surprisingly, perhaps, the behavior of actors

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over time is most commonly evidenced by implication rather than through specific and explicit application in research.

In this paper we propose and articulate a conceptual framework based on theories of resilience and social relationships for analyzing the behavioral processes of dynamic long-term social relationships that underlie collaborative arrangements in the management of SESs. We argue that an analysis of such processes requires an understanding of the complexity and extent of relational change. The framework we propose can be used to determine the potential for relational change as well as to categorize relationships based on the amount of relational capital and degree of relational connectedness. These elements of a behavioral approach to relationships theory are proposed as a foundation for resilient social relationships. Not only can such a perspective help us better understand and improve dynamic collaborative schemes, but also it can assist us advance the integration of human behavioral sciences into SES research.

CONCEPTUALIZING COLLABORATION AND RELATIONSHIPS

Different authors use different ways to define collaboration (see Wood and Gray 1991, Hardy and Phillips 1998, Phillips et al. 2000, Kinnaman and Bleich 2004, Selin 2004). For the purposes of this paper, we conceive collaboration as a behavioral process that involves different actors working together to create more benefits than could be produced in unilateral settings (Hall 1995, Imperial and Kauneckis 2003, Kinnaman and Bleich 2004, Imperial 2005). This process is founded on long-term relationships through which actors influence each others' behavior over a period of time to advance common and individual interests (Ostrom 1998, Cousins 2002). The benefits advanced for collaborative efforts include reduced transactional costs (Wood and Gray 1991), greater social-ecological resilience (Walker et al. 2002), enhanced performance (Imperial 2004), and improved governance (Imperial 2005). Following Bardach (2001) and Hardy and Phillips (1998), however, we do not view collaboration as a 'fix-all' strategy for all social-ecological problems. Its significance and appropriateness will depend on a range of

contextual, preferential and contingency factors (Wondolleck and Yaffee 2000, Imperial 2005). Accordingly, actors operating in particular SESs may opt for any of the several strategies of engagement such as toleration, avoidance, compliance, contention, and contestation (Hall 1995, Huxham 1996, Hardy and Phillips 1998, Cousins 2002), just to mention a few.

The term relationship means the manner in which actors interact with other actors, be they persons, groups, communities, or organizations (Ford et al. 1998). The state of interactions evinces the mode in which actors behave towards each other. By behavior, we mean the way in which actors act or do the things they do (Hutchison 2003). Whereas consistent patterns of actions constitute behavior and consistent patterns of behavior make up a behavioral style (Hall 1995), a single interaction between actors is called an episode (Ford et al. 1998). Each episode is shaped by the history of interactions in a relationship, and ultimately exerts influence on the future of that relationship (Axelrod 1984). Interactions unfold over time as actors act, react, and react to reactions thereby yielding long-term relationships (Hakansson and Snehota 1995).

Whilst it is not the intention of this paper to engage paradigmatic debates, broadly speaking two schools of thought that explicitly deal with relationships in social and behavioral sciences can be identified: social exchange and network approaches. The social exchange approach, whose contribution is mainly attributed to Blau (1964), seeks to understand the underlying processes that engender social interactions between actors. It examines processes that regulate social relationships over time, and is premised on the understanding that human behavior is predisposed to maximizing benefits and minimizing costs (Emerson 1987). On the other hand, the network approach analyzes the structures that emerge and constrain social interactions (Granovetter 1985, Knoke, 1990). It is typically founded on socio-grams which illustrate the links among network members (Newman and Dale 2005). Following Blau (1987) and Granovetter (1990), however, this paper recognizes that the two approaches are both useful frameworks for studying important social phenomena such as relationships. Given that they provide contrasting, and not necessarily comparative theoretical perspectives, they are based on different units

and levels of analysis, and thus may use different concepts and tools. In a sense, the two approaches deal with different aspects of social life, and each tries to explain phenomena which the other assumes to be given. Thus, they are not mutually exclusive.

In this paper the analytical approach is founded on a process-view of relationships. Our interest is the behavior of actors over time (Pettigrew 1973, 1990). From this perspective, the long-term relationships that underlie collaborative schemes in the management of SESs should not be construed as entities, but rather as dynamic behavioral processes. As with all behavioral processes, they should be viewed as having outcomes, no matter how definable or indefinable those outcomes may be (Cousins 2002, Kinnaman and Bleich 2004). Such a perspective denotes how mutual adaptations in behavioral interactions take place between actors involved in collaboration. The adaptations provide premises on which collaborative actors rationalize their behavioral styles. We cannot therefore fully understand the behavioral style of an actor without an understanding of how it is linked to relational change.

A FRAMEWORK FOR ANALYZING RELATIONAL CHANGE

Change is an inherently pervasive variable in the process of managing long-term social relationships. According to Ford et al. (1998: 26), managing long-term relationships is not "a linear process of moving them in one direction towards some ideal state." It involves parties coping with discontinuous change in different circumstances at different times as they interact with each other. Most approaches to interpreting change in social relationships have been inadequate partly because they describe the development of relationships from initiation to stability. The concept of stability, however, has proved to be a difficult one for those researching collaboration (see Hakansson and Snehota 1995, Ford et al. 1998, Imperial 2005). As illustrated in this paper, most long-term relationships evolve through periods of instability. Also, it is important to note that not all relationships reach relative stability. Contemporary theoretical developments, therefore, stimulate a need to expand the range of frameworks to be used for interpreting change in social relationships.

We argue that a resilience approach offers a better perspective to the study of change in long-term social relationships, specifically those that underlie collaborative schemes in the management of SESs. We propose a conceptual framework which represents the phases of an adaptive cycle of long-term relationships in collaborative schemes. We postulate that long-term relationships, as complex behavioral processes, have a tendency of moving from an opportunistic state through collaborative and adversarial states into a tactical phase. The framework can be used to determine the potential for change based on the amount of relational capital and the degree of relational connectedness. These elements of a behavioral approach to relationships theory are proposed as a foundation for resilient social relationships.

The essence of the framework is to facilitate understanding and building of resilient social relationships for effective collaboration through interpreting and managing relational change. Without a sound theoretical underpinning we risk omitting the critical determinant variables that can help explain and predict effective collaboration. In this context, the centrality of relationship theory in the process of integrating human behavioral sciences in SES research cannot be overemphasized. Our framework however should be construed as a related set of explicit assumptions that can be used to better understand and improve collaboration. We acknowledge that our assumptions are inherently incomplete and will evolve as new understandings of collaboration emerge. Issues that are strongly related to resilience in collaborative arrangements form the basis for the assumptions. We believe that effective collaboration in the management of SESs should be founded on resilient social relationships.

The two foundational models

The framework we propose builds on the works of Cousins (2002) (relationships theory) and Holling (1995) (resilience theory). Cousins (2002) proposes a model based on four types of inter-organizational relationships; adversarial, tactical, opportunistic, collaboration (see Figure 2.1). His model provides an approach for viewing different

types of inter-organizational relationships using a matrix comprising two dimensions, dependency and certainty. The two dimensions influence how organizations make choices about what types of relationships are appropriate to deliver desired outputs. Whilst a number of approaches have been developed for classifying relationships (see Wood and Gray 1991, Huxham 1996, Imperial 2005), Cousins' (2002) model is particularly important in that it illustrates how organizations manage risks in relationships based on strategic decisions. Using game theory, the model provides a way for organizations to select and manage competitive relationships. The model, however, fails to explicitly expose the dynamic nature of long-term relationships, which is of utmost interest to this paper. As such, it may not be that useful for interpreting change in social relationships.

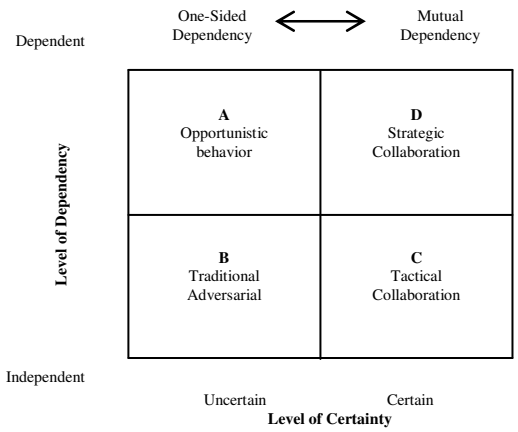

Figure 2.1: A model for viewing different types of inter-organizational relationships using a matrix comprising dependency and certainty dimensions (***Source:*** Cousins 2002).

Holling (1995) proposes a 'figure eight model' which was originally designed to interpret the dynamics and resilience of complex ecosystems, which are thought to go through phases of an adaptive cycle (see Figure 2.2). The model is based on two dimensions, connectedness and amount of stored capital, which determine the exploitation, conservation, release and reorganization phases of ecosystems. It is assumed that complex ecosystems move from rapid exploitation into a mature phase called conservation. As this phase develops an ecosystem would become more rigid thereby

exposing the system to greater vulnerability. Eventually a disturbance would trigger sudden collapse, which is followed by a re-organization phase. Depending on particular circumstances, the system would then restart the adaptive cycle or move into a new configuration, as showed by the exit arrow at the left of Figure 2.2. In this context, resilience refers to the amount of change a system can undergo while maintaining its function and structure (Holling 1973, Walker et al. 2006). It also entails the degree to which the system is able to self-organize and renew following disturbances (Berkes et al. 2003).

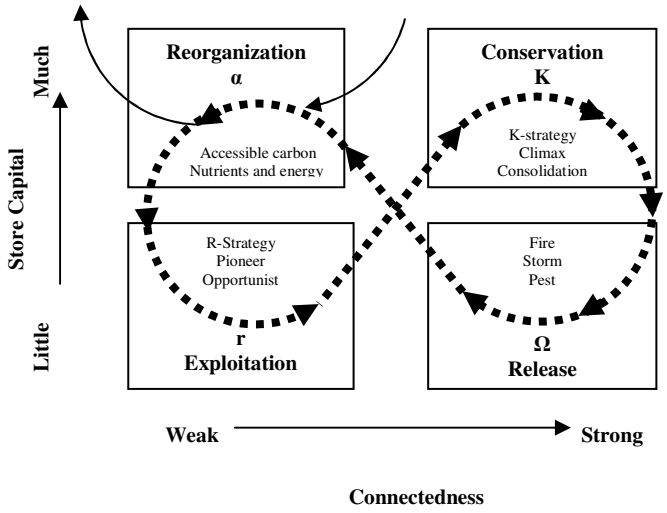

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Figure 2.2: The four ecosystem functions and the flow of events between them (***Source:*** Holling 1995).

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We acknowledge that a number of other people have also modified and applied Holling's model to a range of complex systems. Berkes and Folke (1998), for example, have mobilized a collection of interesting case studies which illustrate the application of the model. Also, Abel et al. (2006) provide a brief account of similar studies. According to resilience theory, only two conditions have to be met if we are to apply Holling's model to systems other than ecosystems. Firstly, such systems must be describable in dynamic terms and secondly, they must have potential to move into multiple phases (Holling 1986, Berkes et al. 2003). We are of the view that the two conditions are met by most dynamic

human processes, and thus the model can as well be applied to long-term social relationships. Given that humans have values and the ability to envision the future, we recognize that such an endeavor must be done with extra precautions. This understanding, however, does not stop scientists from experimenting, learning, probing, and confronting uncertainty through innovative models (Walker 2000). We need a variety of models to interpret the changing nature of the long-term social relationships that underlie collaborative schemes in the management of SESs. Accordingly, by incorporating the models of Holling (1995) and Cousins (2002) into a behavioral approach to relationships theory, the conceptual framework we propose in Figure 2.3 can be used to examine change in such relationships, and to categorize and explain problematic episodes in collaborative schemes; thereby enabling focused corrective measures.

Relational change and its key mediating variables

Relational change is defined by the degree of stability and instability of social relationships (Hakansson and Snehota 1995). Although the two terms, stability and instability, may seem contradictory, in the context of long-term social relationships they coexist and are inseparable. Whereas the structure and function of collaborative schemes may appear relatively stable, the strength of underlying relationships changes discontinuously in response to multiple factors. Relationships may grow stronger or weaker to reflect the correlation between stability and instability. Thus, given the issues of bounded rationality (Williamson 1985), a collaborative actor has to jostle with unpredictable change surrounding the nature and character of the behavior of the other parties. For example, given the previous unimpressive socio-political record of most governments in the establishment of parks in southern Africa, some local communities were initially skeptical about governments' intention to genuinely involve them in collaborative wildlife management schemes. This led governments and donor agencies to invest financial resources in community projects to demonstrate their commitment to collaboration (Kiss 1990). In a way, these efforts helped in changing the nature of the long-term relationships between these actors.

Although we are aware that change in long-term relationships can be initiated by either the parties involved or contextual factors, for the purposes of this paper we suggest that the potential for change is in large part mediated by the amount of relational capital and degree of relational connectedness. We propose that the two mediating variables represent the extent of change that a collaborative scheme would have to experience before its underlying relationships move into different phases. The two variables, through repeated interactions between parties, can generate multiple phases for relationships in particular social environments (Axelrod 1984). Accordingly, we suggest that multiple phases of relationships provide the substance of dynamic collaborative schemes in the management of SESs.

Relational capital refers to the stock of socio-psychological attributes of social relationships. Following Cullen et al. (2000), we consider trust and commitment as the two key attributes of relational capital. We propose that particular levels of these attributes mediate change in social relationships. Whilst the two attributes are not necessarily the only forms of social capital, most relationships theorists view them as particularly important determinants of the levels of relational capital. Trust is a socio-psychological state in which a party to a relationship adopts a belief that the other parties will not act against its interests (Luo 2002). As a socio-psychological state, it evolves from an actor's past experience, current interactions, and expectations. Commitment, on the other hand, refers to the energies and resources invested by parties in building long-term relationships. It denotes the extent to which parties believe that a relationship is worth expending energies and allocating resources on. Importantly, it evinces the readiness of parties to do more than is formally expected (Ireland et al. 2002).

Relational connectedness refers to the degree to which actors in social relationships are linked and the strength of links which mediate change in social relationships (Hakansson and Snehota 1995). For the purposes of this paper, actors in relationships are linked primarily through bonds, activities and resources (Ford et al. 1998). The bonds dimension denotes the various ways in which actors perceive and respond to each other socially and professionally. The activities dimension refers to the connections among the activities of

actors, and how such connections affect choices about how to share activities. The resource ties dimension evinces how the resources of actors are tied together and how such ties evolve as actors exchange or access each other's resources. Although the three are not necessarily the only dimensions for examining connectedness, they provide a useful approach for analyzing the substance of change in social relationships.

The adaptive cycle of long-term social relationships

It is from the perspective of relational capital and relational connectedness that behavioral processes are vital in interpreting change in the long-term social relationships that underlie collaborative schemes. The two variables provide the basis of change to the extent that they enable relationships to grow, mature, collapse, and reorganize based on mutual adaptations in behavior. As shown in Figure 2.3, long-term relationships go through phases of an adaptive cycle. The opportunistic phase represents a phase during which new opportunities for collaboration are rapidly engaged. It is characterized as a growth phase where actors capture easily accessible relational capital. Whereas the potential for change is lowered through engaging new opportunities, relational connectedness is however focused in terms of the identified new opportunities. Given the relatively low levels of relational capital, however, opportunities arise for parties to behave opportunistically (Williamson 1985).

In Zambia, for example, the early years of collaborative wildlife management involving government, donor agencies and local communities were characterized by instances when community representatives diverted project funds to personal purposes (Nkhata 2005). Although such practices can exist even within established collaborative schemes, this example demonstrates situations where an actor faces a counterpart who it may not know well or trust, and whose commitment might be questionable.

Growth in social relationships gives way to conservation as relational connectedness expands and relational capital is consolidated (Figure 2.3). We refer to this emergent phase as the collaborative phase where slow accumulation of relational capital and

increased relational connectedness result in complex structures of interactions. Social relationships in this phase have the advantage of functioning through cooperative rather than market or bureaucratic instruments (Huxham 1996, Lawrence et al. 1999). Thus, it is possible in the collaborative phase to find parties that offer benefits to others even when they get nothing tangible in return. Whilst such behaviors may encourage mutual cooperation, they are not necessarily altruistic in nature. Although it is impossible to predict the timescale on which particular relationships will attain this phase, it is important to note that cooperative behaviors in this phase are the emergent result of continuing interactions between parties (Axelrod 1984). Such interactions are based on exchanges which may not necessarily involve material artifacts, but also other intrinsic behavioral variables such as bribes, promises, gifts, rewards, and even sanctions.

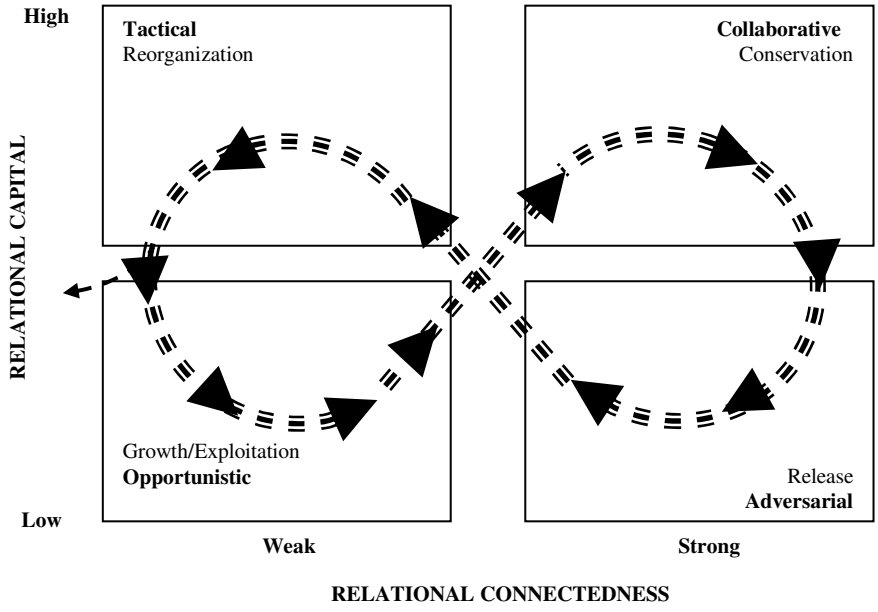

Figure 2.3: A framework based on relational capital and relational connectedness for analyzing change in long-term social relationships (Adapted from Holling [1995] and Cousins [2002]).

Empirical cases of emergent cooperative behavior have been recorded in collaborative wildlife management in Namibia (Jones 2001), watershed governance in the Lake Tahoe Basin (Imperial and Kauneckis 2003), and transnational river management in the Zambezi River Basin (Turton et al 2005). In the United States, for example, repeated interactions between parties involved in the governance of Lake Tahoe generated changes

in long-term intergovernmental relationships between public agencies and civil society actors (Imperial and Kauneckis 2003). The transformation of these relationships from being conflict-based to cooperative interactions resulted in the evolution of watershed governance in the Lake Tahoe Basin.

As the relationships progressively become more conservative, and thus more vulnerable to relational change, conservation gives way to release (Figure 2.3). We refer to this emergent phase as the adversarial phase when connectedness is strong but in which the capability for change is low because of the complexity of expanded connectedness and a growth in adversarial behavior. Given that the relationships under this phase are founded on low levels of relational capital, the potential is high for them to generate conflict which is associated with significant administrative and coordination costs (Lubell 2004). As Ford et al. (1998) suggest, although the sources of some conflicts are beyond the control of parties, the degeneration of most relationships into adversarial phases can occur as a result of enduring patterns of interactions which give rise to the institutionalization of behavioral routines. At Lake Mburo National Park in Uganda, for example, behavioral routines that previously allowed the relationships between park staff and local communities to operate with low transactional costs were over time not questioned (Hulme and Infield 2001). As a result, parties paid less and less attention to routines such as holding regular meetings, sharing of revenue from the park, compensating loss of livestock to wild animals, and rewarding informers of illegal activities, thereby creating conditions for relationships to collapse. Notwithstanding the important effects of institutionalization, such moments are a common feature in long-term park-people relationships (Brechin et al. 2003).

Release in relationships gives way to reorganization during which a collaborative scheme is reorganized through the emergence of new tactics and opportunities (figure 2.3). During the tactical phase, whereas the capability for change is high due to the re-strengthened relational capital, connectedness is low as it is regaining focus. Depending on particular conditions, reorganization may result in opportunism once again, thereby triggering the system into yet another adaptive cycle. As the exit arrow at the left of

Figure 2.3 suggests, reorganization may also lead to a shift into a new configuration of less or more cooperative behaviors. Reorganization in long-term relationships is evidenced in practice in many ways including the crafting of local rules for the onshore traditional fisheries in Alanya, Turkey (Ostrom 1990); the institutionalization of science practices in the National Estuary Program in the Unites States (Lubell 2004); and the establishment of water commissions in southern African (Turton et al 2005).

Based on the foregoing and building on existing literature, it is suggestive that long-term relationships vary as behaviors evolve over time. They change into different phases which shape the nature of collaborative arrangements. Multiple interactions between parties generate different phases through which collaborative actors rationalized their behavioral styles. It is important to note that whilst the four phases of relationships are distinguishable, in reality they find expression simultaneously and to different extent at any stage of exchanges between actors. It should also be realized that relationships do not necessarily move into each of these phases in a predetermined manner. Some relationships will, of course, fail to strengthen, whilst others will be short-lived due to various factors. The conceptual framework in Figure 2.3, therefore, should be construed as a representation of relationships that are long lasting and pass through situations that are potentially problematic in reality.

CONCLUSION: RESILIENCE IN LONG-TERM SOCIAL RELATIONSHIPS

We have attempted in this paper to provide a social relationships perspective of collaboration in the management of SESs. In so doing we have provided a conceptual premise for understanding the dynamics of long-term social relationships that underlie collaborative processes. Arguably, a resilience approach offers a better perspective to the study of change in long-term relationships. An analysis of resilient social relationships requires an understanding of the complexity and extent of relational change. The conceptual framework we have developed highlights the elements of a behavioral approach as a foundation for resilient social relationships. The resilience of long-term social relationships denotes the competence of actors to maintain relationships in socially

desirable phases and to allow relationships to reorganize following disturbances. In other words, relational resilience enhances the competence of actors to cope with change in various situations. It is important, however, to realize that not all aspects of resilience are necessarily essential. This is because some undesirable phases of social relationships can be highly resilient. For example, actors would continue to invest considerable effort in dealing with adversarial partners even when there are no apparent desirable outcomes. In such cases, it might be important to identify the behavioral processes that help maintain such undesirable relationships.

The conceptual framework is designed to illustrate how actors can build resilient collaborative relationships based on the levels of relational capital and degree of relational connectedness. It shows how actors can make decisions about how to shape the nature and quality of long-term social relationships. Based on the two variables (relational capital and relational connectedness), actors can either change or maintain forms of relationships that buttress the interests of all parties. We postulate that collaborative schemes in the management of SESs largely fail due to incompatibilities between the two variables. When these variables are not effectively managed misunderstandings and disagreements between actors emerge. To that end, the framework enables actors to categorize forms of relationships and to identify those behaviors that exert negative influence on collective decision-making processes. As such, the framework allows actors to determine where remedial interventions may be required. The framework does not only allow actors to understand consistent behavioral patterns, but also it provides a premise on which collective decision-making processes can be managed in collaborative schemes.

We have illustrated that multiple phases of relationships provide the substance of dynamic collaborative schemes. Whereas change in long-term relationships comes about as a result of behavioral processes involving the two variables, change also feeds back to influence the behavioral processes (Axelrod 1984, Bardach 2001). As such, the two variables do not only provide a wide range of possible pathways for the future development of social relationships, but also enable behavioral learning through the

building, upgrading and enriching of the knowledge stores of actors. Learning shapes the actors' ways of behaving in relationships by aligning and fostering their capacity to deal with relational change (Johnson et al., 2004). To that extent, the amount of change that social relationships can undergo is important in determining how actors cope with change when it is almost impossible to predict with accuracy future phases of social relationships. And this is a function of resilience.

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3

Integrated Learning Systems for the Governance and Management of Protected Areas*

INTRODUCTION

Learning systems have become to be understood as an effective means of coping with change associated with complex social-ecological systems (Berkes and Folke 1998, Johnson 1999, Gunderson and Holling 2002, Folke et al. 2005). They denote the ways in which social actors align and foster their competences to cope with discontinuous change that often leads to heightened uncertainty (Folke et al. 2002, Olsson et al. 2004). In the context of protected areas, they represent a collective process or set of routines for building and sustaining the knowledge or capabilities (Eisenhardt and Martin 2000) required to adapt to the complex, ever-changing and uncertain conditions of such areas (Biggs and Rogers 2003, Roux et al. 2006). Use of terms such as system and routine imply that learning must be purposive, seeking to progress from fragmented to integrated learning, to construct shared mental models from the complex mix of perceptions among stakeholders (Kim 2004). Thus, given the unpredictable properties of protected areas (Salafsky et al. 2001) and the individual nature of beliefs (Hayes and Allinson 1998), social actors are increasingly encouraged to establish and operate learning systems so as to build competences required for adaptability (Diduck et al. 2005, Walker et al. 2006).

The concept of adaptability provides a useful approach for incorporating learning systems into the governance and management of protected areas (Nina-Marie and Kay 1999, Biggs and Rogers 2003, Folke et al. 2005). It does this by incorporating knowledge creation processes in the governance and management of protected areas to systematically test assumptions that allow socials actors to adapt and learn in the face of

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change (Johnson 1999, Salafsky et al. 2001). While some aspects of adaptive governance (Olsson et al. 2004, Folke et al. 2005) and adaptive management (Rogers 1998, Johnson 1999, du Toit et al. 2003) have been discussed in literature, the link between governance learning and management learning has remained largely unattended. Most authors have tended to conflate governance learning and management learning (see Singleton 1998, Carlson and Berkes 2005). Little attention has been explicitly given to the functional linkage between the two concepts. Yet an integrated perspective provides a potentially useful framework for explaining and improving knowledge creation processes around which the concept of adaptability is structured and implemented (Biggs and Rogers 2003). To enhance such processes, we need to understand that successful adaptability for protected areas largely depends on the effectiveness of the efforts to integrate governance learning and management learning.

Following Hall (2006:30) and others, I view management as a process that refers to "the implementation of actions aimed at society's agenda or vision" and governance as a process that refers to "the broader social systems of governing, systems that enable society to accept or reject alternative political agendas or societal visions." In this context, governance sets the rules of the game as well as the systems in which human actors operate. Both governance and management are adaptive learning systems that are transformative, thereby conferring institutional robustness (Anderies et al.2004). Being pubic entities, state protected areas are established under governance processes operating mostly at national scale. By contrast management operates predominantly at local scale. Also, given that governance reform occurs less frequently than management reform, it can be argued that the distinction between governance and management is important in so far as effective learning must occur at two spatial and temporal scales to foster adaptability.

In this paper, I propose a conceptual framework for analyzing integrated learning systems for the governance and management of protected areas. I argue that an understanding of an integrated learning system is essential if we are to successfully promote learning as a fundamental component of governance and management. The establishment and

maintenance of an integrated learning system take place in a complex context which links elements of governance learning and management learning subsystems (Folke et al. 2005). The strongly coupled linkages between the two subsystems influence the performance of an integrated learning system. Performance indicators must therefore reflect the effectiveness of the two subsystems as well as their contribution to the overall performance of an integrated learning system (Bossel 2001). The derivation of such indicators must acknowledge that the creation of knowledge through governance learning and management learning occurs in a dynamic context of information flows which link multiple actors in an integrated learning system. Whereas human knowledge is essentially created in the minds of individuals (Wilson 2002, Kim 2004), ongoing information sharing processes founded on collaborative relationships play a decisive role in the creation of that knowledge (Nonako 2004). Thus, I suggest that the degree to which social actors are connected in an integrated learning system provides the premise on which those actors share information to create the knowledge required for effective protected area governance and management.

THE CONCEPTS OF LEARNING, GOVERNANCE AND MANAGEMENT

Human learning, as with most concepts in behavioral sciences, has so many meanings that its significance has at times been reduced to a vague slogan (Senge 1990, Hayes and Allinson 1998, Johnson et al. 2004, Kim 2004). Argyris and Schon (1978) were amongst the first behavioral scientists to attempt to explicitly define learning. For them, learning essentially entails the detection and correction of error. It involves searching for a strategy where something goes amiss in human interventions. To that extent, Argyris and Schon (1978) argue that this searching process requires the identification of determinant variables which affect the nature and type of strategies as well as the consequences of particular interventions. Implicit in that definition is that learning consists of two meanings: “the acquisition of know-why, which implies the ability to articulate a conceptual understanding of an experience; and the acquisition of skill or know-how, which implies the physical ability to produce action” (Kim 2004: 30). In the same vein, Leavy (2004) suggests four levels of learning: cognitive knowledge (know what),

advanced skills (know-how), systems understanding (know-why) and self-motivated creativity (care why). As such, one is able to recognize that learning occurs at multiple levels.

Individual learning is primarily concerned with the perceptive and cognitive processes of single human beings (Hayes and Allinson 1998, Kim 2004). According to Argyris and Schon (1978), given that all learning processes take place through individual actors, individual learning forms the basis for all learning processes. On the other hand, collective learning focuses on groups of individuals who orient their behaviors towards some shared goals and problems (Hayes and Allinson 1998, Ireland et al. 2002, Johnson et al. 2004). It entails a social process of building, upgrading and enriching of the knowledge and skills of actors such as organizations and communities (Sawhney and Prandelli 2004). In a sense, collective learning denotes the learned ways of behaving in social systems by aligning and fostering the competences of actors to deal with emergent issues and problems (Johnson et al. 2004). From a strategic adaptive perspective, actors also have to sense what might arise in the future so that they can respond appropriately (Biggs and Rogers 2003). While the meaning of the term learning necessarily remains the same as in individual learning, the learning processes at the collective level are however essentially different. As one moves from a single human being to a large collection of diverse actors, the level of complexity in learning processes increases. Also, learning processes that foster efficiency are not the same as those that foster strategic renewal and transformation (Leavy 2004). Thus, one can argue that collective learning is more dynamically complex than individual learning (Allee 1997).

As with learning, the concept of governance has also been evolving in response to the dynamic challenges and opportunities associated with social-ecological systems (Mugabe and Tumushabe 1999, Folke et al. 2005). Previously, conceptualizations of governance mostly focused on the state-civil society relationships. However, it is now generally recognized that the process of governance is broad and goes beyond the political power exercised by governments (UNDP 1997, Mugabe and Tumushabe 1999). In this paper, I define governance as a decision support process used by societies to guide and regulate

social relationships among interest groups as they go about to articulate their interests, exercise their rights, meet their social obligations, and mediate their differences (UNDP 1997). Governance is founded on and shapes societal values and norms that are expressed through informal and formal rules, laws, policies and procedures. Importantly, it accentuates the social relationships among interest groups, of which government is just a part.

Adaptive governance emphasizes the iterative learning dimension and the nature of the social relationships among interest groups operating at multiple spatial-temporal scales as nested quasi-autonomous decision-making entities (Folke et al. 2005). The properties of such relationships are epitomized in legitimate decision-making processes, which denote the degree of acceptance enjoyed by decision makers (Ponton and Gill 1982). The degree of acceptance, however, is not simply a matter of attitudes but of behavior, which resolves itself into a question of the degree of connectedness among the actors. Collaborative behavior characterizes the nature and degree of connectedness among actors involved in adaptive governance (Brunner 2002). To that end, I suggest that the need to understand the dynamics underlying the social relationships among actors has great implications for the learning systems that underpin adaptive governance.

Management is an implementation support process used by societies to foster coordinated human actions (Nina-Marie and Kay 1999, Folke et al. 2005, Checkland 1989). This definition is somewhat different to most conceptualizations of management, vis-à-vis social-ecological systems, in that it focuses on human actions rather than on social-ecological systems. Historically, the concept of management has always been concerned with the planning, organizing, leading and controlling of human actions (Checkland 1989, Smit and de Cronje 1997). It is surprising why in some instances the concept has been extended to imply the planning, organizing, leading and controlling of social-ecological systems. Strictly speaking, we can never truly 'manage' complex adaptive and self-organizing social-ecological systems (Nina-Marie and Kay 1999). However, what we can do is to manage how we behave in such systems. Moreover, we ought to be extra cautious as evidence suggests that the more we intervene into complex social-ecological

systems the less resilient they become and the less flexible management institutions become (Holling 1995). Based on the concept of adaptive management, therefore, social actors focus on those human behaviors and actions that maintain the context for complex social-ecological systems to be resilient by preventing them from moving into undesirable states and configurations (Walker et al. 2002).

Adaptive management, a methodology grounded in the works of Holling (1973), is based on an understanding that human actions have to be treated as experiments given that social-ecological systems function under great complexity and uncertainty (Johnson 1999). It stresses the need for management institutions to develop and maintain their competences to adapt to the ever-changing conditions of social-ecological systems. This implies that actors have to continually behave in ways that enable management plans to be continuously refined, corrected, and rejected depending on the outcomes of particular actions. In so doing, 'learning by doing' becomes the means of productivity and resilience.

I believe that adaptive governance and adaptive management are strongly linked. Whereas as adaptive governance refers to the process in which society formulates decisions that reflect socially desirable end-points (Folke et al. 2005), adaptive management provides the mechanisms for implementing those decisions (Johnson 1999). Although governance adapts more slowly as it involves formulating the decisions, management commonly adapts more frequently because it is testing implementation of the decisions. In this way, the effectiveness of implementation largely depends on the nature and quality of the decision processes. And mostly likely, if the implementation does not produce desirable outcomes, it is because it was based on inadequate assumptions, it involved inappropriate spatial-temporal scales, it was not well coordinated, it was not socially desirable, it was not supported by adequate skills or resources, or it was affected by a combination of these factors (Salafsky et al. 2001). This understanding is important to this paper as it points to the key issues that particular learning systems have to deal with. The understanding suggests that the links betweens adaptive governance and adaptive management can be better understood by considering a

conceptual framework that integrates subsystems of governance learning and management learning.

A FRAMEWORK FOR ANALYZING INTEGRATED LEARNING SYSTEMS

I propose a conceptual framework for analyzing integrated learning systems for the governance and management of protected areas (Figure 3.1). The framework depicts the complex context of protected area learning which comprises nested subsystems of governance learning and management learning interacting as an integrated learning system. The governance learning subsystem is founded on and informs societal perceptions and values which over time are translated through societal principles into policies, laws and regulations. The levels of enforcement and compliance are correlated through monitoring and evaluation to facilitate adaptive governance. In the context of protected areas, which are defined in space and function, governance learning occurs at higher levels of society and is associated with long time and large spatial scales. The management learning subsystem focuses on management values, principles and vision which are eventually transformed through management goals and objectives into management strategies. The implementation of management strategies is subjected to continuous monitoring and evaluation to facilitate adaptive management. Management learning occurs at lower levels of society and is associated with short time and small spatial scales.

Purposive behavior by parties to an integrated learning system helps to establish relational connectedness and relational capital for both governance learning and management learning (Figure 3.1). Whereas relational capital refers to the stock of socio-psychological attributes of social relationships (Cullen et al. 2000), relational connectedness refers to the degree to which actors in social relationships are linked (Hakansson and Snehota 1995). Purposive behavior in this context simply means that the behavior of parties is purposive and guided by collective and individual goals (Coleman 1990). As Coleman (1990) explains, the concept of purposeful behavior denotes that we are able to understand the behavior of actors as being driven by values and preferences. It

also implies that we are able to comprehend their intended goals and how their actions contribute to those goals (Ford et al. 1998, Dyer and Nobeoka 2000).

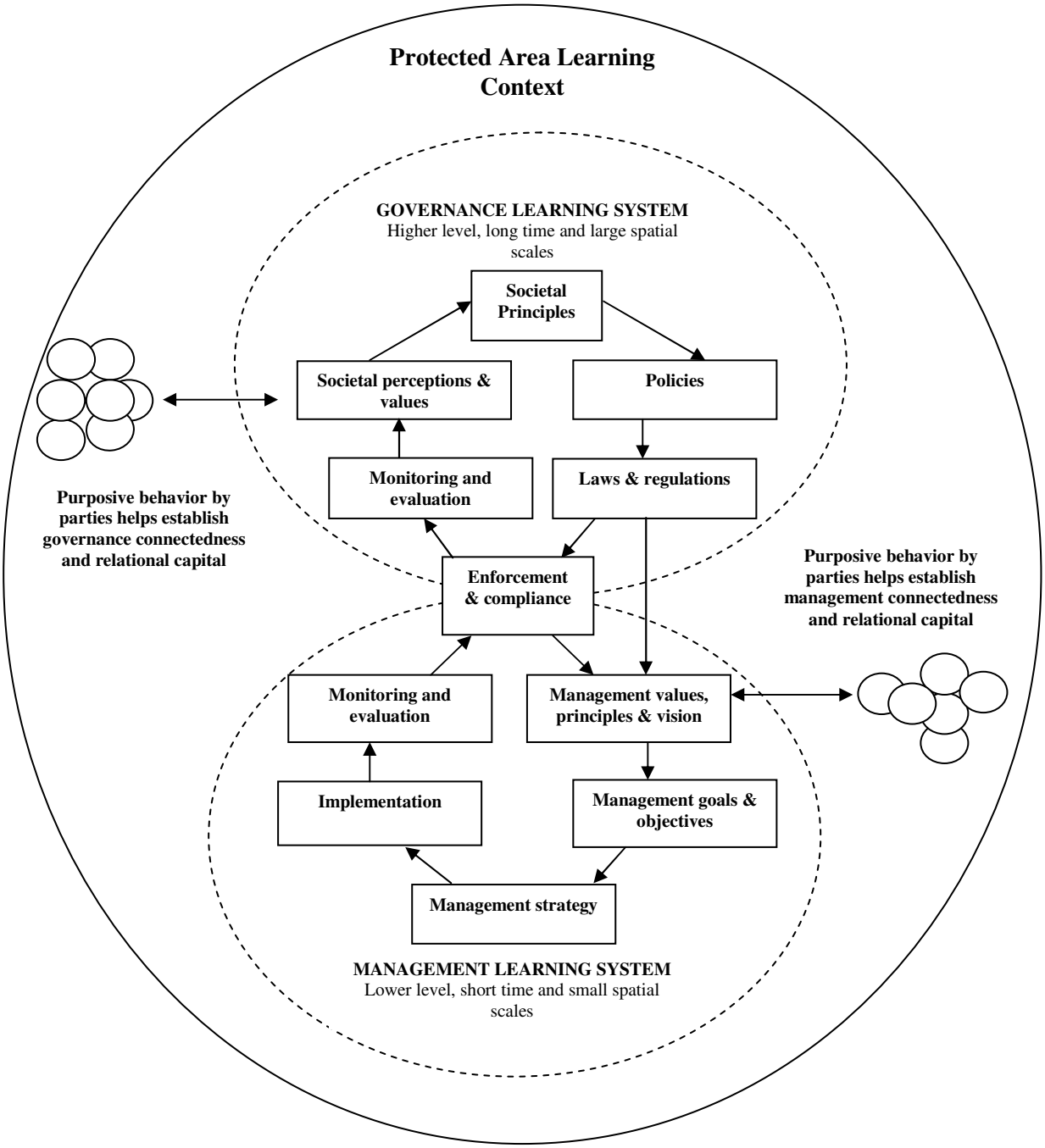

Figure 3.1: A framework for analyzing an integrated learning system for the governance and management of protected areas

The subsystems of governance learning and management learning interact with each other through flows of information, and as open systems they use these flows to maintain their structure and function as well as to organize learning and knowledge creation processes. Within each of the two subsystems there are nested subsystems with narrower focus. The subsystem of governance learning provides management learning with a system environment on which the latter depends for context and direction (Folke et al. 2005). This means that management learning can not be as effective in the absence of a context set by governance learning. In Kruger National Park, for example, the lessons and strategies drawn from implementing the elephant management policy have been shaped through higher level decision processes (du Toit et al. 2003). Whereas management learning has largely involved practitioners within an individual conservation agency, governance learning has been at a much broader scale of 'nested' communities of practice involving different interest groups such as the animal rights movement. According to Wenger (2004), communities of practice are social groupings that are established around shared practices. Such communities do not only store the competences that make up an integrated learning system (Wenger 2004), but also provide for the development of a fabric of social relationships among actors (Sawhney and Prandelli 2004). Thus, an analysis of integrated learning systems for the governance and management of protected areas must be able to facilitate identification of the nature and quality of the social relationships that constitute communities of practice.

Social relationships provide for the creation of shared knowledge in communities of practice and if not well facilitated can affect the overall performance of an integrated learning system (Kim 2004). It is through social relationships that communities of practice in integrated learning systems are able to establish channels of information flows required to create and share knowledge (Sawhney and Prandelli 2004). Social relationships enable practitioners to negotiate meanings that form the basis of knowledge creation (Brown and Isaacs 1996). The negotiated meanings in turn help to transform information into shared knowledge. In that way, it is through social relationships that information flows in integrated learning systems help create shared knowledge, which

facilitates the convergence of mental models in governance and management processes (Roux et al. 2006).

The creation of shared knowledge through social relationships in a dynamic integrated learning system can be understood through the diagram shown in Figure 3.2. Based on resilience theory (Holling 1995, Folke et al. 2002, Berkes et al. 2003), I suggest that the potential for shared knowledge creation is in large part defined by the amount of relational capital and degree of relational connectedness (Nkhata et al. in press). In this context, 'potential' means the capability for shared knowledge creation through accumulated relational capital and strength of relational connectedness. As such, the development of relational capital and expansion of relational connectedness to a large depends on how parties collectively define and execute their shared purpose within an integrated learning system. And this happens most effectively when there is 'cause' to bring people together. Thus, the two variables do not only provide a wide range of possible pathways for the future development of shared knowledge, but also enable collective learning through building, upgrading and enriching of shared knowledge (Dyer and Nobeoka 2000).

It is postulated that the development of shared knowledge moves from a growth phase through conservation and release phases into a reorganization phase (Figure 3.2). During the growth phase, opportunities for learning arise whereby actors easily exploit information required for creating shared knowledge. The potential for creating shared knowledge is enhanced through engaging new learning opportunities. The conservation phase emerges as relational capital builds and relational connectedness expands through the slow accumulation of information leading to the consolidation of shared knowledge. Conservation gives way to the release phase as information is released and shared knowledge loses cohesion and connectedness weakens. During this phase shared knowledge becomes vulnerable to disturbances such as external new ideas. In this way, disturbances define the nature and substance of collapse in shared knowledge. While connectedness is strong during the release phase, the potential for shared knowledge creation is low because of the complexity of expanded connectedness. Over time, release

gives way to the reorganization phase during which the released information becomes accessible and shared knowledge self-organizes through the emergence of new tactics and connections. Although the potential for shared knowledge creation is high, connectedness is however low as it is regaining focus. And depending on particular conditions, reorganization may give way to either growth once again or trigger the learning system into another configuration (see arrows at the left hand corner of Figure 3.2).

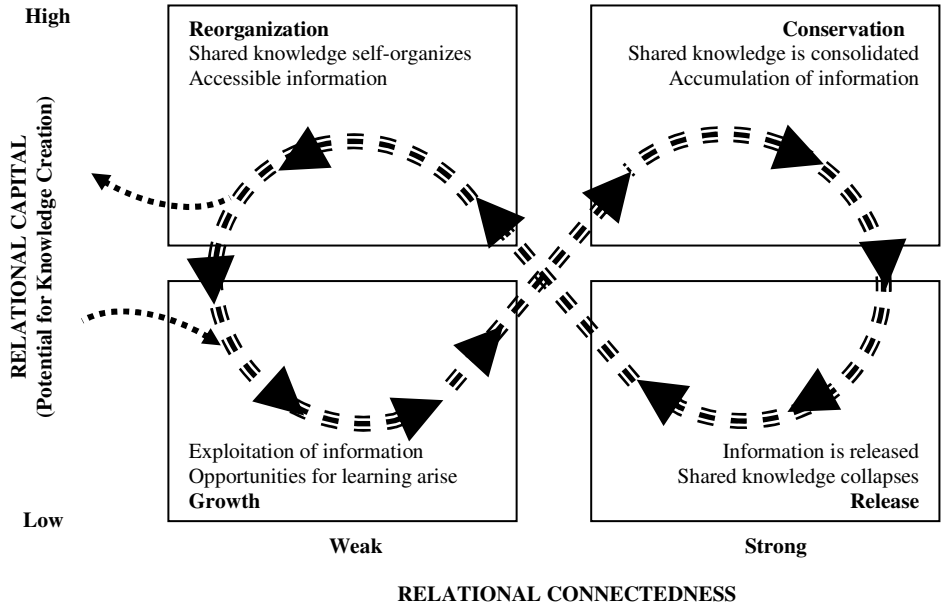

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Figure 3.2: The creation of shared knowledge in an integrated learning system (Adapted from Holling 1995 and Nkhata et al. in press).

In the context of an integrated learning system, relational capital denotes the collective assumptions and beliefs that actors hold about information, knowledge and learning (Allee 1997). It is premised on the shared values that enable parties to interpret their experience in similar ways and to behave according to agreed upon norms. Importantly, it evinces how the behavior of parties affects information sharing (Allee 1997). In the Lake Tahoe Basin, for example, it has been shown that communities of practice that focus on building relational capital are capable of instilling behaviors required for effective information sharing (Imperial and Kauneckis 2003). With this capability, they are able to

recognize good information behaviors, and when necessary discourage bad ones. In so doing, they continually promote behaviors that help enhance shared knowledge creation and thereby improve collective learning.

As an integrated learning system moves through the four phases, relational capital establishes norms which create conditions that make the manipulation of information unattractive. Relational capital defines the limits within which parties can share and use information associated with an integrated learning system (Marchand et al. 2001). It allows for the formal and informal use of appropriate and undistorted information. During the conservation phase, for example, parties would not deliberately transfer inaccurate information that would negatively affect their counterparts or even the learning system (Brown and Isaacs 1996). Further, they would not hide or keep important information to themselves (Marchand et al. 2001). In this way, parties are able to believe that the information they access through their counterparts is trustworthy (Brown and Isaacs 1996). The levels of information culture thus influences the degree to which parties use and trust both formal and informal sources of information in an integrated learning system through out the four phases. It improves information reliability by providing accurate, trustworthy and consistent information necessary for improving performance.

The expansion of relational connectedness in an integrated learning system is primarily concerned with the movement of information and how parties transfer information between themselves (Brown and Isaacs 1996). It directly affects the content and quality of the information shared and used in an integrated learning system. To foster connectedness, parties need to put in place mechanisms that promote the free flow of information between themselves. In Canada, for example, the Nunavut Wildlife Management Board (NWMB) has established a number of mechanisms that facilitate connectedness among actors involved in the management of polar bear and narwhal (Diduck et al. 2005). This Board has developed communication channels that facilitate adequate contacts between the actors. Group fora have been used to enhance connectedness through the holding of stakeholders' meetings which provide for high-

level communication. Working committees have been established to facilitate information sharing on specialized topics which are selected by the involved parties and focus on areas that are critical to the success of an integrated learning system. These mechanisms provide opportunities for parties to engage in learning conversations that are important in promoting the free exchange of information in an integrated learning system, thereby enabling the expansion of relational connectedness.

CONCLUSION

I have developed a conceptual framework for analyzing integrated learning systems for the governance and management of protected areas. Given that protected areas are defined in space and function, the framework provides a useful distinction between governance and management. The framework provides an understanding which is essential if we are to successfully promote learning as a fundamental component of governance and management. It illustrates that the establishment and maintenance of an integrated learning system takes place in a complex context which connects elements of governance learning and management learning. The strongly coupled connections between the two subsystems influence the performance of an integrated learning system. The effectiveness of the two subsystems is an important factor in the overall performance of an integrated learning system. This effectiveness is essential for the creation of knowledge through governance learning and management learning. In that regard, the conceptual framework evinces how knowledge creation occurs in a dynamic context of information flows which link multiple actors in an integrated learning system.

This paper illustrates that the creation of shared knowledge is a social process that caters for adaptability through information sharing. Such a process links information and social relationships in the dynamic creation of knowledge. While this understanding is premised on the sharing of information, it is important to recognize that the relational aspects of learning compel us to distinguish the creation of shared knowledge from the related concepts of information management. The creation of shared knowledge is strongly related to the relational skills of actors, whereby the nature and quality of social

relationships influence the effectiveness of an integrated learning system. As Malhotra (2002) argues, human beings are better at skills required for knowledge creation, while machines are more adept at information task. Similarly, I contend that humans – as opposed to machines and other technologies – occupy a central role in the creation of shared knowledge within an integrated learning system. Thus, the paper facilitates understanding of the process of strategic adaptation in an integrated learning system that is important in guiding the behavior of parties as they go about to formulate effective responses to unexpected events.

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Mental Models and Adaptive Management of Demands on Protected Areas*

INTRODUCTION

Protected areas are established in response to demands expressed by society over time and space (Bell 1984, MacKinnon et al. 1986, Brechin et al. 2003, Child 2004). These demands are varied and commonly involve protection of natural and cultural heritage so that society can continue to enjoy them into the future (Brown 1984, Murphree 2004). As the demands placed on protected areas continue to evolve and expand (Gibson 1999, du Toit et al. 2003, Murphree 2004), so do their expressions which are expected to be reflected through mental models in management planning processes (Hocking et al. 2000, Knight et al. 2006). Given that management agencies usually assume that demands are uniform and made up of a small number of preferences (Wilshusen 2003, Anne-Marie and Chimere 2006), this makes it difficult to acknowledge the dynamics of demand management in contexts that are complex and unpredictable.

In this paper I have termed demands as expressions of multiple mental models with regard to access to and use of protected areas. I argue that much of society's perception of successful protected area management is determined by how management agencies understand, respond to and manage demands or the mental models that frame those demands. For protected area management to be effective, agencies must be able to develop and sustain sufficient of a 'group mind' or 'shared mental model' (Klimoski and Mohammed 1994). This necessitates that these agencies acknowledge the likelihood of multiple sets of mental models among stakeholders and incorporate a process for formulation of shared mental models into adaptive management of demands. It also requires an appreciation of the disturbances that define change in the mental models.

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Hence, in this paper I propose a conceptual framework that embodies a social learning process to facilitate sharing of beliefs and meanings with the intention of developing and adapting a shared or team mental model (Klimoski and Mohammed 1994). It is through group level activity that protected area agencies are enabled to understand and respond to demands through institutionalized processes of adaptive management.

MENTAL MODELS AND DEMANDS

Mental models can be construed as representations of reality that correspond to significant aspects of physical and social systems (Klimoski and Mohammed 1994, Carley 1997, Ostrom and Janssen 2004). They embody the basic theory for understanding how people think about the world. They can be understood as knowledge or mental configurations of given phenomena (Klimoski and Mohammed 1994). According to Senge (1990), mental models are deeply ingrained assumptions which reflect the internal pictures and images that people hold about how the world works. For example, in interacting with protected areas directly or indirectly, people develop deeply ingrained assumptions that influence how they understand these areas and how they decide on actions they wish to take. Through processes of individual and social learning, they develop multiple sets of mental models that relate to protected areas. Depending on their particular belief systems and the emergent demands, people may seek to manipulate other people and elements of protected areas based on those ingrained assumptions (Murphree 2004). In this way, behaviors can be regarded as expressions of individual mental models.

This understanding informs us that mental models can be used to identify where particular management interventions can be expected to have the greatest effect and thus, how necessary changes can be brought about. They can be used to explain why the efficacy of demand management is in the state it is and to describe the factors affecting it. The effectiveness of demand management can be linked to perceptions of the validity of the mental models on which demands are founded. Since mental models are expressions of individual beliefs and values, quite different models may have equal ‘personal’ validity, yet may not enjoy such validity in a group (Klimoski and Mohammed 1994). In

such cases individuals may have to revise their mental model to better accord with the group mental model, or seek to effect a change in the group model. It is this social learning process in which personal and group constructs are matched and modified that provides a basis for achieving behaviors that facilitate management of demands, particularly when they are incongruent. The governance of protected areas establishes the shared broad public mental model against which 'validity' of individual mental models is tested. As such, many systemic failures can be directly traced to incomplete learning cycles (Kim 2004) and thus incomplete mental models and more specifically, to the assumptions guiding their construction (Senge 1990).

While mental models play an important role in many aspects of protected area management (Ostrom and Janssen 2004), the connection between mental models, relationships, learning and demands has remained largely unattended in research. Most studies have not been paying explicit attention to the manner in which mental models shape the emergence of demands and the management thereof. Yet, in a sense, a demand is an expression of a mental model that a legitimate allocation with regards to a particular resource or subject matter should or should not be effected (Pettigrew 1973). For example, expressions of demands on protected areas would manifest in the form of mental models and behaviors with regard to the protection of specific species (Adams 2003), use of landscapes and associated resources (Brechin et al. 2003), land claims and demarcation of boundaries (Child 2004), as well as in the form of ethical considerations (du Toit et al. 2003). To that end, a distinction is made between an interest and a demand, such that the expression of an interest is not synonymous with the expression of a demand. For an interest to become a demand, a mental model has to require a behavioral response to be expressed that authoritative action be executed to that regard (Pettigrew 1973). Surprisingly, most approaches to adaptive management have been premised on the supposition that demands are expressed in the vision and objectives contained in management plans (see Salafsky et al. 2001). In this paper, however, I suggest that demand management in protected areas requires an understanding of how interest groups construct and express mental models as demands on protected areas, and how they deal with social dilemmas such as tension among mental models.

The foregoing suggests that protected areas are associated with multiple demands (Child 2004) and that tension among mental models is an inherently pervasive factor in the management of those demands (Gibson 1999, Brechin et al. 2003). Historically, tension among mental models has been viewed as a dysfunctional attribute of protected area management (Attwell and Cotterill 2000). Its negative effects have been assumed as a break down in the standard procedures of the management of protected areas. In Kruger National Park, for example, tension among mental models involving interest groups that support the culling of elephants and those that do not has resulted in decision-making situations in which the management agency has been experiencing difficulties in selecting alternative actions (du Toit et al. 2003). At least in an African context, there have always been tensions between mental models focusing on protected areas because of the sense of injustice felt by indigenous peoples who had their land expropriated (IIED 1994). These tensions elicited behavioral responses that brought parties into conflict and served to reinforce existing mental models. It is thus not surprising that efforts have been consciously directed at resolving tensions in protected area management (Kiss 1990). Despite the significant consequences of such tensions, approaches to managing them have largely been symptomatic with little attention directed at gaining appreciation for the fundamental causes that are to be found in the assumptions that shape individual mental models. This draws attention to the need for a systemic adaptive approach that seeks to manage demands by resolving the tensions between mental models and their underlying assumptions.

I suggest that the failure by management agencies to highlight sources of tension among mental models in adaptive management leads them to give inadequate attention to the underlying assumptions. Where there have been competing demands, adaptive management has been largely determined by technical considerations such as the formulation of vision statements (Hocking et al. 2000), land cadastral (Brandon and Wells 1992), biological monitoring (McNeely et al. 1990), and the setting of quotas (Gibson 1999). In Korup National Park in Cameroon, for example, technical efforts aimed at resolving a 25-year old resettlement stalemate between the management agency

and the Ikundu-Kund people have been to no avail (Anne-Marie and Chimere 2006). According to Anne-Marie and Chimere (2006), the confrontation of dominant Western representations of nature with African local realities as well as the continued emphasis on technical considerations is at the root of the impasse in the resolution of competing demands on Korup National Park. Whilst technical efforts may have provided short-term solutions for managing competing demands (such as the resettlement of the Ikundu Kundu village in 2000), in the long-term the management agency will still have to cope with behavioral responses emanating from the considerable latent of tension among mental models. I contend that a rigorous analysis of mental models would encourage the management agency to shift focus more toward fundamental and away from symptomatic solutions (Figure 4.1).

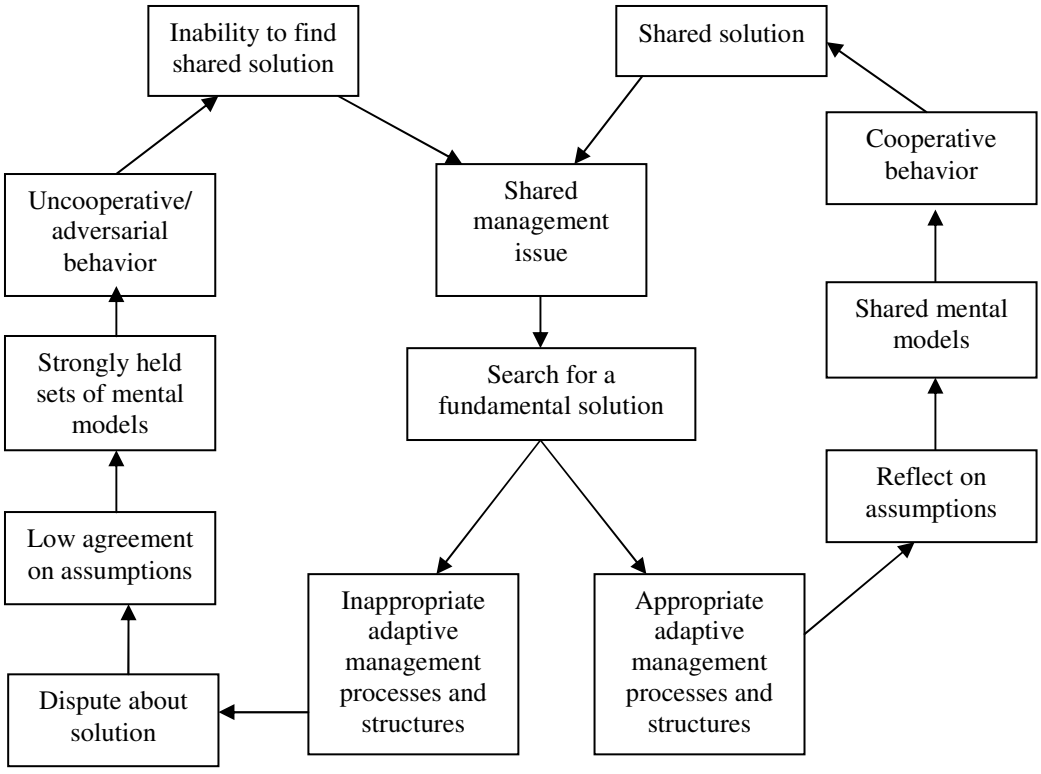

Figure 4.1: An illustration of the search for fundamental solutions in adaptive management of demands on protected areas.

Given that it is usually disturbances such as a shared management issue that bring together different actors, the search for a fundamental solution would result into either

inappropriate or appropriate adaptive management processes or structures (Figure 4.1). Whereas inappropriateness would create conditions that favor disputes about solutions, appropriateness would encourage actors to reflect on their assumptions. In this context, disputes about solutions would lead to low agreement on assumptions, thereby fostering strongly held sets of mental models which generate uncooperative/adversarial behavior (see Figures 2.3 and 3.2 in previous chapters). Such behavior would reinforce the inability to find a shared solution and subsequently affect the shared management issue. On the other hand, reflection on assumptions leads to shared mental models which assist to generate cooperative behavior. Such behavior would promote the capability to generate a shared solution required to address a shared management issue. As such, fundamental solutions in adaptive management processes have to focus on an understanding of the assumptions that underlie mental models because they direct behavior which is a primary concern particularly when tensions arise.

A CONCEPTUAL FRAMEWORK FOR INTEGRATING MENTAL MODELS INTO ADAPTIVE MANAGEMENT OF DEMANDS

In this section I develop a conceptual framework that integrates mental models in the adaptive management processes of demands on protected areas. The framework is premised on the assumption that managing behavior is central to coping with tensions that arise in protected area management and that this cannot be achieved in the absence of an approach that elicits shared assumptions and group mental models. My framework builds on the works of Kinnaman and Bleich (2004) and other behavioral scientists. I propose that adaptive management as it relates to the management of demands on protected areas occurs in a complex context. I suggest that such a context is shaped by the amount of professional/social agreement on assumptions and the level of certainty about outcomes (Kinnaman and Bleich, 2004) (Figure 4.2). In this context, I argue that if actors can achieve shared assumptions or at least agree to the validity of different assumptions, then the individuals are more likely to behave in ways that facilitate construction of mental models that have more in common than they have differences.

High levels of agreement on assumptions and high levels of certainty about outcomes are associated with technical decision-making situations which are most likely to generate coordination and toleration behavioral styles amongst actors. According to Kinnaman and Bleich (2004), these behavioral styles are usually associated with 'plan and control' decision-making strategies which are premised on the assumption that the world is orderly and predicable. Low levels of agreement and certainty are most likely to result in chaotic decision-making situations, which might require strong directive leadership. Between high to low levels of agreement and certainty there are collaborative/cooperative behavioral styles, which are mostly associated with moderate levels of agreement and certainty. Under such decision-making situations, protected areas are assumed to be relatively unpredictable. Based on the model in Figure 4.2, I contend that effective demand management in protected areas will commonly occur under conditions in which there are moderate levels of agreement and certainty.

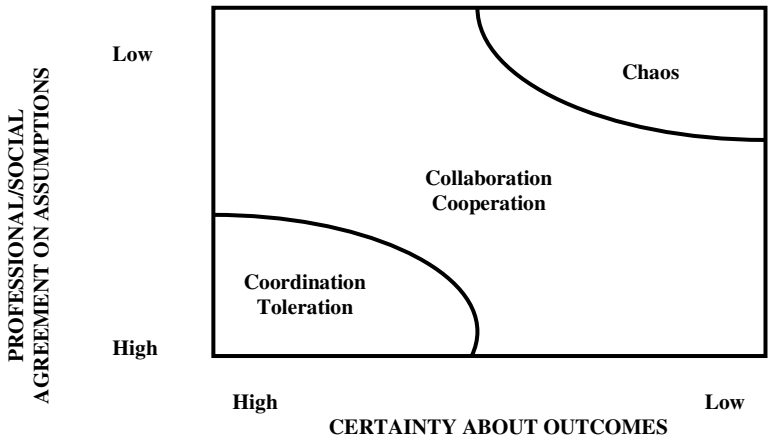

Figure 4.2: A decision-making model based on the levels of agreement on assumption and levels of certainty about outcomes (Adapted from Kinnaman and Bleich, 2004)

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I consider that demand management is essentially a social learning process that evinces the manner in which social actors interact with each other to construct mental models as expressions of assumptions about protected areas (Figure 4.3). Such a process denotes how actors deal with the interplay between agreement on assumptions and certainty about outcomes. Importantly, it reflects how two or more actors influence each others' fundamental assumptions over a period of time to construct shared mental models and to reconstruct individual mental models.

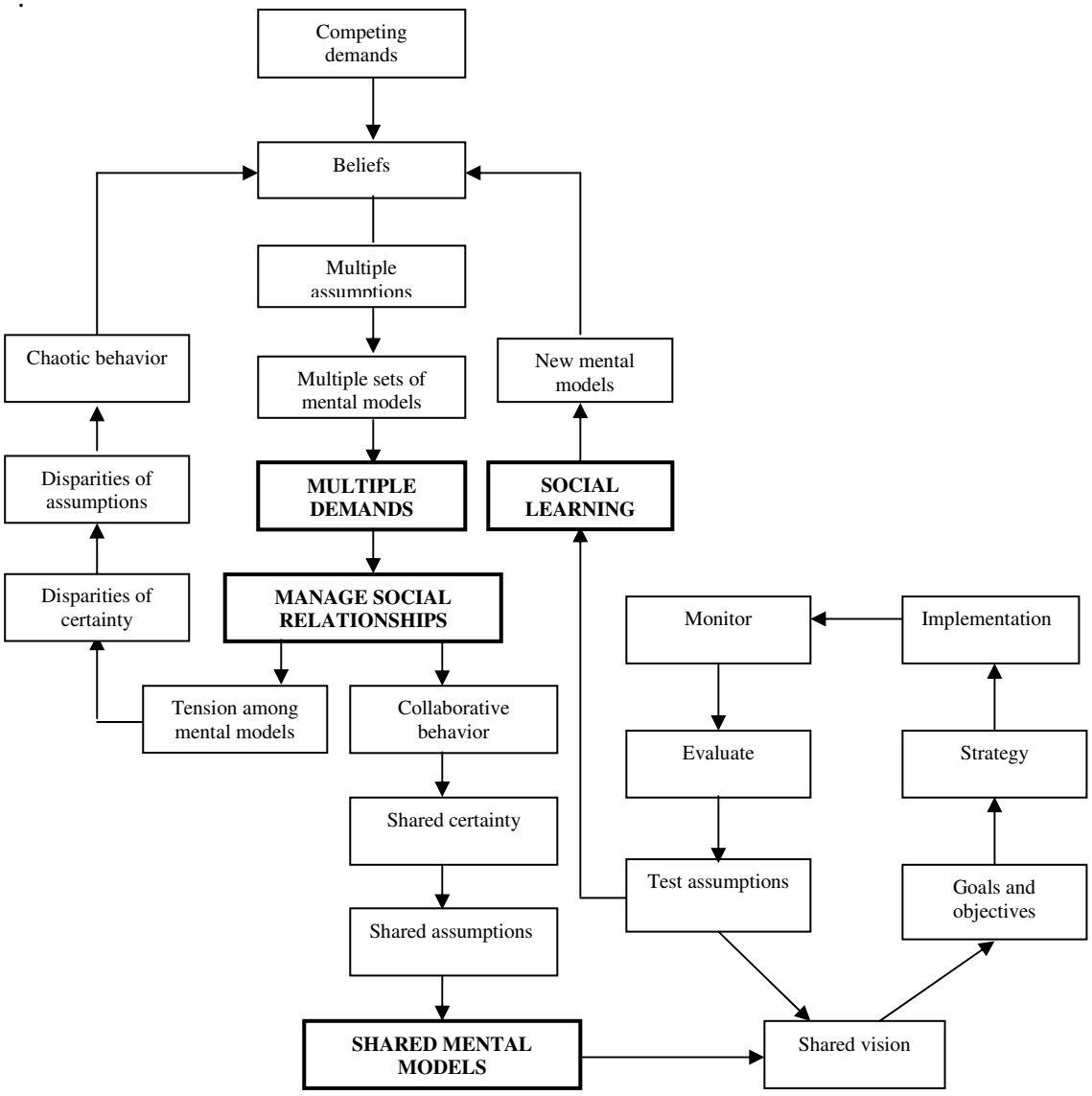

Figure 4.3: A conceptual framework for integrating mental models in adaptive management of demands on protected areas .

To establish behaviors that facilitate an adaptive process for the management of demands, management agencies have to identify the assumptions that underlie particular mental models. Adaptive management requires that the assumptions are reformulated into mental models which establish the context for management planning. The mental models need to be continuously evaluated and if found inappropriate they are discarded in favor of new mental models through social learning. In this way, adaptive management seeks to establish how assumptions should shape demand management in an adaptive

management process and provides indicators that signal when agencies should re-examine those assumptions.

Effective demand management encompasses social relationships involving interest groups (Figure 4.3). An analysis of demand management requires an examination of social relationships which shape fundamental assumptions through specific behavioral styles. In part, this is because demand management evinces social situations in which interest group actors may make independent decisions in interdependent situations (Ostrom 1998). In such situations, the maximization of short-term self-interests may generate outcomes that leave all interest groups worse off than feasible alternatives. Interests groups, of course, may have the option of being either collaborative or adversarial. While it is possible for interest groups to work independently in interdependent situations, the costs of unilateralism far outweigh those of collaborative behavior. I consider the framework to be specifically based on a behavioral approach to relationships theory. Arguably, a behavioral approach to relationships theory offers a better approach to demand management as it evinces the behavioral processes that underlie long-term social relationships. Such an approach conceives instability generated through competing demands as an inherent attribute of long-term social relationships. Hence, the need for systemic rather than symptomatic management approaches.

I propose that social learning for the construction of shared mental models in demand management provides a useful framework for interpreting how management agencies search for appropriate, defensible responses to rapidly changing societal demands (Figure 4.2). The building, upgrading and enriching of knowledge aligns and fosters the competence of actors to respond to emergent demands. In Kruger National Park, for example, the manner in which the agency manages dynamic and sometimes competing demands is a function of knowledge creation through interaction with various interest groups (Rogers 1998). If demand management is to develop in directions that are consistent with policy and are desired by the agency and concerned parties, then it would require considerable social learning. In this context, however, it is important to note that in some instances there may not be agreement and some parties may not approve of the

proposed direction. Thus, the creation of knowledge through social learning requires management agencies to incorporate social learning into their interactions with interest groups in an effort to deepen shared assumptions about the nature of demands (Roux et al. 2006). In this way, knowledge creation can have the effect of fostering the competence of management agencies to cope with discontinuous change and uncertainty, and thereby extend their competence to construct shared mental models.

The management of demands is characterized by temporal variability, whereby successful interventions are dependent on the capacity of management agencies to process information in time, even ahead of time. In this context, issues of organizational preparedness and response time become central to the effectiveness of management agencies. I have argued that agencies need to anticipate the likely existence of fundamental differences in assumptions and thus also in mental models that direct behaviors. Effective management requires that agencies support processes through which individual mental models become explicit in constructive social learning processes. And, of specific interest is that management effectiveness requires timely responses in the management of demands placed on protected areas. It is perhaps therefore not surprising that the philosophy of adaptive management is founded on the notion of improving both response time and the nature of the response in the management of social-ecological systems. A temporal dimension suggests that demand management is essentially a dynamic social process that happens over time in a non-linear fashion, with new situations and opportunities to learn, negotiate, and adapt. And in my opinion, these issues can be effectively addressed through the conceptual framework I have developed.

CONCLUSION

One of the most difficult mandates of protected area agencies is the management of ever-changing competing demands expressed by various interest groups through mental models. The challenge of agencies is establish processes that help to surface mental models and thereby making assumptions explicit. The more heterogeneous and differentiated a social system is the more likely ever-changing competing demands are to

be place on protected areas. Such conditions are a function of the complexity and uncertainty associated with contemporary demand management processes in protected areas. In this paper, I have illustrated that demand management is essentially a social process that evinces the manner in which social actors interact with others to construct mental models as expressions of assumptions. I have demonstrated how such a process denotes the manner in which actors deal with the interplay between agreement on assumptions and certainty about outcomes. Demand management involves interest group actors that influence each others' fundamental assumptions over a period of time to construct shared mental models. This calls for management agencies to identify the assumptions that underlie particular mental models in the adaptive management processes of demands,

Ultimately, demand management affects the effectiveness of protected area agencies. Most of the critical decisions that protected area agencies have to make are largely about what sort of demands they would like to engage. In a sense, the social environment of these agencies is essentially about managing demands placed on protected areas. In that regard, a social systems approach helps us to understand the social environments of protected area management, an understanding that is so critical to the management effectiveness of protected areas. The conceptual framework I have proposed should be interpreted as a contribution to the move in protected area management towards enhancing adaptive management. Essentially, the framework focuses on enhancing understanding about the social aspects of protected area management vis-à-vis adaptive management. In constructing the framework, I envisage that I will also be contributing towards developing protected areas agencies as learning organizations capable of changing and adapting in complex social-ecological systems.

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CHAPTER 5

Collaborative Arrangements in Fire and Water Management in Kruger National Park[*]

INTRODUCTION[†]

As social actors in South Africa increasingly exercise influence over management and use of natural resources, so management agencies have to more effectively manage social relationships among interested parties (MacKay et. al. 2003, Knight et al 2006, van Wyk et al. 2006). The need for people to work together to support and generate greater public value in the management and use of natural resources can hardly be exaggerated. The crux of the matter has been such that it is no longer a question of whether managers and users of resources should collaborate, but how they should do so. Interest in collaborative processes in the natural resources sector has in recent years been growing at an unprecedented rate (Turton and Henwood 2002, Imperial 2004, Knight et al. 2006). We have witnessed in South Africa a proliferation of novel institutional developments – such as catchment management agencies (CMAs) and water user associations (WUAs) – which in essence epitomize the philosophy and principles of collaboration (van Wyk et al. 2006). Whilst it is generally agreed that the conceptual frameworks from which these institutional innovations emerged have led to some noticeable gains in so far as establishing collaborative practices is concerned, the management of most collaborative processes in natural resources management still remains a significant challenge in South Africa. This can perhaps be attributed to a failure to adequately structure social theory into adaptive management. This understanding thus stimulates a need to expand the range of theories to be used as a foundation for improving the understanding and management of collaborative processes. As governance and management structures increasingly

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[†] The purpose of this part of the thesis was to test theoretical understandings through examination of two practical issues in protected area management.

become complex, effective collaboration becomes more dependent on scientifically robust and defensible theories which should explain where collaboration can be expected to produce greater societal benefits, and how necessary changes can be made in concomitant structures and processes.

In this paper I examine how social relationships influence collaborative arrangements in natural resources management. I argue that effective collaboration in large part depends on how actors in natural resources management manage social relationships. This is premised on the assumption that the behavioral processes that underlie such relationships are important determinants of management effectiveness. I assert that these behavioral processes are to a large extent a function of dynamic decision processes which evolve through multiple states defined by the level of professional/social agreement on basic assumptions and level of certainty about outcomes. I suggest that an analysis of decision processes requires an understanding of the interplay between relational capital and relational connectedness that determines the degree of stability and/or instability of social relationships. Whereas relational capital refers to the stock of socio-psychological attributes of social relationships (Cullen et. al. 2000), relational connectedness refers to the degree to which actors in social relationships are linked (Hakansson and Snehota 1995). Using this understanding, I examine two situations of collaborative arrangements in natural resources management. The central question I address is how a behavioral approach to relationships theory can be used to better understand and improve collaborative natural resources management.

I provide an analysis of the collaborative arrangements in fire and water management in Kruger National Park. The analysis is conducted in the context of strategic adaptive management (SAM). The SAM approach was developed for the park to support and facilitate adaptive management in the rapidly evolving, multidimensional world of protected area management decision making (Rogers 1998). It focuses on pragmatic, goal-orientated adaptive management to emphasize its orientation towards management effectiveness (Rogers 1998, Biggs and Rogers 2003). The SAM approach draws largely on the broader philosophy of adaptive management, whereby it affirms that the effective

management of protected areas requires an appreciation of complexity, change and uncertainty. Therefore, SAM responds to the challenges and opportunities posed by the three phenomena by highlighting the need for protected area agencies to develop and maintain their competences to learn and adapt. Contrary to conventional adaptive management, however, SAM has "a stronger emphasis on the forward-looking component [and] attempt[s] to swing the bulk of decisions into proactive rather than reactive mode" (Biggs and Rogers 2003:59). In that regard, it sets four key minimum conditions for management effectiveness: setting achievable goals; an explicit monitoring and evaluation process; an appropriate institutional design; and broader understanding of the learning process (Rogers 1998, Rogers 2003).

RELATIONSHIPS AND SHARED NATURAL RESOURCES

In most modern societies the management and use of natural resources occurs in complex social contexts. A number of social and organizational theorists assert that a realistic description of such contexts demands an account of the relationships among relational actors (Granovetter 1985, Mizruchi and Schwartz 1987). Mizruchi and Schwartz (1987) contend that social contexts are deeply entrenched with 'concrete' relationships to the extent that any analysis that underemphasizes them limits the analytic leverage of social science. Ford et al. (1998) assert that no actor, in our context users of resources and associated management agencies, exists in isolation in modern social environments. They claim that all actors are locked in complex networks of relationships which influence their behaviors, decisions and actions. These internal self-organizing forces have long term influence and can contribute to resilience through building competences for learning and adapting (Carpenter et al. 2001). Similarly, I contend that the social context of natural resources management can be better understood through incorporation of a perspective of social relationships whose nature and quality shape collective interventions in natural resources management.

As with all shared natural resources, the management of the use of natural resources is more of a social than an ecological process. In a sense, natural resources management

should be largely a social process that seeks to attain socially acceptable use and equitable sharing of access to natural resources. While many people believe this to be obvious (Mascia et al. 2003, Wilshusen et al. 2003, Stankey and McCool 2004), there is still contention about framing natural resources management as a socio-political process. Terborgh (2004), for example, has argued that we should continue to use a very narrow definition of natural resource management that is centered on biophysical dimensions. On the contrary, I understand natural resources management systems as complex socio-natural processes that incorporate socio-political interactions among resource managers and users. Importantly, such interactions are founded on long-term relationships involving interest groups with divergent experiences, perceptions and expectations and sustain a learning foundation for management that is socially just and ecologically effective (Belsky 2004). This is especially so in developing countries where there are such differences in experiences of impacts, of awareness and of power to influence the situation (Breen and Nyambe 2002, Bohensky and Lynam 2005).

Notwithstanding a growing appreciation of the importance of social relationships in management, little attention has been explicitly given to the application of theory of relationships in natural resources management. Most commonly, relationships theory is evidenced by implication rather than through specific and explicit application. Research in community-based natural resource management (CBNRM) and participatory management has emphasized aspects of relationships theory. For example, publications increasingly highlight the need for having 'good' relationships among stakeholders (Murphree 1994, Brechin et al. 2003, Knight et al. 2006). This superficial understanding of the substance of relationships contributes to a simplistic perception of importance that belies their reality and complexity (Wondolleck and Yafee 2000, Kinnaman and Bleich 2004) and contributes to a belief that developing 'good' relationships may be the panacea for problems associated with the use and management of shared natural resources. Drawing on contemporary perspectives in relationships theory, however, being 'good' or 'nice' in relationships is ultimately not the solution to the problems associated with the use and management of shared natural resources. Rather, as Ford et al. (1998) suggest, it makes more sense to draw from the perspective that relationships are real and have an

existence in complex social contexts and importantly that they profoundly influence the outcomes of particular interventions in social environments.

In a changing world striving for sustainability, equity, efficiency, and resilience in access to and use of scarce natural resources requires constant learning, adjustment and adaptation; trade-offs are inevitable and will increasingly strain relationships between actors. Mutual interdependences among interested and affected parties form the substance of the sharing problems experienced by resource managers and users. In that context, I contend that a relationships perspective offers a more useful framework of social analysis with which to examine human behavioral processes in natural resources management.

STUDY AREA AND METHODS

Study area

The Kruger National Park was established in 1926 and covers 1 948 528 hectares. It is situated in the low-lying savannahs of the Limpopo and Mpumalanga provinces of South Africa and lies between the latitudes 22^{o} 20' and 25^{o} 32' south and the longitudes 30^{o} 53' and 32^{o} 02' east (Figure 5.1). Its elevations vary from 260 to 839 m above sea level. The rainfall patterns range from 350 to 750 mm and are typified by wet and dry periods which affect the occurrence of fires. The park lies within the drought belt of the southern hemisphere defined as an arid region. As a result, management is continuously faced with the challenge of maintaining flow of the seven perennial or seasonal rivers (Crocodile, Sabie, Olifants, Letaba, Shingwidzi, Luvuvhu and Limpopo) (Ashton et al. in prep). Previously, all these rivers were perennial, but due to the demands of an increasing human population along with agricultural and industrial demands, only the Sabie has remained so. Flows in all of the rest have been recorded to cease and in some, this is now an annual occurrence.

The northern and southern boundaries of the park follow the courses of the Limpopo and Crocodile rivers respectively. The eastern boundary forms the international border

between South Africa and Mozambique and lies along the Lebombo Mountains which are prominent in the south but disappear completely in the north. The western boundary follows no natural features except in the extreme south where the Sigaas River constitutes the boundary, a small section north of the Letaba River where it follows the course of the Klein Letaba River and also in the far north where it follows the Luvuvhu and Limpopo rivers for some distance. The western boundary has over 2 million people who make up the Tsonga, Vhavenda, Pedi and Swazi tribal groups. These groups were segregated during the Apartheid era into what were referred to as the homelands. The former homelands are typified by densities as high as 300 persons per km^{-2}. They are associated with small-scale cropping and stock grazing. Comparatively, the adjacent commercial farms, which are largely owned by English and Afrikaans speaking whites, are characterized by densities as low as 5 – 20 persons per km^{-2}. They are associated with cattle farming, game ranching and tourism.

Although the park had been fenced along its entire periphery by 1978, the fence on the western boundary between the Sabie and Olifants rivers was removed in 1994 to allow free movement of game between the adjacent private reserves and the park. The fence along the Limpopo River has also recently been removed as it denied wildlife access to water in the dry season. These fences are not entirely "game-proof" as individuals of certain species manage to get through, under or to break them, but they certainly curtailed all major movements of animals in or out of the park. Since establishment of the Greater Limpopo Transfrontier Park in 1992 sections of the fence between the park and the Limpopo National Park in Mozambique have been removed.

The foregoing geographical description suggests that the management of Kruger National Park is embedded in a complex social environment. As indicated in the following sections, such an environment is characterized by a network of social relationships that influence management effectiveness.

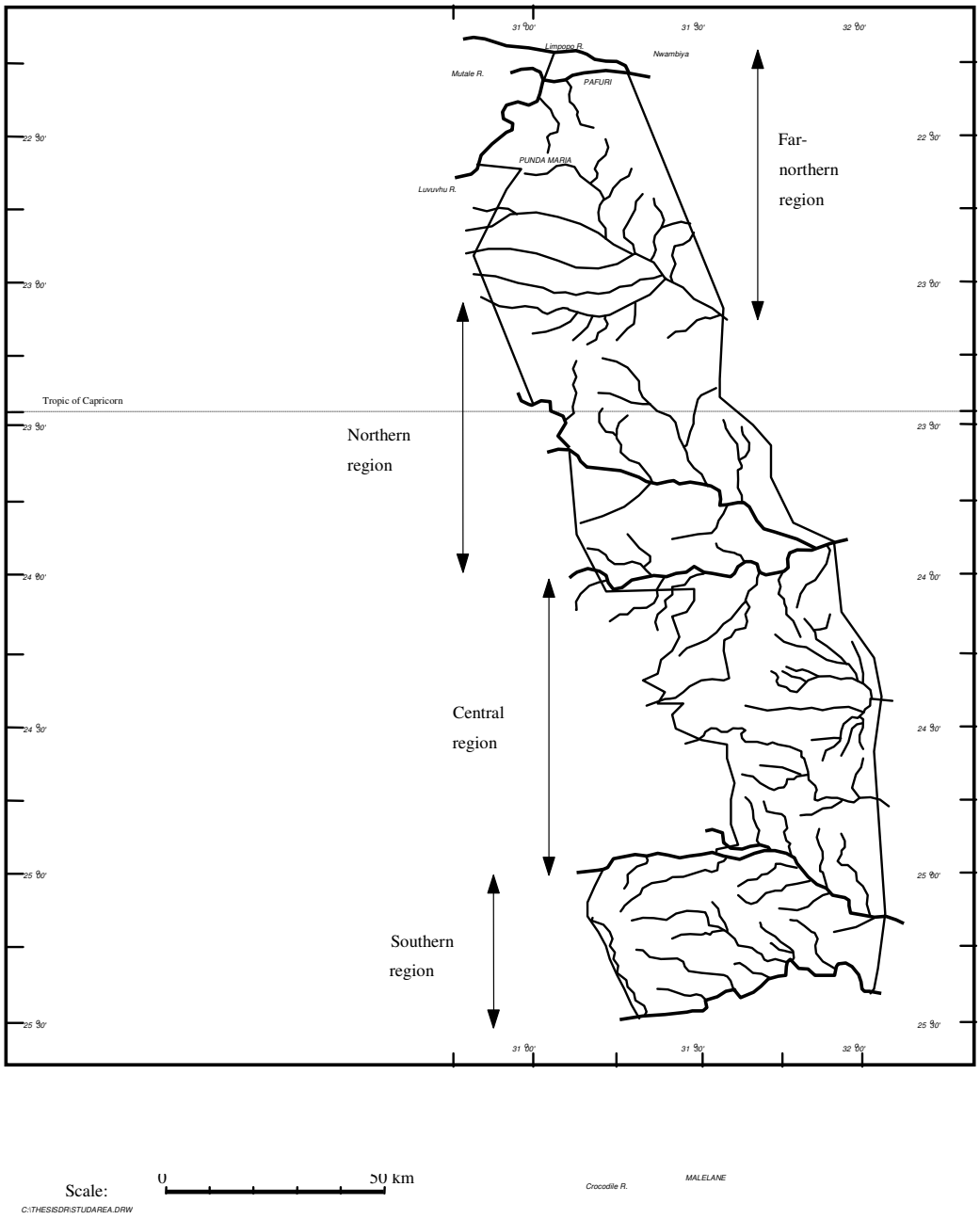

Figure 5.1: Map of the Kruger National Park

Methods

The study adopted a qualitative and comparative case study approach (Strauss and Corbin 1998). Data were collected from two primary sources. Field interviews were conducted using an interview schedule which was administers to key informants representing park management and other organizations associated with Kruger National Park and its surroundings (see Appendix 1 for the interview schedule). Individuals were identified using a snowball sampling technique (Babbie 2004). All interviews were confidential and recorded using a digital voice recorder to ensure accurate recording for later analysis and interpretation. Telephone interviews were conducted with individuals who could not be reached in the field. Additional contacts and follow-up interviews clarified responses and obtained additional information. Direct observation of events and meetings were also conducted during field visits.

Documentary analyses were used to examine material generated by park management and other actors. A major advantage of this method was that the documents were generated contemporaneously with the events to which they referred (Babbie 2004). As such, they were less likely to be subject to memory decay or memory distortion. The key sources of the data collected included organizational records, journal articles, data-tables, research reports, minutes, information briefs and newsletters. These documents were a useful source of data on the activities in river and fire management and had to be reviewed and assessed for background information. The field data were analysed qualitatively using a computer software programme called QSR NVivo 2.0 which is a qualitative research tool used for codifying qualitative field data.

FIRE MANAGEMENT

For a long time, fire management has been used in Kruger National Park in the maintenance of savannah rangelands. Although approaches to fire management have changed on a number of occasions (van Wilgen et al. 2004), the study revealed that two major phases have defined the nature and substance of collaborative arrangements in fire

management, pre-2002 and post-2002. These phases have been largely shaped by the level of professional/social agreement on assumptions and level of certainty about outcomes (Figure 5.2).

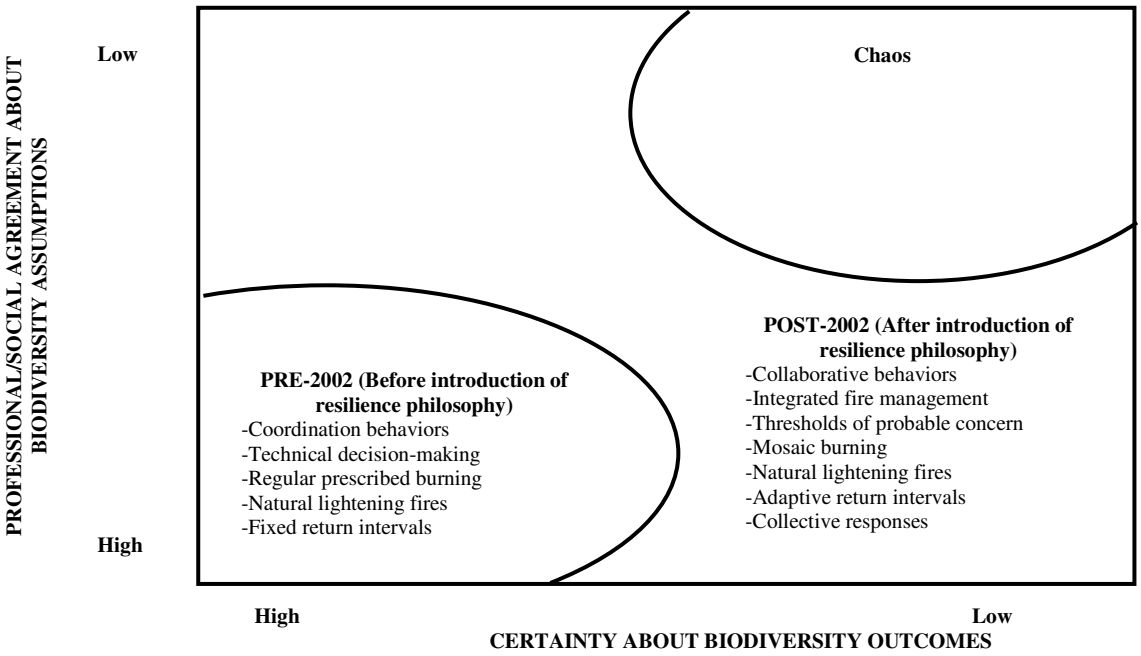

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Figure 5.2: Social relationships and the evolution of fire management decisions in Kruger National Park (Adapted from Kinnaman and Bleich, 2004).

For many years, management of public conservation areas in South Africa was largely the domain of park staff, informed by research that was predominantly local (du Toit et al. 2003). Importantly relational connectedness was confined largely to staff and close associates, among whom relational capital was high. Unsurprisingly therefore, the pre-2002 phase was largely characterized by high levels of agreement on assumptions and high levels of certainty about outcomes amongst park scientists and managers (Figure 5.2). It is a phase that could be regarded as a period that was associated mostly with technical decision-making situations. From 1957 to 1992, for example, regular prescribed burning was conducted on fixed return intervals. This fire decision regime was executed every 3 years in spring after the first rains and fire breaks were used to delimit burning blocks. In addition, from 1992 to 2001, a natural lightening fire decision regime was

implemented in which management prevented and suppressed all fires other than those arising from lightening which was considered to be 'natural.' According to one park scientist, these fire decision regimes were designed and implemented through 'command and control' strategies which are premised on the assumption that the world is orderly and predicable. Given the high levels of agreement and certainty, the regimes were so routinized that they became "the way things are done here." As such, I suggest that the pre-2002 was mostly characterized by coordination behavioral styles amongst actors.

The transition into the post-2002 phase has witnessed growing relational connectedness with and among managers and researchers that required new levels of relational capital. This period is associated with expanding social learning and hence a move away from a command and control management paradigm. Inevitably, it requires actors to acknowledge dynamic complexity in protected area management and is associated with moderate levels of agreement and certainty (Figure 5.2). Under these decision-making situations, the world is assumed to be relatively unpredictable. For example, an integrated fire management regime has been introduced in which fires may have both natural and intentional origins and whereby burning patterns may be influenced by, but not be totally determined through collaborative design processes. The consequences of all fires are monitored and evaluated within the framework of SAM. The collaborative arrangements involve participation of stakeholders including park scientists, managers, rangers and external actors. A hybrid of patch mosaic burning and lightening fires is used to meet burning targets and the outcomes are measured against thresholds of probable concern. Through the framework of SAM, upper and lower thresholds relating to a range of fire patterns are collaboratively agreed upon. If there is a clear trend towards a threshold or when a threshold is reached, then a management decision is necessary. Such a decision may be as a result of the need to heighten awareness, intervene in some way or to re-assess the validity of models. The framework of SAM includes thresholds relating to fire-return periods, the seasonal distribution of fires, the range of desired fire intensities, and the size-class distribution of fires. Given the moderate levels of agreement and certainty, deviations from these thresholds are designed to provide early warning signals to all the concerned to enable timely and collective responses. In essence the system is designed to

enhance preparedness through gaining fundamental insights as much as it is designed to improve responsiveness to symptoms.

I contend that the post-2002 phase has mostly been characterized by collaborative behavioral styles. The transition from coordination to collaborative behavioral styles was facilitated by the interplay between relational capital and relational connectedness. The study revealed a number of events that could be attributed to the building up of relational capital and strengthening of relational connectedness. For example, it was revealed that trust has been developing over the years (Figure 5.2). According to one of the park scientists, "I think there is more trust with the current fire policy than with the previous one because it was in the 2000s that we started getting external actors to win in. In the previous policy we did not have much consultation with external actors as fire management was largely a preserve of the inner workings of Kruger National Park." The aspects of externalization and consultation are both important ingredients in the building up of relational capital and strengthening of relational connectedness.

The study revealed that regular discourse between and among rangers and scientists has contributed to developing relational capital and relational connectedness. While in the previous fire policy the competence of fire management was largely viewed as a preserve of scientists who operated in an exclusive social learning group, regular meetings have brought on board rangers who actually implement the policy. This has in turn widened the social learning group. For example, according to one of the park managers, "We had a meeting in May 2006 involving park scientists and where more than 80% of the rangers attended. This was quite remarkable to get the rangers attending a scientific meeting. The one reason I think they attended was because they now take a keen interest in fire issues as compared with the previous policy." The study further revealed that annual general meetings are also held where the issue of fire is discussed between rangers, managers and scientists. Regular information updates in the park have also helped to improve communication. Such updates come in the form of reports, maps and tables which indicate what needs to be achieved and what has been achieved in terms of fire management. The updates show areas that need to be burnt as well as those that do not

need to be burnt. The scientists also provide updates to rangers on aspects such as weather forecasts and fire danger indices. In the past planning and implementation were operationally separated so that planners had little relational connectedness and relational capital with those charged with implementing the plans.

Improvements in information culture have also contributed to developing relational capital and relational connectedness. The study revealed that over the years incidents involving the manipulation of information have been reducing. As one scientist put it, "Previously rangers would report on fires that had not taken place. They had been filling in fire reports for a long time, so they could manipulate the forms based on previous weather conditions, fuel loads and fire intensities. I was sure they were making this stuff up. Under the previous policy, in which rangers and scientists were largely disconnected, it was easy for rangers to provide false information to scientists concerning fire events in the park." According to this scientist, the situation has changed with the current policy. The rangers have realized the value of information exchange in enhancing fire management. With the help of new technologies, the problem of information manipulation is almost the thing of the past.

The post-2002 phase might still be in its early stage. Yet it provides a valuable theoretical perspective to explore collaborative processes and enabling conditions evident in the initial iterations of the fire management regime in Kruger National. Importantly, the findings strongly suggest that effective collaboration in large part depends on how actors in fire management manage social relationships.

WATER MANAGEMENT

South Africa is a water stressed country and the combined storage capacity of impoundments already exceeds 70% of total runoff (Basson et al. 1997). With high levels of abstraction and regulation of river flow, the Kruger National Park has become increasingly aware of the risks of water shortage and the need to negotiate assured supplies. According to Owen-Smith (1996), water provision in the park ranks with fire as

among the main management tools available to managers for maintaining savannah ecosystems. The management of surface water has been a major priority since the establishment of a water provision program in the 1930s. As with fire management, the study revealed that two major phases have defined the nature and substance of collaborative arrangements in water management, pre-1997 and post-1997. These phases have also been largely influenced by the level of professional/social agreement on assumptions and level of certainty about outcomes among the government, the national parks agency and other stakeholders (Figure 5.3).

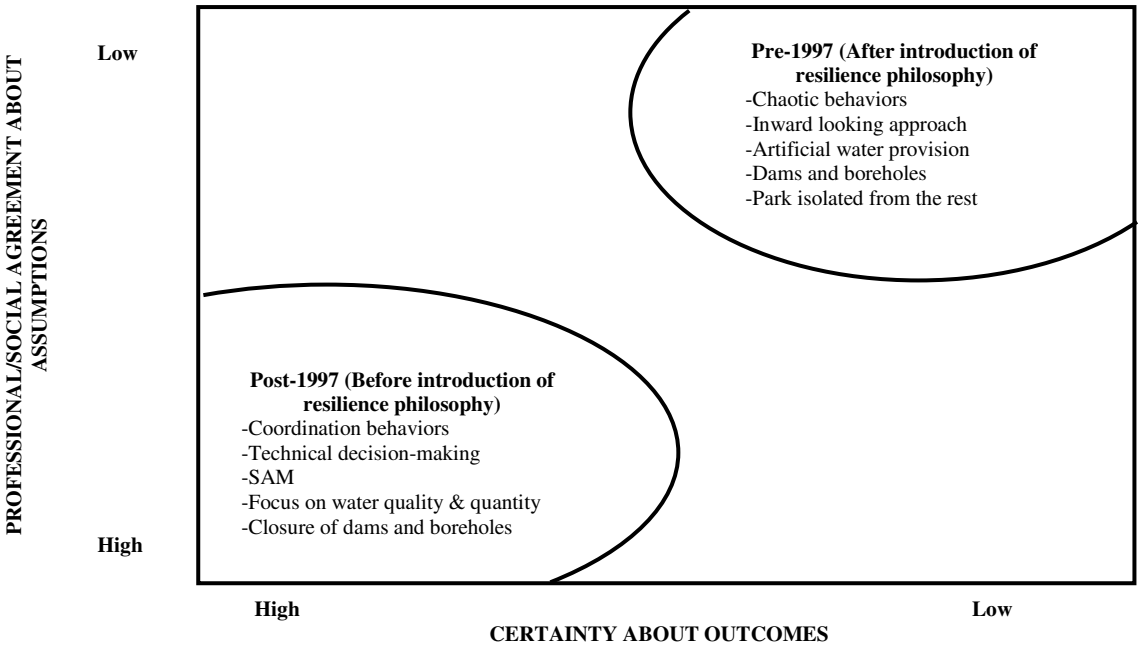

Figure 5.3: Social relationships and the evolution of water management decisions in Kruger National Park (Adapted from Kinnaman and Bleich, 2004)

The pre-1997 phase was largely characterized by low levels of agreement on assumptions about the implications of increased access to water for biodiversity and low levels of certainty about associated outcomes, conditions which favored chaotic behavior that confounds collaborative decision making (Figure 5.3). It is a phase in which for the first time the management of the park started to feel the upstream impacts on the river systems. Management realized that it had no control over upstream water uses. The park

staff assumed that by raising awareness of these impacts, government and other concerned actors would respond appropriately. But this was not the case as government and water users in the catchment placed less value on water allocated to conservation than to their uses. From a park management perspective, behavioral styles were chaotic as they were unable to achieve agreement among actors under conditions of uncertainty. The park management responded by adopting an inward looking approach sensing that the asymmetrical power relationships involving irrigators, foresters and miners were too pervasive to counteract.

Under this phase, water decision regimes were in a sense designed to make the park less dependent on upstream water sources and in so doing to isolate the park from the consequences of water use by its neighbors. Through the artificial water provision policy, 365 boreholes and 50 earth dams were constructed to provide water for the wildlife populations. These more secure artificial water sources resulted in the majority of the land in the park being within 5 km of permanent water. Ironically, many of these installations were facilitated through funds made available through a network of supportive people and organizations that shared the concerns of park management. This phase was characterized by strong directive leadership that developed as a response to the low levels of agreement and certainty between the park staff, government and upstream water users. By focusing on self reliance and away from co-dependency, the park management was able to reduce the risks of chaos that would prejudice the operations of the park. In this sense the goal of management was to avoid chaos. This required that certainty and agreement were relatively increased through a process of reducing relational connectedness (management isolating itself from other stakeholders) and not having to strive for relational capital with actors who did not share the same assumptions. Inevitably this created conditions that favor behaviors typified by toleration and coordination. As such, I suggest that the pre-1997 phase was mostly characterized by chaotic behavioral styles, at least from the perspective of park management and perhaps others in its network of supporters. .

Subsequent to the emergence of a democratic government in South Africa in 1994 there followed a process of water policy reform. Important for this study was the incorporation of environmental considerations into legislation (van Wyk et al. 2006). Thus, the transition into the post-1997 phase coincided with a change in the mental model held by the government, particularly the Department of Water Affairs, from one in which environmental issues were not featured strongly to one in which there was a legal requirement to provide water to sustain aquatic ecological systems (Republic of South Africa 1998). Consequently, this transition has been largely associated with the initiation of higher levels of agreement and certainty among stakeholders (Figure 5.3). Whilst this is so in matters of principle, the scarcity of water continues to be a latent driver of uncertainty and disagreement among affected parties. Nevertheless, at this time it is a phase where environmental water management is beginning to experience technical decision-making situations.

The post-1997 phase has focused on the application of technologies to the management of river systems. It has witnessed the first generation of the SAM procedures and technologies for river systems. Adoption of SAM has made possible the development of a sophisticated approach for calculating riverine water requirements for Kruger National Park. The center of attention has largely been on developing a shared understanding of water quality and quantity to sustain the natural environments of rivers which flow through the park. The combination of the legal requirement for securing water for the environment, the emerging scientific ability to determine and defend estimations of environmental water requirements and growing appreciation for the unforeseen impacts emanating from artificial supplies of water has encouraged park management to rescind the previous water provision policy. This has led to decommissioning of a number of dams and boreholes within the park. This is an illustration of how collaborative behaviors, among actors with divergent mental models, emerged through relational connectedness and built relational capital at national scale which led to a new mental model at park level. Important to appreciate, however, is that this model is founded on an assumption that the principle of reserving water for conservation agreed at national level will find expression in the reallocation of water thereby ensuring a reliable supply of

water to the park. Whether this happens or not depends on the behavioral styles of people at river catchment scale.

Why do I argue that the post-1997 phase is exhibiting coordination rather than collaborative behavioral styles? Although coordination behavioral styles represent an important aspect of relationship development, I contend that the answer lies in the dynamics involved in the interplay between relational capital and relational connectedness. The study revealed that while there has been notable technological progress in water management, both relational capital and relational connectedness have not been developing as evidenced by low levels of relational capital and relational connectedness expected. At the end of 2005, for example, the Olifants River stopped flowing through the park. Whilst some could attribute this to preceding low seasonal rainfall, those in the park attributed to an unwillingness to acknowledge conservation as justification for water allocation. This illustrates that notwithstanding the fundamental change in mental model at national scale it has been much slower to change at local scale. Although at national scale this situation was attributed to institutional failure, that is inability to enforce the South African Water Act of 1998, perhaps more importantly it reflects the failure by park management to appreciate that not attending to relational capital and relational connectedness was a major contributing factor.

Stakeholders in the Olifants River Catchment have historically held a fundamentally different mental model from that of park management as evidenced by perceptions of how water should be allocated. And this suggests that there may still be need to develop relational connectedness and relational capital in order to achieve the collaborative behavioral styles that would lead to a shared mental model in which water for conservation is acknowledged. In 2005, for example, the refusal by the supervisor of a dam upstream to release some water for the park caused a lot of anxiety and panic for the park managers as biodiversity was under threat. To some extent, this was compounded by the fact that the Olifants River Forum, which was established to promote collaboration between parties to help with the conservation of the river, was not performing as expected. According to one of the river managers, “The forum has been slowly dying out

to pave way for new institutional structures as provided for by the new Act." As such, the membership, which includes officials from the mines, farms, the park, and the water department, has not been meeting regularly enough to grow appreciation for the consequences of decisions affecting allocation of water. Without transparent exchange of information, social learning cycles are incomplete and opportunities to build relational connectedness and relational capital are undermined.

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A SYSTEMIC PERSPECTIVE

Giampietro (2004) draws distinction between robustness and resilience. Whereas a robust system retains its identity by displaying resistance to change, a resilient system retains its identity while accommodating change. In this context, however, neither robustness nor resilience confers immunity from change that affects the identity or state of the system. For a complex system to have an identity it must be able to resist change (Argyris and Schon 1978, Cilliers 2006). On the other hand, too frequent and rapid change threatens the integrity (self organizing properties) of complex systems (Bossel 2001). This suggests that identifiable systems go through periods of resisting change and periods of accommodating change. From a conservation organizational perspective, and more particularly that of a public conservation agency, one can appreciate the importance of a stable identity. Also, one can speculate that this would be associated with a resistance to change such that these organizations would be characterized by 'certain slowness' in their response to forces of change (Cilliers 2006).

In Figure 5.4, I have adapted Giampietro's (2004) evolutionary approach to illustrate and interpret how the management of Kruger National Park maintained its social identity. In this interpretation it is important to distinguish between forces of change deriving from the larger context that effect a change in identity and those that reinforce an identity. I have also used my interpretation of relational connectedness and relational capital to illustrate their roles in an evolutionary process. Although the Figure can be used in both the fire and water studies, I use water to illustrate its application.

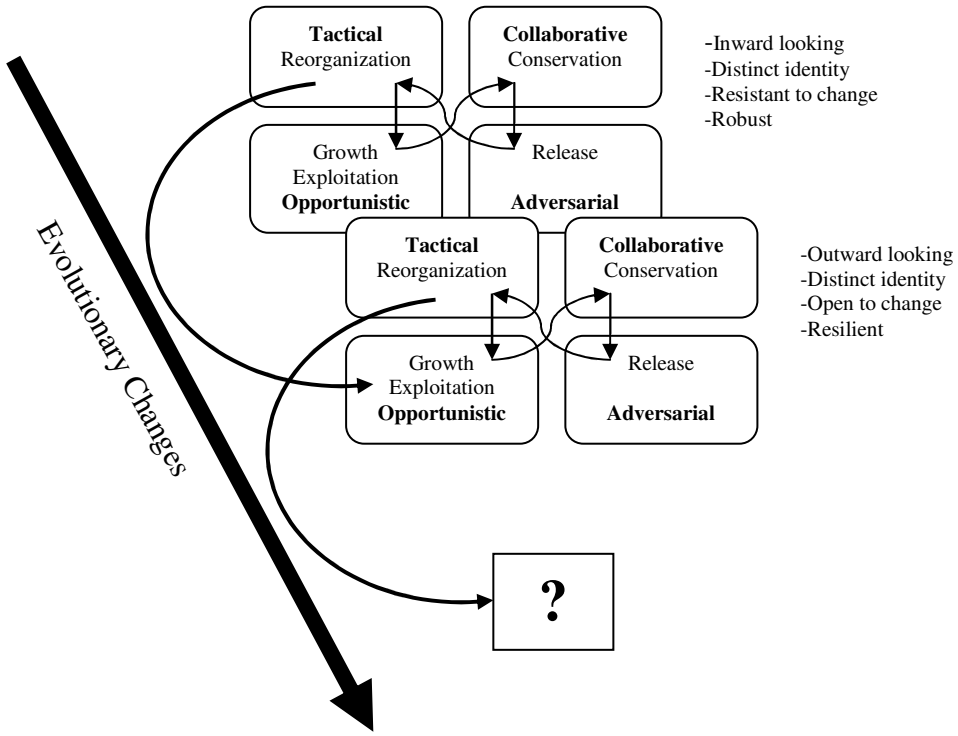

Figure 5.4: Diagram illustrating evolutionary changes and increasing relational capital and relational connectedness among management and other stakeholders in water management in Kruger National Park (adapted from Giampietro 2004)**.**

For many years the rivers supplying water to Kruger National Park were perennial. During this period, the Kruger social-ecological system had a distinct identity in which water was not a defining issue. Interviews with park staff and the literature (Pollard et al. 2003) indicate this to have been a period in which park management was inward looking. Thus, while within the park relational connectedness and relational capital may have been high, at larger scales both would have been low. Management sustained its identity resisting change through isolating itself from external forces. It was a robust organization. But when it became impossible to ignore the larger context that impacted on the river flows, the scale for relational connectedness changed and management began to appreciate that it did not have either the relational connectedness or the relational capital to effect a desired change in society. Perhaps because of its strong culture of independence, this outcome directed the agency to reorganize internal operations so as to

reduce dependence on upstream sources of water. The result was a fundamental change in internal operations, particularly in technical decision-making, but not in relational capital or relational connectedness with the sectors that might ultimately resolve the issue of river flow in the park. In essence management retained its robust character.

Over time park management began to open opportunities for research to the wider community of scientists and so it expanded relational connectedness and relational capital with researchers. But this led to unanticipated outcomes. It became evident that the practice of providing additional secure sources of water in the park was having undesired consequences and at the same time, failure to secure flows in the rivers had consequences that went far beyond simply the 'provision of water' for animals. There emerged an appreciation for the importance of relational capital and river research sought to build social capital (Biggs et al. in prep). This heralded a fundamental change in the identity of park management from an inward looking, robust organization resisting change to an outward looking organization that is willing to accommodate change, to a more resilient organization. Under this new identity, relational connectedness and relational capital are perceived to be important. Confidence in the belief that this operational philosophy and in the legal requirement for providing water for the environment encouraged management to decommission many of its water provisioning services.

I interpret the evolutionary changes illustrated by the fire and water studies to indicate a shift from robustness that made the organization vulnerable to change emanating, particularly because of it being a part of a larger complex system, to an organization that is more responsive to change and so one that is likely to be more resilient. I contend that relational connectedness and relational capital have both enabled this shift and can contribute meaningfully to organizational resilience.

CONCLUSION

The major sociopolitical transformation that emanated from the 1990's governance changes in South Africa has led to changes in the nature and substance of collaborative

arrangements in Kruger National Park. Whilst the internal collaboration between the scientists and managers of the park has proved to be effective to some extent, evidence suggests that collaborative arrangements – more especially those involving external actors – have generally not been performing as desired particularly by conservation agencies. Although collaboration in fire management seems to be performing satisfactorily, elsewhere such as in water management collaborative efforts appear to be struggling. I suggest that the perceived difficulties associated with managing collaboration in large part require an understanding of the nature and quality of the underlying social relationships among key stakeholders as well as the competence to apply that understanding.

This paper therefore has demonstrated that effective collaboration in large part depends on how actors in natural resources management manage social relationships. The behavioral processes that underlie such relationships are important determinants of effectiveness in collaborative arrangements. The paper has illustrated that behavioral processes are to a large extent a function of dynamic decision processes which evolve through multiple states defined by the levels of agreement and certainty. To that end, I contend that an analysis of decision processes requires an understanding of the interplay between relational capital and relational connectedness.

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6

Synthesizing the Research Propositions

INTRODUCTION

The stated aim of this study is to contribute to the improved understanding of social systems analysis in management effectiveness research on protected areas. This is premised on the assumption that research has been largely confined to issues strongly related to the management effectiveness of biophysical systems. To this end, I developed four propositions in Chapter 1 for incorporating the analysis of social systems into management effectiveness research. The propositions were applied in Chapters 2 to 5 to systematically analyze the main theoretical frameworks on which this thesis is premised. The application of the propositions has provided useful insights into social systems analysis and management effectiveness research. In this chapter, I synthesize the propositions by exploring the challenges and opportunities of applying them at a broader scale in management effectiveness research.

A BEHAVIORAL APPROACH TO RELATIONSHIPS THEORY

As a starting point, I proposed that research on the role of a behavioral approach to relationships theory is necessary for analyzing collaborative processes. This was premised on the understanding that most studies have not been taking sufficient account of the behavioral processes that underlie long-term relationships in collaborative arrangements in the management of social-ecological systems such as protected areas. The paper presented in Chapter 2 articulated a social relationships perspective of collaboration in the management of social-ecological systems. It provided a conceptual premise for understanding the dynamics of social relationships that underlie collaborative processes. A framework based on resilience and social relationships theories was developed for analyzing effective collaboration. The elements of a behavioral approach to

relationships theory were discussed as a foundation for resilient social relationships. The paper demonstrated that an analysis of resilient social relationships for effective collaborative management of social-ecological systems requires an understanding of the complexity and extent of relational change. By incorporating the models of Holling (1995) and Cousins (2002) into a behavioral approach to relationships theory, the paper proposed a conceptual framework that can be used to determine the potential for relational change based on relational capital and the degree of relational connectedness in the social relationships that underlie collaborative processes.

This study has illustrated that social relationships are important in understanding the realities of the social environments of protected areas. It has demonstrated that protected area management agencies are increasingly becoming more dependent on external actors – and vice versa – for their effectiveness. In other words, the decisions and actions of a management agency depend on and affect those of others. The relationships of an agency have been identified as being among the indispensable variables for explaining management structure and function – even effectiveness. As Ford et al. (1998) argue, most of the critical decisions of organizations are largely about what sorts of relationships they would like to have with other actors and how to achieve those relationships. Whether by accident or design, relationships ultimately affect the management of an organization and its future direction. Thus, in a sense, managing in the social environments of protected areas is essentially about managing relationships, which marks a significant shift away from the dominant paradigm of managing species.

Accordingly, some organizational and management theorists – such as Pfeffer (1987) and Hakansson and Snehota (1995) – approach their studies with terminologies like relationships, dependences, networks and embeddedness. In their considered view, a relationships perspective offers a more realistic perspective of what managing in social environments is all about. As Mizruchi and Schwartz (1987) observe, the intellectual challenge of this perspective is to reorient the study of organizations and management into their social environments. Such a reorientation enhances the understanding of organizations and management based on the notion that social environments are real and

have an existence (Pfeffer 1987). It proceeds by treating relationships as units of analysis. Its central assumption is that relationships are the primary units for understanding the behavior of organizations and the nature of management in social environments (Mizruchi and Schwartz 1987). As such, it is argued that organizations can never be truly autonomous as their management processes will always be constrained and/or enabled by a complex network of relationships (Granovetter 1985, Ford et al. 1998).

This study has shown that the management of relationships in social environments is central to management effectiveness. It has demonstrated that a structured approach in the study of management effectiveness requires an understanding of relationship management. In that regard, the thesis has illustrated that the management of relationships is central to effective protected area management. Importantly, such management must be premised on a sound theoretical understanding of behavior.

INTEGRATED LEARNING SYSTEMS

I proposed that research on integrated learning systems is essential if we are to successfully promote learning as a fundamental component of the governance and management of protected areas. I argued that the establishment and maintenance of an integrated learning system for protected areas requires an understanding of governance learning and management learning. The paper presented in Chapter 3 illustrated that the strongly coupled connections between the two subsystems influence the performance of an integrated learning system. Performance indicators of an integrated learning system need to reflect the effectiveness of the two subsystems. The derivation of such indicators must acknowledge that the creation of knowledge through governance learning and management learning occurs in a dynamic context of information flows which link multiple actors in an integrated learning system. As such, I suggested that the degree to which social actors are connected in an integrated learning system provides the premise on which those actors share information to create the knowledge required for effective protected area governance and management.

This study has illustrated that discontinuous change in the governance and management of protected areas can lead to greater uncertainty in an integrated learning system. This is because it is almost impossible to predict with precision the future states through which governance and management processes can evolve. The uncertainty associated with a dynamic integrated learning system exceeds the capacity of parties to predict future behaviors and events. This phenomenon is compounded by the vast number of possible actions available to each party in an integrated learning system. Further, the large number of restricting factors complicates the efforts to forecast the future in any meaningful way. To maintain their capacity to cope with uncertainty, parties have to engender ongoing learning processes by being strategically adaptive. In so doing, they would interact with each other under a defined set of possible future scenarios.

Elsewhere, research has shown that the complex context of governance learning is a source of external stimuli with the potential to generate change in management learning (Nina-Marie and Kay 1999). While the learning occurring at the scale of governance may trigger change in the learning associated with management, the latter has been happening mostly without due regard to the former. As a consequence, management learning has been unable to cope appropriately with governance learning. There has been a mismatch between the spatial-temporal scales of governance learning and management learning. To respond adequately to the scale dilemma, we need to understand that successful adaptability for protected areas largely depends on the effectiveness of the efforts to integrate governance learning and management learning.

The process of strategic adaptation in an integrated learning system is important in guiding the behavior of parties as they go about to formulate effective responses to unexpected events. This process can foster the competence of parties to deal with a wide range of ‘surprises’ within an integrated learning system. Thus, although parties would continue to encounter surprises, “they would not be surprised that they are surprised” (Malhotra 2002). Rather, they would anticipate surprises. Strategic adaptation can have the effect of fostering the competence of parties to cope with uncertainty, and thereby extend their capabilities to deal with emergent governance and management issues. Such

a process incorporates enquiry and reflection into the interactions of parties in an effort to deepen their shared knowledge. If an integrated learning system is to develop in a particular direction desired by concerned parties, then it would demand considerable enquiry and reflection. Therefore, the manner in which a dynamic integrated learning system evolves over time will largely be a function of learning by interaction.

ADAPTIVE MANAGEMENT OF DEMANDS ON PROTECTED AREAS

I proposed that research on adaptive management theory is necessary for understanding and effectively managing demands on protected areas. This was premised on the understanding that most studies have not been taking sufficient account of how management agencies manage competing demands through adaptive management processes. In Chapter 4, I presented a paper that illustrated that protected areas are established in response to demands expressed by society over time and space. These demands are varied and commonly involve protection of natural and cultural heritage so that society can continue to enjoy them into the future. As the demands placed on protected areas continue to evolve and expand, so do their expressions which are expected to be reflected through mental models in management planning processes. Accordingly, I argued that much of society's perception of successful protected area management is determined by how management agencies understand, respond to and manage demands. Hence, for protected area management to be effective, agencies must incorporate mental models into adaptive management of demands.

Elsewhere, research has shown that society's ever-changing demands have continued to trigger instability in the structure and function of protected area management systems. In sub-Saharan Africa rapidly growing human populations and the need for economic growth are placing increasing demands on protected areas, whose extent by IUCN category stood at 10.9% of the total land area in 2003 (UNEP 2003). While protected areas represent an essential tool for the protection and sustainable use of natural and cultural resources, most of these areas have continued to face serious threats from systemic societal demands including uncontrolled human settlements, illegal trade in

products of endangered species and bush meat, unsustainable agricultural and mining practices, and increased uncoordinated tourism activities. Despite the institutionalization of management effectiveness approaches, a combination of competing and incompatible demands from rural livelihoods and commercial interests is poised to change the extent and status of protected areas. Protected area agencies are thus challenged to find strategies for resolving and managing these ever-changing societal demands on protected areas by transforming the ways in which they practice adaptive management as a management effectiveness approach.

The research and practice of demand management in protected areas through adaptive management has been mostly associated with technical decision-making situations. In large part this is because adaptive management has been typically based on technical instruments which focus on improving the accuracy of forecasts and the use of biophysical characteristics of demands to determine inventory and capacity requirements for protected areas agencies. The emphasis on framing demand management from a technical perspective, without examining how social relationships impinge on decisions about demands, has rendered adaptive management an inadequate framework for collective decision-making. Hence the management of societal demands has been reduced to a technical allocation of values and associated benefits, with relatively little attention being given to the implications of social relationships.

Arguably, managing societal demands on protected areas is not a matter of setting a utility function and selecting the alternative leading to the preferred set of consequences. On the contrary, demand management requires a systemic framing of key social relationships variables which define the effectiveness of demand management. This understanding justifies a strong concern for understanding the nature and substance of social relationships embodied in collective decision-making processes relating to demand management. Given these conditions, protected area agencies need to develop relational and not technical competences to respond adequately to the decision-making dilemma which underlies demand management.

In sum, I argue that, in the context of managing societal demands on protect areas, adaptive management has traditionally been assumed not as a relational but a technical competence with a consistently strong bias on the internal dynamics of protected area agencies. Such a perspective gives the impression that most if not all demand-related problems and solutions are inherently endogenous to protected areas agencies. In a way this has resulted in a situation where protected area agencies have been unable to cope appropriately with the social forces occurring at larger scales. As a consequence, a distinct mismatch between the spatial-temporal scales of demand-related problems and solutions has emerged, whereby protected area agencies have been unable to effectively and timely respond to demands emanating from various interest groups across spatial-temporal scales. Not surprisingly, perhaps, although adaptive management theory acknowledges that the complex context of social-ecological systems may be a source of external stimuli with the potential to generate instability in protected area management systems, the research and practice of demand management in protected areas through adaptive management has continued to be internally focused within protected area agencies. It is this basic weakness of adaptive management that leads me to suggest that its conception of demand management is but a partial theory. Attempts to address this challenge will require an understanding of the nature and substance of the complex context of protected areas.

A SOCIAL SYSTEMS APPROACH TO MANAGEMENT EFFECTIVENESS

I proposed that an analysis of social attributes through a systems approach is central to the study of the management effectiveness of protected areas. I argued that a structured approach to the study of management effectiveness research requires an understanding of social systems that can help explain and assess management effectiveness from an holistic approach. From the foregoing, it is evident that social systems analysis offers a powerful methodology for management effectiveness research. Its inherently robust techniques and procedures have been used in this study to contribute towards thinking about and studying social reality. The methodology has been used to explicate some of the major contemporary issues in the social world of protected areas. It has been

employed as a means for contributing towards building knowledge about the social world by providing new insights into the dynamics of human behavior. As such, this contribution provides the necessary impetus for developing a social systems approach to management effectiveness research.

This study has illustrated that a social systems approach to management effectiveness is especially appropriate to the study of processes located in the changing structures of social systems of over time. The approach offers useful techniques and procedures for examining subtle nuances in attitudes and behaviors. It defies the inherent concerns of superficiality implicit in most methodologies by providing profound insights into social reality. One would argue that one of the most important strengths of the approach lies in its ability to allow the study of social processes over time (Babbie 2004). Thus, a focus on the temporal dimensions of social systems allows researchers to broaden the depth of understanding of management effectiveness.

Research in other disciplines suggests that social systems analysis is increasingly becoming a useful methodology for facilitating structured inquiries into complex social issues and concerns (Checkland 1985, Senge 1990, Bossel 2001). This development is premised on the understanding that we need better ways for dealing with complexity. Social systems analysis offers an approach that can facilitate structured analyses of complex social problems. However, for social systems analysis to become useful in management effectiveness, its concepts and tools must be expressed in terms that are so understandable and usable that most people can apply them to their specific situations.

Having said all that, the question that remains is, “Is social systems analysis a science?”

Although a meaningful response to such a question is contingent upon different factors, it can be argued that the criterion of theory-building offers useful cues. As Strauss and Corbin (1998) observe, theory-building represents a central concern of science in general. If this understanding were taken as given, then a theory-building methodology offers a useful criterion for evaluating social systems analysis as a science. A theory-building

methodology connotes the explanatory power of scientific research. Such power is founded on the ability of a particular theory to predict the probability of events. In this case, it is important to distinguish between substantive and general theories. The former refers to theory that is generated from the study of one specific population, whilst the latter denotes theory based on large scale populations (Strauss and Corbin 1998). Therefore, if substantive theory were taken as a legitimate concern for science, then one would argue that social systems analysis meets the criterion for science. This is because, as Strauss and Corbin (1998: 267) observe, "a real merit for substantive theory lies in its ability to speak specifically for the populations from which it was derived and to apply back to them."

The comprehensive nature of social systems analysis suggests that the methodology meets the criterion for science that is founded on substantive theory. Given that the methodology requires direct and indirect observations of social phenomena, it can be contended that social systems analysis enables researchers to produce substantive theories that provide a deeper and fuller understanding of social reality. This is particularly the case as the methodology can be used to facilitate a framing of problem situations under natural conditions (Chalmers 1999). Such an understanding thus compels one to suggest that social systems analysis justifiably falls within the realm of science founded on substantive theory.

The implication of social systems analysis as a substantive theory-based science is that it offers researchers a leverage to study reality from a systematic and objective perspective. However, as Strauss and Corbin (1998: 267) suggest, "the more systematic and widespread the theoretical sampling, the more conditions and variations will be discovered and built into theory and, therefore, the greater its explanatory power (and precision)." Based on this understanding, social systems analysis can be justifiably used as a scientific approach to systematically interpret underlying interrelationships and patterns of change in social reality. Importantly, it can assist management effectiveness researchers to focus on structures that provoke particular attitudes and behaviors that in turn determine events, rather than reacting to individual subjective biases.

CONCLUSION

In this thesis I sought to contribute to the improved understanding of social systems analysis in management effectiveness research on protected areas. In so doing, I developed and applied propositions for incorporating the analysis of social systems into management research. These propositions were designed as theoretical constructs which represent some aspects of social reality in protected area management. They signified an organized way of thinking about the social domain of protected area management. I conceived them as comprising interconnected theories organized in a way that made it useful to analyze social systems. I understood the propositions as being probabilistic and not deterministic. As hypotheses, the propositions were founded on a set of explicit assumptions. Whilst I acknowledge that the assumptions were inherently incomplete, this however did not diminish their core scientific value; that of providing a hypothetical model for applying logic which can be independently tested by others.

An analysis of management effectiveness must recognize the need to take into account the inherent interactive nature of the connections among the three variables, relationships, learning and demands. Importantly, the three variables do not exist in isolation, but are interconnected and exert influence, sometimes with considerable delays, on each other. The interactions among the variables provided this study with a conceptual structure for analyzing the social domain of protected area management. Within this structure, the concepts of relationships, learning and demands were usefully integrated to generate theoretical frameworks on which the study is premised. Accordingly, this thesis is premised on an understanding that incorporates the dynamic coupled connectedness among the three variables. It is only through such a systemic approach that we can appreciate that indeed the whole is greater than the sum of its parts. Thus, the interconnections among the three variables provide the substance of a dynamic social system.

The methodology of social systems analysis has been used in this study to provide a comprehensive means of making sense of and dealing with social systems. Given the pervasiveness of social systems in all aspects of protected area management, I view this thesis as an important contribution that provides the necessary intellectual tools for interpreting and dealing with social systems. The thesis should be seen as a theoretical foundation that espouses a philosophy of social systems in management effectiveness research. Whilst researchers may be at liberty to develop their own systems theories, I suggest that management effectiveness research should use frameworks that build upon existing philosophies of systems such as resilience theory. Such an approach would better facilitate the development of methodologies and methods for understanding and managing social systems. Importantly, the approach would offer an understanding of the nature of systemic indicators required for analyzing the human dimensions of protected area management.

This thesis should be viewed as being founded on a common philosophical theme; systems thinking. This philosophical theme helped in conceptualizing the connections among relationships, learning and demand management. It provided the basic underlying assumptions of this study and assisted to unify the thesis into an integrative product. It offered a compelling rationale that justifies the selection of the three variables as well as the envisaged causal relationships among them. Also, it provided opportunities for exploring the generic application of the propositions at a broader scale in management effectiveness research. As such, the philosophical theme exemplifies why potential end-users of my work should give credence to my representation of social analysis and its application in management effectiveness research. I assume that the propositions have generic applicability and that if they are to be useful for research and practice, then all the causal relationships among the three variables have to be tested. Thus, the philosophical theme of systems thinking provides a basis for judging the reasonableness and usefulness of the propositions by providing a lens for looking at and understanding contemporary social issues in protected area management.

From the foregoing, I assert that this thesis has made a contribution to management effectiveness research by examining in some important ways why research should not be determined solely by biophysical components, but should be extended to the broader social issues that define the nature and quality of management. A deep appreciation of management effectiveness requires an understanding of relationships, learning and demands to provide a foundation for systemic social analyses. The thesis has illustrated why a behavioral approach to relationships theory provides a foundation for resilient social relationships in collaborative processes. It has shown why the establishment and maintenance of an integrated learning system take place in a complex context which links elements of governance learning and management learning. It has also evinced why protected area management agencies have to incorporate mental models into adaptive management of demands. These insights imply that the opportunities for effective protected area management are largely contingent on systemic insights into the underlying social structures and processes responsible for emergent problems. By exposing the insights, research on management effectiveness is poised to take new direction.

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APPENDIX 1

Interview Schedule

Researcher's introduction

I am Abraham Nkhata a doctoral candidate at the University of KwaZulu-Natal. I am conducting research on the social relationships in natural resources management sector. It is envisaged that this research upon completion will contribute to a better understanding and management of the social relationships that underlie collaboration processes in the sector.

I am therefore kindly requesting your permission to ask you some question that will assist in informing the research. Please be advised that you are free to inform me if you do not feel safe in participating in this research. However, if you accept to be interviewed, the information you shall give will be treated with utmost integrity and sincerely. You may also indicate if you wish the information to be treated with confidentiality and/or to remain anonymous. I intend to record the interview using a digital wave player. You might indicate if you do not want to be recorded digitally. The questions that follow are semi-structured and open-ended. As a respondent you are expected to provide your own answers.

A. Decision Processes

1. What is/has been the major decision process in river/fire management?
2. Why and how did this decision process arise?
3. Who are the main social actors concerned with this decision process?
4. What are the expected outcomes of this decision process?
5. Do you all agree about the expected outcomes of this decision process?
6. Are you all certain about the expected outcomes?
7. Generally speaking, what is the condition of the relationships among the actors?

B. Relational Capital

Trust

1. Do you trust this organization/group/individual?
2. Does this organization/group/individual keep its promises?
3. Does this organization/group/individual treat others fairly and justly?
4. Do you believe what this organization/group/individual normally says?
5. Does this organization/group/individual take the opinion of others when making decisions?
6. Are you willing to let this organization/group/individual make decisions on behalf of others?
7. Do you feel confident about the skills of this organization/group/individual?
8. Does this organization/group/individual have the ability to accomplish what it says it will?

Commitment

1. Is this organization/group/individual committed to working together?
2. Do you feel that this organization/group/individual attempts to maintain long-term relationships with others?
3. Does this organization/group/individual make long-term investments into working with others?
4. Do you expect to be working with this organization/group/individual for a long time?
5. Would you rather work together with this organization/group/individual than not?
6. Are you committed to working with this organization/group/individual?
7. Are you willing to maintain long-term relationships with this organization/group/individual?

8. Are you willing to make long-term investments in working with this organization/group/individual?

C. Relational connectedness

Information sharing

1. Do you communicate with this organization/group/individual?
2. Do you know the collectively agreed roles and responsibilities of this organization/group/individual?
3. Do you meet on a regular basis to discuss with this organization/group/individual?
4. Does this organization/group/individual keep you informed of new developments?
5. Do you have access to information held by this organization/group/individual?
6. Does this organization/group/individual manipulate information?
7. Does this organization/group/individual deliberating transfer information that would negatively affect your relationship?
8. Does this organization/group/individual hide important information?

Resource sharing

1. Do you share resources with this organization/group/individual?
2. What resources do you provide to this organization/group/individual?
3. Do you have access to the resources of this organization/group/individual?
4. Does this organization/group/individual deliberating withhold resources you are meant to share?
5. Who is responsible for distributing resources in this collaborative scheme?