



National Environmental
Research Program

LANDSCAPES &
POLICY *hub*

Biodiversity Governance

in the

Tasmanian Midlands

and

Australian Alps

Literature Review



Wallace Hut, Falls Creek Victoria

Ken Duncan

Sarah Clement

School of Environmental Science - Murdoch University

18 July 2012

Landscapes and Policy Hub

Biodiversity Governance in the Tasmanian Midlands and Australian Alps

Literature Review – 19 July 2012

Sarah Clement (31752173) – School of Environmental Science

Table of Contents

1	Institutions	2
1.1	Definition and Attributes of Institutions	2
1.2	Clarification of Key Terms	7
1.3	New Institutionalism	9
2	Governance	12
2.1	Definitions and Key Concepts	12
2.2	Adaptive Management, Governance, and Comanagement	18
3	Networks and Social Capital	20
3.1	Networks and Governance	20
3.1	Social Capital	21
4	Change, Learning, and Innovation	22
4.1	Institutional Change and Learning	22
4.2	Institutional Entrepreneurship and Innovation	26
4.3	Change through Networks	30
5	Social-Ecological Systems (SES) and Resilience Thinking	32
5.1	Overview of SES and Resilience Thinking	32
5.2	Institutions, Governance, and Resilience	35
5.3	Related Frameworks	38
6	Research Paradigm	40
7	Analytical Themes in Institutional Analysis	41
7.1	Causality, Performance, and Design	41
7.2	The Problem of Fit	44
8	Approach to Institutional Analysis	46
8.1	Case Studies	46
8.2	Diagnostic Framework	48
8.2.1	Frameworks, Theories, and Models	48
8.2.2	Design Principles	49
8.2.3	Institutional Diagnostics	51
8.2.4	The Institutional Analysis and Development (IAD) Framework	53
8.2.5	Incorporating Discourse	58
8.3	Conclusion and Next Steps	63
9	References	64

Table of Figures and Tables

Figure 1.	Visual representation of stability landscape and basins of attraction	33
Figure 2.	Visual representation of the adaptive cycle	34
Figure 3.	IAD Framework	53
Figure 4.	PIASES Framework – Top Tier Components	54
Figure 5.	PIASES Framework – Second Tier Variables	56
Table 1.	Summary of collective-action and social-practice models	5
Table 2.	Implications of models for designing effective environmental regimes.	6

About this Document

This literature review was developed by Sarah Clement, PhD Candidate at Murdoch University. This review has informed the development of the Program of Study and provides a preliminary outline of the literature that will inform subsequent research as part of the NERP Landscapes and Policy Research Hub. This literature review and the Program of Study were submitted to and approved by Murdoch University as meeting the first PhD candidate milestone. Please cite the document as follows, however this document is subject to revision and citation details should be confirmed with Sarah Clement (S.Clement@murdoch.edu.au):

Clement S (2012) *Biodiversity Governance in the Tasmanian Midlands and Australian Alps – a preliminary literature review*, Murdoch University, Perth, Western Australia.

My PhD research adopts an institutional approach to understanding biodiversity conservation governance and identifying options for reform. The focus of my PhD is on how institutions and actors¹ enable (and constrain) collective action to conserve biodiversity and respond to drivers and disturbances. This literature review summarises the key concepts, theories, and paradigms that will underpin my research and have influenced its design and methods. Specific information about the study areas, policy context, and the full suite of methods selected for the study can be found in the Programme of Study.

1 Institutions

1.1 Definition and Attributes of Institutions

The term *institution* has no single or standard definition, and the term is used differently depending on the disciplinary perspective and context. Broadly, institutions can be described as “systems of established and prevalent social rules that structure social interactions” (Hodgson, 2006; p. 2). Hodgson (2006) contends that the prevalence of institutions makes them the most important structures in the social realm. Institutions structure daily life and guide human interactions (North, 1990), and profoundly affect the beliefs, thoughts, and behaviours of individuals and collective entities (Lawrence and Suddaby, 2006). Institutions can be described as performance scripts, as they guide actors’ behaviour and assign roles (Garud et al., 2007). They can be formal (e.g. laws and constitutions) or informal (e.g. norms, strategies, codes of conduct). Although they can be tangible statements on paper, the concept of an institution extends to the more abstract, often unspoken, structure of economic markets, marriage, church, and family (Ostrom, 1990; Ostrom, 2005; Young, 2002a). While these definitions describe institutions in a broad sense, more precise definitions are generally adopted for the purpose of institutional analysis; and these definitions vary.

The variation in institutional definitions reflects the diversity not only of the institutions themselves but also of institutional research. The decision to adopt a particular definition of an institution can be based on a number of considerations, including the theoretical perspective of the research question, the time scale and topic of interest, and pragmatic considerations (Crawford and Ostrom, 1995). Rules are a common feature of most definitions, although what characterises a rule and how these rules should be organised is often debated. This is why descriptions of institutions often include ‘social’ rules, emphasising that informal rules are also institutions (Hodgson, 2006). Although some analysts focus only on written institutions (i.e. *rules-on-paper*), much of the recent literature acknowledges that institutions evolve over time and may deviate substantially from their documented origins, even though participants know them well (Ostrom, 1990). These are commonly called *rules-in-use* or alternatively *working rules*. Ostrom (1990) defines working rules as those prescriptions that are monitored and enforced by those directly involved. Although actors may know these unwritten rules very well, such unspoken institutions can be difficult to study because they are often tacit. Despite this challenge, the contemporary institutionalist literature emphasises rules-in-use and other informal institutions that influence daily practices, as they can provide access to the underlying structures of society.

Drawing primarily from the sociology and political science literature, institutions are defined in this PhD research as the habitualised behaviour, prescriptions, and concepts (e.g. rules, norms, strategies, decision-making procedures, beliefs) that structure social practices and assign roles to

¹ ‘Actors’ refer to both individuals and organisations.

actors who participate in these practices (Adger, 2000; Garud et al., 2007; Healey, 2006a; Ostrom, 2005; Young, 2002a). The habitual element of institutions is important, and it arises from repeated interactions (Ostrom, 2005). A habit is a propensity to perform the same act under similar conditions or in a similar context, and it is habit that provides one psychological mechanism for rule-following behaviour (Hodgson, 2006). Not all habits are institutions, and the point at which a habit becomes an institution can be difficult to identify. Hodgson (2006) contends that a habit becomes a rule – and thus an institution – when it is prevalent among a group, acquires normative content, and has the potential to be codified. The definition of institutions adopted here is inclusive, as it includes behaviour, strategies, rules, norms, and other concepts, rather than just focusing on one element of institutions. This means it is broad enough to accommodate the wide range of institutions that are relevant to biodiversity conservation. The theoretical perspectives discussed in this literature review, many of which emphasise the role of both structures and the agency of actors and the broader socio-cultural contexts, have influenced this decision. Adoption of this definition is also practical because it is consistent with those that dominate the contemporary institutional literature from which this research will draw.

Several additional features of institutions are worth noting. Most of the institutional literature discusses or alludes to the role of institutions in fundamentally shaping actor behaviour and capacity. Much institutional research has focused on the constraining and controlling attributes of institutions to explain how institutions contribute to the persistence and homogeneity of phenomena (Dacin et al., 2002). These attributes are important, as institutions make social and economic coordination possible by generating tacit understanding and expectation, ensuring every interaction does not turn into a negotiation (Connor and Dovers, 2004). Although institutions create structure and predictability, they are not just forces that restrain actors. They also have the capacity to enable individual behaviour (Hodgson, 2006; North, 1990). Institutions can empower and support actors by providing guidelines on how to act (Scott, 2001). Institutions have thus been called a “two-edged sword” for their dual actions of enabling interaction and providing stability and certainty on the one hand, and preventing reform and codifying existing power relations on the other (Klijn and Koppenjan, 2006). Although these attributes of institutions are widely recognised, there are differences in how researchers explain the observed regularities and the mechanisms by which institutions shape behaviour.

The manner in which institutions are defined varies in part because explanations of how institutions create patterns of behaviour vary. Crawford and Ostrom (1995) summarise three broad views of these structures: institutions as equilibria (or shared strategies), institutions as rules, and institutions as norms:

- The *institutions-as-equilibria* approach views institutions as stable patterns of behaviour that arise from actor preferences and the pursuit and optimisation of these preferences (Crawford and Ostrom, 1995). Actor behaviour can thus be understood as a logic of calculation between prior preferences and anticipated consequences (March and Olsen, 1998), and patterns of behaviour in this view are sustained by mutual understandings. The contemporary roots of these views are primarily works of political scientists (Crawford and Ostrom, 1995).
- The perspective that conceives of *institutions-as-rules* focuses on the effect of prescribing, allowing, or requiring actions, and how this creates observed patterns of interactions. Actions that are inconsistent with these prescriptions are ineffective or may be sanctioned

by actors with the authority to impose punishment. The origins of this view rest primarily in economics (Crawford and Ostrom, 1995).

- In the *institutions-as-norms* view, actor behaviour is based on a logic of appropriateness and sense of identity (March and Olsen, 1998). Patterns of behaviour, in this view, have their origins in shared group perceptions of what is proper and improper behaviour in a particular situation. This perspective has its roots in sociology, and requires an understanding of the group's shared belief about normative obligations (Crawford and Ostrom, 1995).

The three views are not mutually exclusive, although traditionally disciplinary perspectives were often associated with fairly narrow perspectives of institutions. For example, economists have often focused on institutions as prescriptions or rules. However, in contemporary literature definitions seem to be much broader and incorporate all three elements (e.g. Ostrom, 1990, Ostrom, 2005, Young, 2002a, Healey 2006a, Healey 2006b, Scott, 2001, Garud et al. 2007). Crawford and Ostrom (1995) incorporate all three of these elements in their examination of institutional statements. They offer a grammar tool to study institutional statements, which will be employed in my PhD (Section 8.2.4).

Although these three views will inform examination of institutional statements, my PhD will draw mainly on the perspective offered by Scott (2001). He describes three pillars that are considered to be essential ingredients of institutions: regulative, normative, and cultural-cognitive. These pillars differ slightly to the three previous views (Crawford and Ostrom, 1995). In Scott's (2001) view, institutions guide behaviour:

- through coercion and the threat of formal sanction (*regulative*);
- through norms of acceptability, morality, and ethics (*normative*); and
- through the categories and frames through which actors interpret their world (*cultural-cognitive*).

All three of these pillars support institutions and generate compliance through expedience, social obligation, and shared understandings (Scott, 2001). Although contemporary definitions of institutions now tend to incorporate all three elements, differences in emphasis are still quite evident in practice. The divide is most evident between those that focus on regulative elements and those that focus on normative and/or cultural-cognitive origins of behaviour (Ritzer, 2005). Institutional scholars can also be divided according to the different models they adopt to explain how institutions act as a causal force.

In addition to views on how institutions create patterns of behaviour, there are also models to explain how they affect decision-making and actor behaviour. Young (2002a) identifies two clusters of models in the institutional literature, which he calls collective-action and social-practice. Although the name can cause some confusion, the *collective-action model* does not refer specifically to the broader concept of collective action; rather it refers to a cluster of models based on economic rational choice. Collective-action models view actors as economic rationalists who make decisions based on utilitarian calculations (e.g. cost versus benefit) (Young, 2002a). This view is called the collective-action model because it focuses on institutions as products of collective interests that increase cooperation because actors have an interest in avoiding joint losses or reaping joint gains (Hardin, 1982; North, 1990; Ostrom, 1990; Young, 2002a). *Social-practice models* are sociological and anthropological in origin. Accordingly, actor behaviour originates in

culture, norms, and habits. Institutions, in this view, provide the social practices that shape actor identity, and actors seek to behave in a way that is consistent with their roles. The model does not hinge on the day-to-day utilitarian calculations of actors, instead relying on the role of routine and habit as driving forces behind institutions (Young, 2002a). The basic features of these models are outlined in Table 1, followed by a summary of the implications of these models for designing effective environmental regimes in Table 2. Although the models have their origins in different disciplines, working within a particular discipline does not confine a researcher to a particular model. My PhD will draw primarily upon the social-practice model.

Table 1. Summary of collective-action and social-practice models

Category	Collective-Action Models	Social-Practice Models
Summary of model	Draws on economics and public choice theory to explain actor behaviour in terms of rational choices based on utilitarian calculations.	Draws on sociology and anthropology to explain behaviour in terms of culture, norms, and habits, with choices driven by the actors' roles.
View of environmental institutional regimes	Regimes are devices created by actors seeking to avoid or alleviate collective action problems. Regimes can affect incentives to change behaviour.	Regimes are arrangements that give rise to social practices that shape the identity of actors, generate common discourses, and draw participants into routines or habits.
Actor identity	Actors have identities that pre-date and are largely unaffected by institutional arrangements. Actors are generally viewed as unitary parties that are formally part of the regime (e.g. through signing agreements).	Actors express their interests and even conceive of their identity in terms of the membership in a regime, engaging in behaviour that is consistent with this role. Actors are viewed more broadly and less formally, and can even include individuals that are not formally part of the regime.
Sources of behaviour	Narrow sources of behaviour, i.e. assessment of costs and benefits of individual options to maximise net benefit ('logic of consequences').	Wider sources of behaviour, i.e. complying with commitments because they are authoritative or legitimate ('logic of appropriateness'), because of habit, or because of socialisation.
Social constraints	Specific choices stand alone in that they are either not embedded in the larger social environment or this environment can be incorporated into the actor's calculations.	Context is an external constraint (and/or opportunity) on those that engage in interactive decision-making.

Sources: Young, 2002a; Young, 2008

Table 2. Implications of models for designing effective environmental regimes.

Category	Collective-Action Models	Social-Practice Models
Compliance	Actors will comply if they are convinced the benefits of compliance outweigh the costs of non-compliance. Regimes thus are designed with mechanisms to change this ratio in favour of compliance.	Compliance less of a concern, as it is not decided on a case-by-case basis. As long as rules are accepted as legitimate or authoritative, this induces feelings of propriety. Routines and habits become embedded through a process of socialisation.
Policy Instruments	Market-based instruments are preferred over command-and-control regulations for both effectiveness and efficiency.	Command-and-control regulations are generally favoured for high levels of conformance. Some researchers do not favour market-based instruments because they can legitimise behaviour that falls short by making compliance and fulfilment of commitment into commodities (e.g. bad behaviour is okay, as long as it's paid).
Behavioural Consistency	Actor behaviour is consistent because it is based on careful calculations and participation in the regime does not change their identity.	Individually and collectively, behaviour can vary substantially because actors vary in their responses and decisions depend on interactions between a variety of interest groups and stakeholders.
Durability	Regimes are fragile and tend to fail when one or more key members lose interest or become dissatisfied. This is because they tend to be "lightly institutionalised" arrangements, meaning they are negotiated by key members of the group concerned about an issue through bargaining.	Regimes are persistent and often highly resistant to change, even in the face of pressure from influential actors. This is due to the deeper behavioural roots of institutions in this model, i.e. shared discourses, socialisation, and institutional culture actually influence the way actors see themselves.

Sources: Young, 2002a; Young, 2008

The dichotomy of the two models is a simplification, and there is variance even within the models themselves. However, they provide a useful way to think about the implications for designing effective institutional regimes. Young (2002a) contends that both hold significant promise; however, neither offers a complete understanding of how institutions work. The collective-action model is parsimonious and elegant; it directs attention to a small number of actors and variables. However, with this parsimony comes a trade-off in terms of explanatory power. In particular, collective-action models fail to account for many of the factors that help researchers understand how institutions can solve environmental problems and why some regimes are more successful than others. Social-practice models include those factors that are typically omitted from collective-action models; however, these models are messier and less conducive to formalisation (Young, 2002a). In the context of biodiversity and climate change, social-practice models may prove more powerful to explain the range of factors that contribute to a regime's effectiveness.

The evaluation of the robustness of both models is incomplete and there is neither a unified theory of institutions, nor evidence that one model is more realistic than the other. In some cases Young (2002a) suggests it may be best to draw upon elements of both, and in others he suggests it may

be prudent to select a model based on which pathways are likely to prevail in a particular environmental regime. As yet there is no clear evidence that either model is preferable for studying biodiversity conservation institutions. The social-practice model has been selected because it does not treat behaviour as a cost-benefit calculation, suggesting its potential power to explain the richer set of actor motivations to conserve biodiversity (Section 1.3). This model has also been selected because it fits with the discursive institutionalist perspective (Section 1.3) and interpretive paradigm (Section 6) adopted in this research.

1.2 Clarification of Key Terms

In addition to the term “institution”, there are a number of associated terms that will be used in this research and require clarification.

Organisations

The concept of institutions is sometimes conflated with organisations. This research will distinguish the two concepts to avoid confusion; however, there is debate over the nature of the distinction between them. The two concepts are often separated in the economics literature for the purpose of analysis. In this view, organisations are treated as unitary actors whose actions shaped by institutional arrangements, rather than as a type of institution with variations (Hodgson, 2006; North, 1990; Young, 2002a). This is a simplification, but assists in analytical abstraction. Here institutions are conceived as the rules of the game, and organisations are treated as players in the game that use and are shaped by institutions (North, 1990). Hodgson (2006) contends that even using North’s abstraction, organisations are a particular type of institution because they must be made up an internal system of players and rules. Specifically, he defines organisations as “special institutions that involve (a) criteria to establish their boundaries and to distinguish their members from nonmembers, (b) principles of sovereignty concerning who is in charge, and (c) chains of command delineating responsibilities within the organisation” (Hodgson, 2006, p. 8). Dovers (2005; p. 12) defines organisations as “manifestations of institutions” and notes that some organisations may be persistent enough to be classified as an institution. He notes, however, that institutions are more durable than organisations, which he suggests can be changed more dramatically and quickly disbanded (Dovers, 2005).

The distinction between institutions and organisations ultimately depends on the researcher’s perspective and question. Organisations can be treated as unitary actors within a broader institutional framework, as an entity that provides institutions (e.g. rules, norms, etc.) for individuals, or as the manifestation of institutions. This PhD research is interested primarily in examining the institutions that drive organisational and actor behaviour, thus it is more appropriate to distinguish organisations from the institutions that shape them.

Institutional Frameworks and Policy Instruments

The term *institutional framework* is often used to refer to a particular policy or set of policy instruments. Policy instruments are the “myriad techniques at the disposal of governments to implement their policy objectives” (Howlett, 1991; p. 2). There are many types of policy instruments, and researchers organise them differently depending on the theoretical perspectives and models they adopt. Broadly, policy instruments fall into three categories: regulation, economic means, and information (Vedung, 2003). Alternatively, they have been called carrots, sticks, and sermons (Bemelmans-Videc et al., 2003). No matter how they are categorised, policy instruments

are essential tools in addressing environmental problems. Driven by the social, political, and economic context, instrument choice is considered by some to be at the heart of politics (Howlett, 1991).

Policy instruments can be conceived narrowly, confined to traditional command-and-control style regulations and incentives. In reality there are many types of instruments that can be used to address environmental problems. The type of policy instruments of interest depends in part on the research question of interest. For example, in examining policy instruments that can be used to improve biodiversity conservation on private land, Stoneham *et al.* (2000) focuses on regulation, land purchase, voluntary agreements (e.g. short-term management agreements), and voluntary legally binding agreements (e.g. conservation covenants), tax incentives, and government-assisted community programs (Stoneham *et al.*, 2000). This list considers the network of actors involved in the environmental problem, which is an important consideration for policy instrument choice (Bressers and O'Toole, 1998). Jordan *et al.* (2005) divide policy instruments into the traditional command-and-control regulatory measures and the “softer” instruments that have become more popular since the 1970s in the European Union. In the latter category, which they call ‘new’ environmental policy instruments, the authors focus on market-based instruments, eco-labels, voluntary agreements, and environmental management systems. Based on these categories, they develop a simple typology of policy instruments centred on who or what determines the means and ends of a policy (e.g. the state, non-state actors) (Jordan *et al.*, 2005).

Dovers (Dovers, 1995; 2005) takes a different approach, describing 15 categories of policy instruments for environmental management and sustainability. This includes the usual categories of regulation, common law, and market mechanisms, but he takes a broad view of policy instruments. For example, Dovers’s typologies include research and monitoring, communication and information flow, self-regulation by sectors and firms, and community involvement in management (Dovers, 1995). This PhD research will use Dovers’s typologies as a starting point to create an annotated database of policy instruments, and a selection of the most relevant instruments will be analysed.²

Institutional Regime

The term institutional framework is sometimes used to refer to the entire system of institutions that address a common problem; however, this is perhaps more appropriately called an *institutional regime*. Authors often use this term interchangeably with institutional framework, but here regime will be reserved for the broader suite of institutional arrangements. This includes not only formal arrangements originating from the state, but informal and private arrangements. A regime is more complex than a set of rules, as it is the space where institutions and actor expectations converge (Krasner, 1982). Environmental regimes are established to protect environmental values by changing human behaviour (Miles *et al.*, 2002). An institutional regime for biodiversity is thus the full suite of institutional arrangements and the institutional setting that aims to conserve biodiversity. The concept of regimes will be re-visited in the discussion of governance (Section 2).

² Refer to the Programme of Study (Section 4.2).

1.3 New Institutionalism

Although the two clusters of models discussed in Section 1.1 broadly reflect the different conceptions of how institutions act as a causal force, the field of institutionalism is even more varied. Institutionalism, as it is used here, is an approach to study politics that concerns the relationship between the characteristics of institutions and political agency, performance, and change. Its purpose is to understand and improve political systems (March and Olsen, 2006). Most contemporary work sits within a broad field referred to as new institutionalism. *New institutionalism* takes many forms but is grounded in the view that people are surrounded by constraints of various forms, but that they also actively construct their worlds (DiMaggio and Powell, 1983; Healey, 2003). New institutionalism heavily emphasises the importance of examining rules-in-use in institutional analysis (Ostrom, 1990; Young, 2002a).

Several perspectives have emerged within the new institutionalist literature, which is too vast to be distilled into a single institutional theory. There are several types of new institutionalisms, with their roots in history, sociology, economics, political science, and broader social theory. My PhD adopts the new institutionalist perspective most closely associated with the discursive tradition in the political sciences, although it also draws from rational choice (RC) institutionalist perspectives as well. Researchers in RC institutionalism tend to be neo-positivist, whilst those in discursive institutionalism tend to operate from an interpretivist or constructivist paradigm (Section 6).

RC Institutionalism

RC institutionalism dominates the common pool resource (CPR) literature. CPRs are resource systems where the exclusion of any of those who benefit from using the resources is costly, and exploitation by one user reduces the availability of the resource to others (Ostrom, 1990). CPRs are associated with Hardin's (1968) concept of the 'tragedy of the commons'. He contended that in commons situations, individuals acting in their own rational self-interest extract more than their fair share of a resource, even if it is not in the best interests of all. Overexploitation, he proposed, was the natural result: "Freedom in a commons brings ruin to all." (Hardin, 1968; p. 1244). Grazing areas, groundwater and irrigation systems, forests, fisheries, and the Internet are all examples of CPRs in cases where the resources are shared (Basurto and Ostrom, 2009).³ Case studies have since shown that this tragedy is not inevitable, but the capacity of actors to escape this trap varies markedly from situation to situation (Basurto and Ostrom, 2009; Ostrom, 1990; Ostrom, 2010). From an RC institutionalist perspective, institutions provide incentive structures and reduce uncertainties that would otherwise be present due to individual preferences (Ostrom, 1990). This perspective is most compatible with the collective-action model of institutions summarised in Table 1 (Section 1.1).

Perhaps its most distinct feature is its conception of the actor. It also heavily favours use of the tools and theories of economics such as game theory, microeconomic theory, and cost-benefit analysis (Ostrom, 2005). RC institutionalism general adopts a model of the actor as rational or *boundedly rational*, in which actors have fixed preferences and calculate strategically to maximise their preferences, i.e. a 'logic of calculation' (Schmidt, 2010). The view of bounded rationality takes many forms, although most models originated from the work of Simon (Simon, 1972). A boundedly rational actor displays goal-seeking behaviour, but their rationality is limited by cognitive and

³ This last attribute is important. A privately owned forest or farm, for example, is not a CPR.

information-processing capability and available information (McGinnis, 2011b).

Researchers in this school of thought generally adopt a neo-positivist paradigm, so its strengths lie in collecting empirical data, systematic analysis, and synthesizing across cases (Steinberg, 2009). Most of the well-known theoretical and analytical frameworks for institutional and policy analysis adopt a neo-positivist paradigm and rest on the foundation of RC institutionalism, even though they do not all explicitly identify with this perspective (e.g. see the seven frameworks outlined in Sabatier, 1999). This form of institutionalism thus offers researchers clear guidance on the variables of interest, compatible theories and models, and (in some cases) hypotheses.

RC institutionalism is also limited in a number of ways. Any attempt to model the complexity of human behaviour will require some degree of simplification, but many researchers have emphasised the prevalence of these shortcomings in RC institutionalism. In particular, researchers have critiqued the lack of richness in the modelling of both actors and context in this dominant paradigm. Bounded rationality models can enrich the view of the actor and move institutional analysis closer to 'real world' conditions, but they also complicate the analysis of choice. Any treatment of the bounds on rationality is necessarily informal and incomplete (Tversky and Kahneman, 1986), but boundaries are necessary to create useable models. Setting clear boundaries is the key to making empirical analysis of actor behaviour possible. There is a great deal of variance between models of bounded rationality (Dequech, 2001). The most popular of these, the bounded rationality model developed by Simon (1972), has been criticised for neglecting social context, habits and the tacit aspects of institutions (Dequech, 2001). At their core, they are all based on a logic of calculation and the focus is primarily on how actors calculate costs and benefits, necessitating neglect or partial treatment of many real-world considerations and motivations.

Dequech (2001) also argues that rationality is *beyond* bounded in situations where novelty and creativity are involved and in situations of uncertainty. For example, the theory of bounded rationality implies that an optimal choice exists, even if a person cannot identify it due to cognitive limitations. In situations of uncertainty, however, the problem is that unimagined states may occur in the future, suggesting the problem is beyond the way actors make decisions (Dequech, 2001). Some researchers recognise that the characteristics of the biophysical world and cultural predispositions and beliefs influence actor decisions (McGinnis, 2011b), however, as these factors become more abstract it is not always clear how they have been integrated into the models used by RC institutionalists.

There are other criticisms that are perhaps more significant than RC institutionalism's preferred model of the individual. The sub-field has been criticised for neglecting institutional change; weak consideration of politics and power; and not accounting for the social origins of preferences (Agrawal, 2003; Hall and Taylor, 1996; Moe, 2005; Schmidt, 2010; Steinberg, 2009). Some of this is related to their emphasis on rule following and tendency to overlook rule breaking, neglecting innovation or even implying it is irrational (Dequech, 2001). Even when RC institutionalism does address change, it is mainly concerned with incremental change (Dudley et al., 2000) and lacks guidance on how to influence change (Weible et al., 2012). The insufficient attention to politics, power, and change is of particular interest for my PhD, which is informed by resilience thinking (Section 5), and the processes of institutional learning, innovation, and change (Section 4).

Discursive Institutionalism

It is notable that institutional theory in general – not just RC institutionalism – has been criticised for providing static descriptions of institutions, rather than dynamic accounts of change. This is likely a result of focusing on the constraining aspects of institutions, such as how and why they persist, and how they create homogeneity and predictability (Dacin et al., 2002; Ritzer, 2005). While some RC institutionalists have sought to understand endogenous change through existing institutionalist lenses, others have turned to ideas and discourse (Schmidt, 2010). This is the discursive institutionalism, or deliberative policy analysis, as made popular by Hajer, Fischer and others (Fischer, 2003b; Hajer and Wagenaar, 2003). Whereas a neo-positivist approach sees separation between the objective practice of policy analysis and the practice of politics, deliberative policy analysis is interpretive and practice-oriented.

In contrast to the view that actors have well-ordered preferences and behave like participants in a game, the deliberative or discursive approach holds that policymakers and administrators are actors with legal and organisational obligations. Decisions are made in response to concrete problems, 'on the fly' or 'in the trenches', meaning there are struggles with power, conflict, uncertainty and unpredictability (Hajer and Wagenaar, 2003). This perspective is similar to the social-practice model of institutions summarised in Table 1 (Section 1.1), but with one very significant difference. While the social-practice model as outlined by Young (2002) emphasised institutional stability, discursive institutionalists are specifically interested in institutional change (Schmidt, 2010).

Discursive institutionalism is a useful approach for examining biodiversity governance for a number of reasons. Institutional change is at the heart of reforming biodiversity governance, so a framework that pays particular attention to the mechanics of change is required. In biodiversity conservation, outcomes are influenced by changes in the biophysical world, social conditions and political preferences: "The stakes are high, the politics are uncertain, and the resources at risk are highly vulnerable to social change, presenting serious challenges for institutional design" (Steinberg, 2009, p. 62). Discursive institutionalism addresses a richer set of factors underpinning actor behaviour. Rational choice models explain actor behaviour by defining well-ordered preferences, accounting for costs and benefits, incentives, and sanctions; but they provide incomplete accounts of the diverse motivations for conserving biodiversity (Steinberg, 2009). The field of economics has made major strides in developing ways to ascribe tangible economic value to biodiversity assets; however, such value is still quite obscure to many people and incomplete. Economic value cannot fully account for the diverse values that people derive from nature. There are varied motivations for conserving biodiversity that are poorly accounted for in RC institutionalism, as well as diverse values that people derive from nature. Failing to account for the full spectrum of motivations for conserving biodiversity can neglect actors whose stake in biodiversity conservation are predominantly non-economic (Steinberg, 2009).

Working with a discursive framework can provide a platform to better understanding these values from the perspective of the actors involved. A discursive perspective also aids the researcher in focusing greater analytical attention on the practice of politics in networked governance (Hajer and Wagenaar, 2003). Not only does this fit the form of biodiversity governance that exists in Australia, but it emphasises that politics cannot always be explained by a rational choice perspective. An emphasis on discourse provides a richer understanding of environmental politics in action and can assist in developing new criteria for institutional design (Steinberg, 2009). A discursive approach

acknowledges that language itself is an institution, and that it can be used as a powerful tool in politics.

This work will draw from the work of RC institutionalists, but it will supplement this with a politicised, discursive approach. This is mainly for practical reasons in that the RC institutionalists offer clear guidance on the factors and variables that should be included in institutional and policy analysis. Discursive institutionalism is not associated with a theoretical framework that provides a clear and consistent concepts and propositions, with a specified set of causal drivers, factors, and hypotheses (Dudley et al., 2000). Although discursive institutionalists have outlined their theories of the policy process (e.g. Dryzek, 2000; Fischer, 2003a; Hajer and Wagenaar, 2003; Schweber, 2011), their explanations are qualitative in nature and have been criticised for not meeting the criteria of scientific framework. The interpretive approach taken by these authors, it is argued, is not “clear enough to be proven wrong” (Dudley et al., 2000; Shanahan et al., 2011). This is mainly due to the emphasis on the qualitative elements of the policy process. For example, the discursive approach emphasises the role of narrative storylines, which bind actors together in discourse coalitions. In recent years, approaches have been introduced to study these narratives in a quantitative way (Jones and McBeth, 2010; Shanahan et al., 2011). While Fischer (2003b) acknowledges that narratives can be studied through quantitative methods, he posits, “their meaning and role in change is qualitative in nature and has to be interpreted in the specific contexts of action” (p. 102). While the discursive approach allows access to a richer understanding of the policy process, its interpretive approach has practical limitations in that it does not clearly dictate the factors of interest, making it challenging to implement.

Although sometimes presented as a dichotomy, RC institutionalism and the discursive approach are not completely at odds. For example, Giddens (1984) theory of structuration reconciles the two views somewhat, by maintaining that social structure provides grounds for behaviour, but these structures are shaped by behaviours, i.e. agency is also social constructed. Giddens thus recommended looking not only at structural elements of political, economic, and legal/sanctioning institutions but also institutions at the symbolic or discursive level (Ritzer, 2005). A further advancement can be seen in the morphogenetic approach (Buckley, 1967), which integrates the theory of structuration and other sociological theories into a systems approach. Morphogenesis refers to processes in complex systems which “tend to elaborate or change a systems given form, structure or state” (Archer, 2010; p. 250). Archer (2010) agrees with the interdependence of structure and agency presented by Giddens in principle, but provides an analytical approach to separate the two based on the notion that they operate on different time scales. The approach can provide a useful way to understand how structures, such as rules, can constrain or enable an actor’s ability to act and change a situation. Combining structure, agency, and politics in this way enriches the understanding of institutions and moves toward a richer understanding of the processes of governance.

2 Governance

2.1 Definitions and Key Concepts

Definitions of both governance and institutions vary across disciplines and paradigms, and the line between the two concepts is often blurred. Institutions are one part of a broader system of governance. Broadly, *governance* is a system of social coordination for resolving common problems (Lee, 2003). The term applies to the entire system of institutions for social coordination (McGinnis and Ostrom, 1996). While institutions are the sets of rules, norms and strategies,

governance is the process by which these institutions are formed, applied, interpreted, and reformed (McGinnis, 2011b). Simply put, “governance encompasses policies, institutions, processes and power” (Swiderska et al., 2008).

Although governance includes actions undertaken by the state, the new governance perspective is more aligned with the actual form of environmental governance. The *new governance* literature recognises that the capacity and responsibility for social coordination does not sit solely with government. Use of the term governance in lieu of the term government is emblematic of this shift in philosophy (Rhodes, 1996). Power dependence between institutions and actors feature prominently in this body of literature, as does the capacity of these networks to self-govern and self-enforce (Lee, 2003). Paavola (2007; p. 94) defines governance as “the establishment, reaffirmation or change of institutions to resolve conflicts over environmental resources”. Adopting this definition puts institutions at the heart of governance, but it also alludes to the importance of politics, power, and values in understanding governance.

Empirical case studies suggest that a *polycentric* form of governance is better suited than centralised government in dealing with the complexity of natural resource issues (Ostrom, 2010; Poteete et al., 2010). In polycentric forms of governance, authority does not lie with a single, central entity. Rather, it is comprised of a nested set of enterprises from national to local levels, with networked sets of institutions and actors both within and beyond government (McGinnis, 2011a; Ostrom, 2005). Theesfeld (2008) notes that polycentric and centralised governance are on two ends of a spectrum with a range of options in between. Biodiversity governance in Australia is toward the polycentric end of the spectrum, but it does not lie at the extreme. It is not fully decentralised because, for example, regional activity is still reliant on the central authority of the Commonwealth and its resources.

Governance and institutions are both distinct from *management*. Governance sets the vision and direction (e.g. through policy), and management operationalises the vision (Folke et al., 2005). Management is generally used to describe on-the-ground activities. This includes both implementing the directives in policy instruments as well as the more tangible physical actions required. Managers and policy-makers can be the same actors, or they can be separate (Dovers, 2005). For example, the Commonwealth government may set biodiversity policy, but individuals and agencies carry out these activities on the ground. There is a wide range of management activities that affect biodiversity assets and processes (e.g. prescribed burning, re-vegetation, and weed control), and these activities may be undertaken by individuals within government agencies, non-governmental organisations, or individual landholders.

Paavola *et al.* (2009) make a useful distinction between governance frameworks and governance regimes, positioned in a biodiversity context. A *governance framework* is a specific governance intervention that is developed and delivered for the purpose of conserving biodiversity, whereas a governance regime is much broader. A *governance regime* encompasses the full range of customs and institutions that shape biodiversity outcomes by influencing actor behaviour. This could include other governance frameworks that are interlinked (e.g. agriculture, forestry) as well as economic structures, incentive systems, and social, cultural and psychological factors that shape behaviour (Paavola et al., 2009). Examination of the influence of governance regimes thus emphasises the interaction between a number of governance processes at multiple levels. For practical reasons this PhD will focus on the narrower biodiversity governance framework, although it will also consider elements of the broader governance regime (e.g. agriculture).

The multi-layered nature of biodiversity governance means that cooperation and partnerships are commonplace. As the definitions of governance suggest, cooperation is a central feature of the decentralised new governance. Cooperation is alternatively referred to as collaboration, although Zbicz (2003) developed a hierarchy of cooperation in which collaboration is only one level. Although her work is focused on cooperation across international boundaries, the hierarchy illustrates that all cooperation is not equal. Zbicz (2003) found five levels of cooperation: no cooperation, communication, consultation, collaboration, coordination of planning, and full cooperation. She differentiates the levels primarily based on the level of information sharing and the coordination of activities and planning. At the top level (full cooperation), there is a joint decision-making committee, activities are fully integrated, and planning is ecosystem-based. This form of planning requires decision-makers to transcend both political and protected area boundaries (Zbicz, 2003).

Collaboration can also be considered in the context of public participation. Approaches modelled on a public participation ladder (Arnstein, 1969) classify the level of public participation in a hierarchy according to the degree in which government dominates or shares power with the community, with equal power sharing between government and communities on the most collaborative end of the ladder (Ross et al., 2002). The influence of this ladder is evident in one of the most commonly used typologies of public engagement, the spectrum of types outlined by the International Association for Public Participation. This characterizes public participation into five categories according to the strength of public impact: informing, consulting, involving, collaborating, and empowering citizens (International Association for Public Participation, 2007). Each category is linked to a particular goal of the public engagement exercise.

Ross *et al.* (2002, p. 205) have created a more nuanced typology of public participation in natural resource management (NRM) in Australia, incorporating “differences in agency (which parties carry the initiative), tenure (the nature of the parties' control over the resources), the nature of the participants, the nature of the task, and its duration.” They describe the characteristics of eight types of public participation in NRM:

- Two no participation categories (individual management and agency or corporation management);
- Community-based management;
- Community collective activity;
- Composite stakeholder bodies;
- Shared management;
- Stakeholder-based planning or negotiation; and
- Consultation.

This typology distinguishes voluntary actions from formal collaborations and other types of management, and the authors provide examples of each, although they could not provide a contemporary Australian example of management that was solely agency or corporation, without any participation (Ross et al., 2002). The appeal of this typology is not only that it was developed in an Australian NRM context, but also its lateral structure. It emphasises public participation in terms of its suitability for a particular NRM task, rather than viewing public participation as a hierarchy

from best to worst (Ross et al., 2002).

Healey (2006b) makes collaboration explicit to governance in her discussions of collaborative governance and collaborative planning. In collaborative governance, the formal institutions of government provide not only the hard infrastructure of the planning system, but also a soft form of infrastructure she calls “relation-building” (Healey, 2006b; p. 200). This soft infrastructure is the locally specific space where social, political, and intellectual capital⁴ is formed. Collaborative planning is central to collaborative governance. Planning is an important part of governance in that it injects a strategic, long-term vision into governance and provides a space for actors to collectively think and act on issues (Healey, 2006b). In the collaborative planning model, planning occurs through a series of face-to-face dialogues between experts and stakeholders, i.e. actors with an interest in the outcomes at hand (Innes and Booher, 2000). Collaborative planning is thought to increase institutional capacity by bolstering formal institutions, filling institutional gaps, producing action agendas, and generating innovative ways of solving problems (Healey, 2006b; Innes and Booher, 2003a). Healey (2006b) notes that the social, political, and intellectual capital that is built through collaboration also provides a new resource for building institutional capacity.

Over the past several decades, there has been a push toward ecosystem-based management. This move represents a shift in understanding of environmental problems from isolated incidents contained within cultural borders to a set of interrelated problems that should be managed as an integrated system (Imperial, 1999). This requires cooperation across borders; but although such collaboration can improve management of natural resources, there is plenty of evidence of noncooperative behaviour. Imperial (1999) notes that incentives can favour noncooperation rather than collective action for three main reasons. First, organisations and programs often have competing interests, including different constituencies, regulatory authority, priorities and objectives, and technical expertise. Collaboration between programs often requires institutional changes that create political conflict. Second, shifting to a new approach (e.g. ecosystem-based management) may also require a change in policy, and that change may be costly, against the disposition of the actors involved, or in competition with other interests. This leads to resistance. Finally, collaboration requires information sharing and coordination of program activities, and this requires significant time and resources. If incentives to encourage cooperation do not outweigh these costs, collaboration may be met with resistance (Imperial, 1999).

Collaborative resource management is the process of resolving shared dilemmas through a diverse group of stakeholders, from many levels of governance, from users to government agencies (Heikkila and Gerlak, 2005). This process, also known as comanagement, requires transboundary cooperation since political and natural boundaries often do not align (Fall, 2002). In addition to cooperation across boundaries, there is an increasing focus on cooperation across governance levels, reflected in the increasing attention to partnerships in NRM. Partnerships can be formed to facilitate interagency collaboration, but the need to move beyond interagency relationships is reflected in the increasing formation of partnerships between government, the private sector, and even the community level. Such joint ventures give stakeholders a voice in the management of natural resources, reflecting a more inclusive approach to governance (Laing et al., 2009).

⁴ Capital is as a resource that can be invested to generate returns. Capital has value because it produces a flow of benefits, and it can refer to the mobilisation of material or symbolic goods (Berkes and Folke, 1998; Lin, 2001).

The rise in partnerships in natural resource governance has also contributed to the increasingly blurry line between public and private (Sikor, 2008). Traditionally, the notions of public versus private and state versus market were presented as dichotomies. When the government owns natural resources, they are often open to the public to use and enjoy; however, open access can lead to the tragedy of the commons (Section 1.3). Privatisation has often been presented as a tool to solve tragedy of the commons dilemmas, with the idea that private actors will act rationally to maximise personal benefit. This leads to its own set of undesirable outcomes, such as loss of social value (Evans, 2012). Contemporary governance, however, often disposes of the divide and comes in the form of public-private hybrid (Sikor et al., 2008). Public-private partnerships are important not only in areas where biodiversity values are held on private property. Quasi-private actors such as NGOs also play a role in managing some publicly owned protected areas (Sikor et al., 2008). Biodiversity exists on both public and private land in Australia, and conservation of this biodiversity relies on not only public and private managers but also public-private hybrids.

Protected area governance is also often characterised by partnerships. There are several dozen governance models for protected areas, although a much smaller number are currently used (Eagles, 2008). These models can be classified in a number of ways, but a common approach is to cluster them according to ownership and/or management. Borrini-Feyerabend *et al.* (2006) identify four types based on who holds the decision-making authority: government protected areas, co-managed protected areas (various actors), private protected areas (private landholders), and community conservation areas (indigenous and community). They further divide these models into sub-types based on management categories, as classified by the IUCN (Borrini-Feyerabend et al., 2006).

Another approach is to cluster them according to three elements of conservation management: ownership of the resources, sources of income for management, and the management body. This suggests seven protected area governance models that are most commonly used (Eagles, 2008):

1. **Golden Era National Park Model:** This is characterised by government ownership and management of the resources and funding support that comes primarily from public taxes.
2. **Parastatal Model:** Here government also owns the resource, but management is undertaken by a government-owned corporation and funded by user fees.
3. **Non-profit Organisation Model:** Protected areas that are owned and managed non-profit organisations and funded by donations are included in this model.
4. **Ecolodge Model:** This is characterised by private, for-profit organisation ownership and management, with funding from user fees.
5. **Public and For-Profit, Private Combination Model:** This is a hybrid approach that involves several different players. In this model the government owns the resource, but management and funding are provided by a combination of public and private organisations
6. **Public and Non-profit, Private Combination Model:** Similar to the model above but less common, the government owns the resources, but funding comes from taxes and user fees. The responsibility for management rests with government agencies and non-profit organisations.
7. **Aboriginal Ownership and Government Management Model:** Using Australia as an example, he describes the protected area governance model in which Aboriginal people

own the land, funding is provided by taxes and user fees, and government agencies manage the land in partnership with the local community.

Later an eighth approach, called the traditional community model, was added because of its increasing popularity, although it is only used in a small fraction of protected areas. This is similar to the ecolodge model, with private ownership and management and funding from user fees (Eagles, 2009). It is difficult to say which single governance model is “best”. Eagles (2008) notes that government ownership is by far the most popular, but all three types of ownership (government, non-profit, for-profit) can be effective. Their success depends on the locale, scale, institutional structure, and available funds. For example, community and non-profit models can be very successful in managing small areas (Borrini-Feyerabend et al., 2006). Government ownership is perhaps the most viable option for large areas (Eagles, 2008).

Each of these models was assessed against ten principles of good governance (e.g. public participation, efficiency, strategic vision, responsiveness), scoring them on a five-point scale from very weak (1) to very strong (5). The public and non-profit combination model (model 6) received the highest score, and it was rated very strong or strong in all areas except transparency. Interestingly, no model scored well on this criterion, suggesting it is given relatively little importance in protected area governance. The Aboriginal and government model (model 7) received the lowest score, with weak or moderate rankings across all criteria (Eagles, 2009). The most prevalent forms of protected area governance (models 1, 2, and 5) received moderate rankings, indicating they may not be optimal. Eagles (2009) notes that this may be due to a flawed assumption that all ten criteria should be equally weighted. Their popularity may also reflect historical or cultural preferences for these models, rather than their ability to provide good governance.

From the perspective of conservation outcomes, there is a notable lack of data on the long-term effectiveness of some of these governance models. This makes systematic evaluation of outcomes against the source of funding and the type of management body difficult. For example, Eagles (2008) notes a lack of published research on the efficacy of conservation under the non-profit and ecolodge models. Funding is also an issue, with varying levels of reliability and constraints on spending. For example, while the government owned and tax-funded models can offer large amounts of stable funding; the money must be requested far in advance, spent during the fiscal year, and is tied up in the politics of government. Government models, he notes, tend to be most effective in situations that are predictable and unchanging (Eagles, 2008). This could be an important consideration from a resilience thinking perspective, as sometimes threats can increase relatively quickly and require a timely response, which can be challenging in these government owned and public-funded models.

Lockwood (2010) explicitly deals with this tension between stability and flexibility in protected area governance. Resilience is included in his seven principles for good governance. Noting that resilience requires the right balance between flexibility and security, he suggests that adaptive management is one way to achieve the former. The importance of land tenure is also noted, with legislation providing a source of security for government-owned protected areas and covenants and long-term contracts providing security in the hybrid models (Lockwood, 2010). Although there are a number of different approaches to evaluating good governance, it is worth noting that none

of them points to a single “ideal” model. Rather, it seems that a range of approaches can produce good governance outcomes.

2.2 Adaptive Management, Governance, and Comanagement

Adaptive management, adaptive governance, and adaptive comanagement are important concepts in contemporary natural resource governance. Although each offers the promise of improved outcomes, each also have their own pitfalls. Adaptive management is an approach to ecosystem management that copes with the uncertainty and unpredictability that occurs when ecosystems and people interact and evolve together (Berkes and Folke, 1998). Adaptive management emphasises learning over control (Pahl-Wostl, 2007). It encourages ‘learning by doing’ by actively testing and learning from the implementation of policies and strategies (Allan and Curtis, 2005). The approach builds adaptive capacity, which means learning from mistakes, responding to system feedbacks and employing innovative solutions (Armitage, 2005; Armitage and Plummer, 2010). The management approach has intuitive appeal as a way to cope with the uncertainty in complex ecological systems, where cause-and-effect is often indirect and the dynamics of many interactions between social and ecological processes does not favour traditional hypothesis testing.

Adaptive management policies respond to these challenges by encouraging development of flexibly institutions that can monitor, evaluate, and take corrective actions as required (McLain and Lee, 1996). Despite many policies that favour this approach since it was introduced in the 1970s (Holling, 1978), adaptive management is notoriously difficult to implement in practice. McLain and Lee (1996) contend failures are related in part to flawed assumptions about how management decisions are implemented. Using the example of budworm control in New Brunswick, Canada, the authors note that the adaptive management proponents failed to account for the complexity of decision-making. The management program favoured centralised control and allowed the views of one stakeholder group to dominate, rather than including the range of stakeholder values and knowledge that should be involved (McLain and Lee, 1996). Although written 16 years ago, many of the same issues highlighted by McLain and Lee remain problematic; and implementation of adaptive management principles remains challenging.

One of these challenges is the way the term is used by different actors within governance. The term adaptive management is used widely, but tends to be interpreted very differently by scientists and policymakers. In its original scientific form, adaptive management seeks to use surprise as a learning tool, rather than simply avoiding or reacting to surprises, which are unavoidable in the management of natural systems (McLain and Lee, 1996). Walters and Holling (1990) distinguish three forms of adaptive management, evolutionary (trial and error), passive (decisions based on a model from historical data that is presumed correct), and active (data is used to develop alternative response models and policy choices are based on balancing alternatives). Although the active adaptive management model holds the most promise for ecological outcomes, policymakers tend to seek single, ideal solutions, thus adaptive management is often interpreted in a passive way (Walters and Holling, 1990). Recent studies in Australia confirm the popularity of this passive approach to adaptive management in NRM practice, even in cases where the ideal of active adaptive management was acknowledged in principle (Allan and Curtis, 2005; Lockwood et al., 2009). Although the approach holds promise as a bridge between science, policy, and practice (Angelstam et al., 2003), it often falls short of expectations. Adaptive management requires reflection, learning, and experimentation, but cultural and institutional conditions have acted as barriers (Lockwood et al., 2009). This suggests that the wider context of governance has a role in

facilitating adaptive management.

Adaptive governance is distinct from adaptive management, but it incorporates some of the principles of the approach to a wider social context (Folke et al., 2005). Like adaptive management, it stresses the importance of learning from and preparing for change (Dietz et al., 2003). This approach to governance requires collaboration across governance levels, thus requiring information sharing, conflict resolution, institutional support (e.g. infrastructure and rule compliance), analytic deliberation amongst diverse stakeholders, and nested institutions (Dietz et al., 2003). It is one aspect of a three-pronged adaptive ecosystem approach, where governance provides the vision and direction, management operationalises it, and monitoring provides the feedback (Folke et al., 2005).

In examining adaptive management in water management, Pahl-Wostl (2007) positions the practice in the wider governance regime. Adaptive management requires a governance regime that allows management systems to respond to change and social learning. When this management approach is inserted in a governance regime that is not adaptive, learning may not be stimulated and institutions may not be able to grapple with the complexity and uncertainty (Pahl-Wostl, 2007). She suggests that in order for adaptive management to be successful, the governance regime must transition to a form that has the built-in capacity to change the structure of a system. This can involve wholesale changes to the way information and risks are managed, and mechanisms that allow transformation in response to this information (Evans, 2012; Pahl-Wostl, 2007). The dynamics of these transitions and how they can be implemented are still not entirely understood. Pahl-Wostl *et al.* (2010) have developed a framework to examine how these changes occur in water management regimes

The concepts of comanagement and adaptive management have also been combined into a governance approach called 'adaptive comanagement'. This term refers to a management approach that links horizontally and vertically across governance, incorporating the dynamic learning element of adaptive management and linking and cooperation elements of comanagement (Olsson et al., 2004). Advocates of the approach aim to address the shortcomings of both approaches by shifting from the heavy emphasis on science to practice (Armitage et al., 2009). Adaptive comanagement extends adaptive management into the social realm by sharing management power and responsibility, and is thus presented as a means of operationalising adaptive governance (Dietz et al., 2003; Folke et al., 2005).

This type of management arrangement takes advantage of the polycentric form of governance, linking institutions and networks. Networks, in adaptive comanagement, are viewed as heterogenous groups of actors that are linked by social learning (Armitage et al., 2009). It requires cooperation between communities, governmental and non-governmental agencies, and user groups, thus social capital, trust, and leadership play important roles (Folke et al., 2005). The approach accepts uncertainty as a given in the social realm, and it rests on the principle that problem solving requires multiple sources and types of knowledge (Armitage et al., 2009). Indigenous knowledge in particular is often emphasised in such systems (Armitage et al., 2009; Robards and Lovecraft, 2010). Integrating indigenous knowledge with western science can be challenging, and how this integration should occur is highly contested (Hill et al., 2012). Hill *et al.* (2012) contend that forms of governance that involve power sharing, for example, co-governance, hold the most promise for integrating indigenous knowledge into Australian natural resource governance. Similar to the way adaptive governance is considered to be a necessary condition for

adaptive management to be successful, it appears that adaptive co-management also calls for wider changes to governance, to an adaptive co-governance approach.

Although the philosophy of adaptive comanagement has gained ground in recent years, there is a need for more monitoring to evaluate the processes and outcomes of the approach (Cundill and Fabricius, 2010; Lindenmayer et al., 2011). Cundill and Fabricius (2010) note that the tools to evaluate comanagement are blunt, and they offer a framework for monitoring governance outcomes in an adaptive co-management regime. There are a number of practical challenges that have contributed to the dearth of data. For example, there is inadequate understanding of the mechanisms that drive transformations in social and ecological systems (Section 5), and there is also a lack of appropriate methods to monitor change in these complex systems. Monitoring governance in general is challenging, since it involves a dynamic and complex set of drivers, can be subject to dramatic shifts due to politics, and no single perspective on what makes good governance (Cundill and Fabricius, 2010). These concerns suggest that the shift toward new forms of governance not only faces the challenge of changing institutional culture, but also the practical challenges of ensuring new paradigms are able to outperform the old.

3 Networks and Social Capital

3.1 Networks and Governance

The concepts of social and policy networks and the related concept of social capital are important elements in the dynamics of governance. Networks are a core focus of the new governance and emblematic of the shift from government to governance (Evans, 2012). As with governance, there is no single definition of networks. The basic principle of networks is that the structure of relations between actors determines the content of their relationships (Ritzer, 2005). The language used in the network governance literature can be confusing. For example, governance networks are the units of governance, while the term network governance is used to describe the way governance regimes are organised (Evans, 2012). A governance network is comprised of a group of actors from the public and private sector that come together to solve common problems or deliver services (Evans, 2012; Rhodes, 1996). Although state agencies are part of these networks, there is also a range of voluntary actors involved. This range of actors can complicate governance, but it also comes with a number of advantages. For example, networks pool resources from disparate individuals and organisations, enhancing the capacity of governance regimes. In addition, many of these actors are in positions outside of bureaucracy and thus networks are thought to be more capable of responding to emerging needs and opportunities (Evans, 2012).

A particular form of network known as a *policy network* plays an important role in the policy process. These networks include the sets of formal and informal institutional linkages between governmental and other actors. Policies emerge from the interactions between actors in these networks, which are structured around shared beliefs and interests (Rhodes, 1997; Rhodes, 2006; Rhodes, 2007). Policy networks are one of the key characteristics of new governance because, as emphasised in Section 2, a wide range of actors outside of government are required to deliver services. Exchange theory is one way to understand decision-making activity in policy networks. This theory is based on the notion that actors (e.g. organisations) are dependent on other actors for resources, and they have to exchange resources to achieve their goals. Decisions within organisations are thus constrained by other organisations (Rhodes, 2007). Policy networks tend to have a dominant coalition that is less constrained, retaining discretion, and influencing which

relationships will be held and the resources that will be sought. Power potential in these networks is “a product of the resources of each organization, of the rules of the game and of the process of exchange between organisations” (Rhodes, 2007, p. 1245). Power is thus an enduring and dynamic feature of policy networks.

Although network analysis can be conducted from three perspectives (instrumental, interactive and institutional), the institutional perspective is most relevant here. From an institutional perspective, networks are analysed as a whole with special attention to institutions and how they shape networks, rather than specific actors or interactions. In this sense, government can improve network governance by influencing the structure and culture of the policy network, creating better conditions for problem-solving and policy-making (Lee, 2003). This suggests that action from both state and non-state actors play a role in the dynamics of networks.

3.1 Social Capital

Social capital is an essential feature of networks. Although the term social capital has much earlier roots, the concept moved into popular consciousness, and subsequently into government policy, after being popularised by Robert Putnam (1995). In this essay Putnam (1995, p. 67) uses social capital to refer to “features of social organisation such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit”. Although a widely used definition, it is too similar to the definitions of governance to prove useful. The World Bank defines social capital as “the institutions, relationships, and norms that shape the quality and quantity of a society’s social interactions... Social capital is not just the sum of the institutions which underpin a society – it is the glue that holds them together” (World Bank, 1999). It is this last analogy, wherein social capital is the glue that binds networks, that illuminates the relationship between social capital and concepts such as networks and institutions.

Social capital can be understood as another form of capital, although perhaps a more abstract one. Just as economic capital can be found in people’s bank accounts, social capital can be understood as the value inherent in the structure of relationships (Portes, 1998). Social capital is prized in the social realm for its contribution to human health and well-being. In governance social capital is prized because it facilitates cooperation within or among groups (Healy et al., 2001). Social capital in the institutionalised realm focuses on the reciprocity between networks. It recognises, for example, that successful collective action depends on forums where the state, private sector, and citizens can participate and pursue common goals (World Bank, 1999). Social capital is built in these forums.

There are several forms of social capital, all of which play different roles in society and are characterised by the strength of the bond. Putnam (2000) identified two types:

- *Bonding social capital* refers to the strong (horizontal) ties or bonds within homogenous groups that form between people with more commonalities and reflect greater interdependence. This form of social capital is associated with closed networks (e.g. organizations that mainly encompass people with the same background), and it supports specific reciprocity and solidarity within these groups.
- *Bridging social capital* refers to the weak ties (vertical) that link or bridge heterogeneous groups. This type of social capital is of particular interest in governance for its role in facilitating the flow of new resources, ideas, and information. This form of social capital

links individuals to external assets and provides opportunities for those who may be excluded from more formal avenues to affect change. In the words of Putnam (2000, p. 23), “Bonding social capital constitutes a kind of sociological superglue, whereas bridging social capital provides a sociological WD-40.”

Bracing is the third type of social capital that is relevant for governance. Proposed by Rydin and Holman (2004), bracing social capital strengthens links between and across scales and sector, but only operates within a limited set of actors. Expanding on the concept of social capital as the glue that binds, it is perhaps more accurate to say that bonding capital is the glue that brings people together and makes them closer. Bridging capital builds bridges out between people, and bracing capital strengthens social scaffolding that brings some people together and others further apart. Rydin and Holman (2004, p. 123-124) introduced the concept to describe a type of relationship observed in many partnerships and governance initiatives:

Such linkages go beyond the bonding of any specific group but are more specific than suggested by the rather broad concept of bridging. The use of bracing capital encourages common values and norms among those linked together, but these may be more strategic and less all-embracing than suggested in the case of bonding capital. Bridging capital, by contrast, is rarely considered in relation to common norms and values, more emphasis being placed on the networks created (Bærenholdt and Aarsæther, 2002). This significantly limits its usefulness in describing many partnership or collaborative situations where the development of common norms is key.

In governance, bracing capital supports long-term strategic relationships that build trust and reciprocity between government and community actors, respecting their distinctive interests but recognising the utility of the relationships (Colliver, 2012). The multiple dimensions of social capital are important because different combinations of each type are believed to account for a range of outcomes, and these combinations are dynamic (Woolcock, 2001). While bonding capital keeps networks viable internally by creating and continuing connections between individuals, bridging capital allows connections between otherwise disconnected networks. Bonding social capital breeds strong ‘thick’ trust within a network and is inwardly focused, bridging capital builds outward connections and ‘thin’ trust (Kavanaugh et al., 2005). It is believed that communities with both types of social capital are the most effective in organising collective action, and it would stand to reason that the third type (i.e. bracing) would also foster collective action by building common norms in partnerships.

4 Change, Learning, and Innovation

4.1 Institutional Change and Learning

Drivers of biodiversity loss such as climate change will place pressure on institutions to change to address uncertain and often unpredictable threats. This includes changes in the ways institutions learn and make decisions (Dovers and Hezri, 2010). Among the key features of institutions is that they structure interactions, providing stability, predictability, and certainty (Goodin, 1996). This is exactly why they are prized, particularly in economics and politics, where predictability reduces transaction costs and provides stability. Although these characteristics have often led to static descriptions of institutions, institutions have the capacity to enable actor behaviour and they can change over time (Hodgson, 2006; North, 1990; Scott, 2001). Institutions do, however, have strong

status quo biases and are often resistant to change (Jamieson, 2011). As previously noted, this bias has influenced the field of institutional analysis, directing its attention to the constraining force of institutions in lieu of research on the mechanisms and pathways to change in institutionalised situations (Dacin et al., 2002; Ritzer, 2005; Weible et al., 2012). In recent years, institutional analysis has increasingly focused on issues of institutional change, both in how institutions themselves change over time and how they can generate change (Dacin et al., 2002). In addition to drawing on the perspectives of discursive institutionalists, my PhD will draw on the institutional change literature to understand how institutions can better respond to drivers and disturbances that may threaten or help protect biodiversity.

The institutional change perspective is adopted in response to the poor performance of existing biodiversity governance regimes. Change comes in two general forms: incremental and radical. Institutional change is often slow and incremental, responding to challenges as they arise. In a process called institutional bricolage, actors respond to changing circumstances by drawing on existing social and cultural arrangements to shape institutions (Cleaver, 2001). There are times, however, when challenges become so great that major changes are required (Mintrom and Norman, 2009). This concept incorporates both radical and incremental change, and can involve transforming existing institutions or even deinstitutionalisation (Lawrence and Suddaby, 2006). Although researchers may disagree about the extent and nature of change required, many researchers have emphasised a need for institutional change to address environmental problems (e.g. Cleaver, 2002; Coffey and Wescott, 2010; Connor and Dovers, 2004; Young, 2002a). In the context of biodiversity, not only have current governance regimes been unsuccessful in efforts to slow or halt biodiversity loss, but the expectation of additional pressures such as climate change increases the urgency of reform (Coffey and Wescott, 2010).

Policy-making can be viewed as a form of social learning in which actors collectively solve puzzles. This interaction is a process of social learning, with lessons expressed through policy (Hall, 1993). Social learning is an essential part of policy-making and can be defined as “a deliberate attempt to adjust the goals or techniques of policy in response to past experience and new information. Learning is indicated when policy changes as the result of such a process” (Hall, 1993, p. 278). This suggests social learning is a significant catalyst for institutional change. For example, in order for governance to cope with the complexity of social and ecological systems, data on processes and implementation of policy should be collected and analysed, and adjustments to the regime should be made accordingly. Sometimes these adjustments will require small, incremental changes, and sometimes they will require radical shifts in approach.

The institutional and political science literature generally focuses on the relevance of a particular form of learning known as *policy learning*. May (1992) describes two types of policy learning: social and instrumental. Social learning here is slightly narrower than the definition provided by Hall (1993) above. May (1992) limits the concept of social learning to policy learning that involves lessons about how policy problems are constructed and how solving the problem should be approached (i.e. scope of policy and its goals). Instrumental learning, on the other hand, is focused around the technical aspects of policy-making, and involves lessons about policy design and knowledge about when a particular policy instrument is appropriate or viable (May, 1992). Although policy learning is dynamic, it is important to note that it is not only involved in change. Learning can also aid in sustaining existing policy practices (Yanow, 2003). If evidence suggests that a particular practice is working or that better alternatives do not exist, then the lesson is that change is not required.

Policy-relevant learning can also be characterized by its depth and scope. One common typology classifies learning into three groups: single-, double-, and triple-loop learning.⁵ Single-loop learning entails learning new facts and perspectives, but it does not delve deeper into the underlying assumptions or goals, nor does it question fundamental questions of design or activities (Argyris, 1976; Argyris, 1993; Innes and Booher, 2003b). Cultural norms tend to favour single-loop learning, particularly in regard to controversial issues, thus this type of learning is most prevalent within groups and organizations (Argyris, 1976). Single-loop learning can lead to incremental improvements in policy and action strategies (Pahl-Wostl et al., 2010), and in some situations this is an effective way to solve the policy problem (Innes and Booher, 2003b). For more intractable and complex problems, double-loop learning is required. Here actors question underlying assumptions of a policy, program, organisation, etc.; and this often requires re-evaluation of the theories of cause and effect that underpin their rationale (Argyris, 1976; Pahl-Wostl et al., 2010). Double-loop learning thus involves reframing the problem, re-thinking goals and interests, and even applying different values (Innes and Booher, 2003b). Triple-loop learning goes one step further, and occurs when current assumptions no longer appear to hold. Actors start to reconsider the values, beliefs, and worldviews. Pahl-Wostl (2009) posits that social learning proceeds through each of these three forms of learning in turn.

Although essential, learning is not easy. If actors were perfectly rational, they would update their beliefs as new information arises. The learning process would occur smoothly and institutional and other changes would occur logically and progressively. Many formal models, especially older economic models, assume that learning is unproblematic and that people update their beliefs as new information arises (Sniderman and Levendusky, 2007). Cognitive biases and limitations in information processing ability, however, can act as significant barriers in the learning process for both experts and non-experts within governance regimes (Gilovich et al., 2002; Sniderman and Levendusky, 2007). This includes a range of cognitive biases that favour rejection of new information, even if it is objective, particularly if it disagrees with our pre-existing beliefs. In fact, there is ample evidence that earnestly attending to facts and arguments that differ from our current beliefs or practices can actually serve to further entrench those beliefs (Pronin et al., 2002). This is not just a phenomenon among non-experts. Experts are also prone to the same cognitive biases, and in some instances issue involvement and education can make people even more prone to such biases.

Cognitive scientists and social psychologists contend that part of the reason for this is the emotive process known as motivated reasoning (Kunda, 1990). Motivated reasoning is one strategy for reducing cognitive dissonance, and people use it to arrive at their desired conclusion (Druckman and Bolsen, 2011). Rather than assessing new information logically *sans* emotion, people tend to seek out evidence or view new evidence through the lens of their existing views, even if it is not objectively accurate (Druckman and Bolsen, 2011; Kunda, 1990). Kahan and Braman (2006) see the issue slightly differently, contending that cultural values orient (rather than motivate) interpretation of empirical evidence. They contend that cultural values, rather than knowledge or facts, are at the core of many policy conflicts. In a set of processes they call cultural cognition, they contend that people accept or reject empirical claims about policies (e.g. environmental regulation, gun control, and the death penalty) through their worldviews. Such processes have important implications for policy debates, since they indicate that simply disseminating

⁵ Alternatively called first, second, and third order social learning (Grin and Loeber 2007).

information and expecting opinion to shift is futile (Kahan and Braman, 2006). These cognitive biases also have important implications for policy-oriented learning, suggesting that this process of learning is by no means straightforward and involves much more than empirical evidence.

As the cultural cognition theory suggests, policy learning involves more than individual cognition. It is also a social process. Policy-relevant knowledge binds groups together and is rooted in the interactive context of the policy process (Yanow, 2003). The process by which policy-oriented learning occurs between different groups can be viewed through a theoretical framework called the Advocacy Coalition Framework (ACF) (Sabatier, 1988; Sabatier and Jenkins-Smith, 1993; Sabatier and Jenkins-Smith, 1999). The framework aggregates actors into coalitions that are bound together by beliefs and stable over time. There are three levels of beliefs in the ACF: deep core, policy core, and secondary aspects. Deep core beliefs are the fundamental normative and ontological beliefs that actors hold. These might be beliefs about human nature; the relative priority of values such as freedom, knowledge, etc.; sociocultural identity (including profession); and the fundamental criteria of justice. Policy core beliefs are the fundamental policy positions about how to achieve core values. This includes beliefs such as the cause and severity of the problem, distribution of authority (state versus market), policy instrument priorities, and policy preferences. Finally, secondary aspects are the easiest to change because they relate to instrumental decisions such as administrative rules, statutory interpretation, specifics of a policy problem in a particular location, and information regarding performance of specific programs or institutions (Sabatier and Jenkins-Smith, 1999).

The framework suggests that policy learning does not occur through a simple process of accepting new information. Rather, as the aforementioned research on cognitive biases suggests, this information is filtered through pre-existing belief systems, and actors are more likely to accept new information if it is consistent with their beliefs – particularly their core beliefs. At the same time, they tend to filter out information that is inconsistent (Sabatier and Jenkins-Smith, 1999). The framework has four hypotheses that predict when learning will occur, and it includes hypotheses relevant to learning across coalitions (Sabatier and Jenkins-Smith, 1999, p. 124):⁶

- *Policy-oriented learning across belief systems is most likely when there is an intermediate level of informed conflict between the two coalitions. This requires that*
 - a. *Each have the technical resources to engage in such a debate.*
 - b. *The conflict be between secondary aspects of one belief system and core elements of the other or, alternatively between secondary aspects of the two belief systems.*
- *Problems for which accepted quantitative data and theory exist are more conducive to policy-oriented learning across belief systems than those in which data and theory are generally qualitative, quite subjective, or altogether lacking.*
- *Problems involving natural systems are more conducive to policy oriented learning across belief systems than those involving purely social or political systems because, in the former, many of the critical variables are not themselves active strategists and because controlled experimentation is more feasible.*

⁶ The ACF neglects the process of policy learning within coalitions, assuming that learning within a coalition is relatively unproblematic (Sabatier and Jenkins-Smith, 1999). This is because advocacy coalitions are treated as unitary actors, thereby neglecting important dynamics within coalitions (Fischer, 2003b). The shortcomings of the ACF are discussed in more detail in Section 8.2.

- *Policy-oriented learning across belief systems is most likely when there exists a forum that is*
 - a. *Prestigious enough to force professionals from different coalitions to participate and*
 - b. *Dominated by professional norms.*

These hypotheses highlight a number of important points regarding policy learning, although these points apply only to situations in which there is some degree of conflict between two different coalitions. They highlight that policy learning is more likely to occur when both groups' core beliefs are not under threat. It is also notable that the ACF considers policy learning to be more likely when natural systems are involved because these systems are not active strategists and controlled experimentation is more feasible (Sabatier and Jenkins-Smith, 1999). While this may be true in some situations, the extent to which this might apply to environmental problems such as biodiversity conservation is questionable. Controlled experimentation is difficult in natural settings. Although the feedback from natural systems is mainly objective, environmental problems still involve subjective decisions (e.g. what to monitor, how data should be interpreted, where resources should be focused) and generate fundamental questions about core beliefs.

4.2 Institutional Entrepreneurship and Innovation

Although adopting an institutional change perspective is appropriate, it can be challenging to identify pathways to change. Institutions constrain and shape behaviour through many (often subtle) processes, whilst also legitimising certain behaviours, making deviation difficult (Garud et al., 2007). Given this power to prevent deviation, a number of interesting questions arise in studying how institutional change occurs. If actors are embedded in these institutional structures, how are they able to envision new ways of doing things and encourage others to adopt them? This debate, often referred to as the embedded agency or structure-agency paradox, has been of interest to institutional theorists for several decades (Garud et al., 2007; Powell and DiMaggio, 1991; Sewell Jr, 1992). At the centre of this debate are institutional entrepreneurs, the actors who actively work to transform existing institutions or create new ones (DiMaggio, 1988). This PhD seeks to identify these entrepreneurs as well as other change agents involved in the formal or informal networks in the biodiversity governance regime, and determine how they use their networks to enable change and foster collective action in biodiversity governance.

Attempts to impose governance reform from the outside can only be successful if actors within the governance regime cooperate. Reform can also come from within the existing governance regime, and this is where the work of *institutional entrepreneurs* and their networks becomes critical. The institutional entrepreneurship literature attempts to combine the literature on institutions and the literature on entrepreneurship to aid understanding of both continuity and change (Garud et al., 2007). An institutional entrepreneur can refer to individuals, groups of individuals, organisations, or groups of organisations, although individuals in an organisational setting are perhaps the most widely studied. Institutional entrepreneurs seek change that diverges from existing institutions and actively participate in pursuing such change. Successful institutional entrepreneurs are able to not only recognise when the dominant regime is not working, but they seize these opportunities to pursue interests they value highly (Mintrom and Norman, 2009). These actors seek to change the institutional setting through a range of strategies, including technical leadership, lobbying, and discourse (Lawrence and Suddaby, 2006). This requires skills not unlike entrepreneurship in other

fields (e.g. business).

These entrepreneurs can be important forces in institutions where there is constant pressure toward stasis. For these actors the pursuit of change is a highly political process that requires energy, creativity, political skills, and resources. It requires not only breaking free of existing patterns to develop new ones, but it also requires institutionalisation of alternative processes or rules (Battilana et al., 2009; Garud et al., 2007; Mintrom and Norman, 2009). Such a task requires envisioning new ways of doing things, as well as mobilisation of allies within the regime, reducing their embeddedness in the process (Battilana et al., 2009). This means they have to not only break away from institutional structures themselves, but also find ways to bring allies along with them. Inevitably, such entrepreneurs encounter resistance from “institutional defenders” who benefit from the status quo, and not all attempts at divergent change will be successful (Battilana et al., 2009; DiMaggio, 1988). Successful attempts require entrepreneurs to legitimise innovations, often by embedding them in familiar designs to make adoption of change more palatable (Dacin et al., 2002).

It is important to understand what innovation is in this context. Innovation is distinct from invention, thus in policy terms innovation does not mean an entirely new idea, rather a policy is innovative when it is new to the government or jurisdiction (Berry and Berry, 1999). In addition, there are two concepts discussed in the entrepreneurship literature that are worth noting: social entrepreneurship and social innovation. Social entrepreneurs pursue change when existing institutions and organisations are inadequately addressing social problems, and they are more interested in social values than economic gain (Mair and Marti, 2006). When such entrepreneurs work to change institutions, they are *both* a social and an institutional entrepreneur. Social innovations are new products, ideas and initiatives that profoundly change the basic routines, resource and authority flows, and beliefs of a social system (Moore and Westley, 2011). Such innovations differ from other types in that they do not require mass adoption to be successful. Instead, they generate systemic change, altering the institutional context (Westley and Antadze, 2010). The process of social innovation in an institutional setting involves the dynamics of institutional bricolage and diffusion (Biggs et al., 2010). This means new ideas about how institutions should be designed not only have to be conceived, but these ideas have to spread.

The study of institutional entrepreneurship is often approached as the work of unique individuals, but generally these individuals do not work alone. Institutional change in many situations is beyond the capacity of individual actors, and requires cooperation among many individuals with diverse interests, some of which may work against cooperation and promote collective inaction (Wijen and Ansari, 2007). Although most research has focused on the individual characteristics of these entrepreneurial actors, environmental problems suggest a need for *collective institutional entrepreneurship*, which has received comparatively little attention. This is the process of overcoming collective inaction and achieving sustained collaboration among numerous dispersed actors to create new institutions or transform existing ones. In collective action situations, there are many factors (e.g. free riders,⁷ apathy, start-up failure) that not only work against collaboration, but generally create an environment where non-participation and inaction are the norm (Wijen and Ansari, 2007). Overcoming inaction in such situations may require the efforts of institutional entrepreneurs, leaders, and the participation of multiple other actors that have the

⁷ Free riders are those that reap the benefits of a situation without absorbing the costs. This is a common concern in CPR situations (Ostrom, 1990).

capacity to pursue change, either within or outside of the governance regime.

Collective institutional entrepreneurship requires collaborative leadership and *institutional work*, which is “the purposive action of individuals and organizations aimed at creating, maintaining, and disrupting institutions” (Lawrence and Suddaby, 2006; p. 215). Lawrence and Suddaby (2006) identified nine categories of institutional work in the literature: advocacy, defining, vesting, constructing identities, changing normative associations, constructing normative networks, mimicry, theorising, and educating. These categories range from overtly political (advocacy) to subtly introducing change by aligning it with existing practice (mimicry), and these categories can provide a framework for analysing the actions undertaken by entrepreneurs. This can be productive work to actively maintain the efficacy of institutions in times of entropy, but it can also be destructive in that the entrepreneurs may seek to tear down institutions or render them ineffectual. There are also elements of institutional work that are relatively unstudied, such as the way these entrepreneurs might work to change the cultural-cognitive pillars of institutions through social construction of rules, scripts, schemas and cultural accounts (Lawrence and Suddaby, 2006).

Collective institutional entrepreneurship has only been explicitly examined in a few studies. Wijen and Ansari (2007) enlighten the concept through the use of regime theory, which focuses on how actors are able to realise their common interests by collaborating in areas that serve those interests. This theory generally applies at the level of the nation-state and focuses on how this collaboration occurs despite the lack of a supranational authority. Wijen and Ansari (2007) apply this to the collective process involved in signing the Kyoto protocol. From this study, they propose six endogenous⁸ drivers of collective institutional entrepreneurship: manipulating power configuration, creating common ground, mobilizing bandwagons, devising appropriate incentive structures, applying ethical guidelines, and using implementation mechanisms (Wijen and Ansari, 2007).

Meijerink and Huitema (2010) analysed 16 cases of transition in water management in 15 EU countries and the USA to determine if individuals affected radical policy changes and, if so, what strategies they used. They confirmed that institutional entrepreneurs (which they call policy entrepreneurs) played a role in the transitions at many different levels within government, as well as outside of government. They also highlighted the important role of collective institutional entrepreneurship, underlining the effects of shadow networks (Section 4.3).

The authors found many similar strategies across studies. Donor organisations, for instance, played a role in affecting change by placing conditions on funding. Policy entrepreneurs, in contrast, cannot enforce changes from the top down, so use strategies to convince others of the merits of their ideas. This often came in the form of pilot studies demonstrating new technologies (e.g. floodplain restoration). These entrepreneurs were particularly skilled at taking their findings to media to change hearts and minds (Meijerink and Huitema, 2010). They are also successful at building bridges across networks that may have different ways of conceptualising the issue. Both entrepreneurs and those trying to block change can successfully use discursive strategies, generating narratives that garner support for their position (Meijerink and Huitema, 2010). This highlights the potential value of discursive institutionalism (Section 1.3) in understanding how change occurs in institutionalised environments.

⁸ They recognize external ‘jolts’ but focus on endogenous drivers.

Another strategy identified in the case studies was the formation of three types of coalitions (Meijerink and Huitema, 2010):

- 1) **Advocacy coalitions**, which are bound by similar beliefs and values. These are similar to the coalitions of the ACF, and might include environmental and pro-development coalitions.
- 2) **Strategic alliances**, which do not necessarily have similar beliefs but have an interest in realising a particular policy change. These are similar to the issue networks discussed in Section 3.
- 3) **Resource dependent⁹ coalitions** consist of actors with divergent interests, but who are dependent on each other to achieve their objectives. These are akin to the coalitions formed by different parties in government.

Coalition formation may account for the structure of collective institutional entrepreneurship. The author noted that actors within these coalitions often play complementary roles and offer different skills, whether that be generating new ideas, advocacy, brokering, or negotiation (Meijerink and Huitema, 2010). Both the formation of these coalitions and the strategies they use to advance their ideas require further research to understand how change occurs in collective action (or inaction) situations.

In addition to such strategies as successfully using narratives and building coalitions, policy entrepreneurs are able to anticipate and exploit windows of opportunity. This will allow them to garner the support required to achieve policy change. These can be windows of opportunity relevant to the issue itself (e.g. a major flood) or windows presented by the political system (e.g. regime change (Meijerink and Huitema, 2010)). A trend across studies was that successful policy entrepreneurs develop alternatives that account for many stakeholder interests and are successful in marketing them. Policy entrepreneurs often seek new venues for the dissemination of their ideas and views, either by tapping into existing formal venues within the policy process or creating new ones. Whatever the institutional setting, policy entrepreneurs often try to manipulate this setting. Interestingly, the authors posit that the entrepreneurs may take advantage of those settings that they know are open to learning and experimentation. Rather than encouraging continued learning, however, the authors suggest they use this learning environment to institutionalise their innovation (Meijerink and Huitema, 2010). This finding highlights the importance of actor motivations in pursuing change and embedding innovations in institutional settings. It is important to note, however, that the concepts of institutional change and innovation are not only associated with change for the better. Settings that are vulnerable to manipulation are open for both positive and negative change, and the direction of change may depend on the motivation of the entrepreneur and the implications of their innovation.

To explore the factors that foster institutional bricolage and innovation in ecosystem management, Biggs *et al.* (2010) reviewed three case studies of transformational change in freshwater management regimes. Using case studies were from Sweden, South Africa, and the USA, the researchers looked for common factors that enabled transformation. The study was exploratory in nature, with the aim to identify potential policies to stimulate bricolage and innovation that merit

⁹ Here “resource dependent” does not refer to the natural resources on which these coalitions depend, rather the resources held by other individuals in the coalition. This might include skills, social connections, money, or popular support.

further research. They identified five factors underlying transformation in ecosystem management: (1) environmental crises, (2) reframing of perspectives, (3) engaging stakeholders, (4) social entrepreneurship, and (5) institutional support (Biggs et al., 2010).

No single factor was sufficient to tip these institutional regimes into transformation, and they were interdependent. For example, an environmental crisis alone was insufficient to set the process of change into motion. There were two necessary co-factors: growing appreciation of the values that would be lost and evidence that existing approaches were not adequate, even if modified (Biggs et al., 2010). In regard to reframing the issue, the authors noted that all three cases required the notion of environmental conservation to be reframed in a way that made economic and social concerns explicit. Social entrepreneurs played a key role in reframing, engaging stakeholders, and managing conflict. This is unsurprising given that entrepreneurs tend to be key nodes linking multiple social networks, making them a carrier of new ideas between groups (Biggs et al., 2010). The institutional support identified by Biggs *et al.* (2010) was government support for the relatively mundane aspects of starting new forms of governance, e.g. finance, personnel, management, planning, and office space. They also contend that these links to government provided an additional pathway for the diffusion of ideas to other areas and groups. Although these factors are interesting, this study was exploratory in nature and included a small number of case studies. As yet it is uncertain if these factors would hold in the context of other environmental problems, such as biodiversity conservation, or what policies and other forms of institutional support might foster this sort of innovation.

In situations characterised by collective inaction, institutional entrepreneurs still play an important role; but their actions alone are insufficient to overcome collective inaction. In these situations, other actors are required to support and facilitate change (Lawrence and Suddaby, 2006). For example, change often requires mobilisation of *issue networks*, which are loose, issue-based coalitions who pursue institutional change via collective action. Actors in these networks generally have asymmetrical resources and power, and the process is dynamic. Although actors may argue about policy options, values, and norms, many issue networks still mobilise to achieve collective goals. Motivated actors, including institutional entrepreneurs but also other change agents, are able to mobilise these networks through mechanisms that include framing of the issue, agenda setting, and social networking (Ritvala and Salmi, 2010). These actors and their mechanisms of mobilisation can be powerful forces for change in a polycentric, networked biodiversity governance regime.

4.3 Change through Networks

In networked governance arrangements, any attempt to change the design of institutions requires change that reaches these networks. A common criticism of policy network analysis, however, is that it does not or cannot explain change (Rhodes, 2006). Institutions are formed through enduring interactions between actors in an attempt to resolve conflicting interests. In the process, institutional capital is formed, and this capital is not easily replaced by newly designed arrangements (Klijn and Koppenjan, 2006). In this case, institutional capital refers to resources held by individuals and organisations. This usage of institutional capital refers to the stock of cultural knowledge and skills about rules, norms, and values that are sanctioned in a particular institutional setting. The concept of institutional capital also incorporates social capital, specifically the extent of social connections and how these can be used to maintain or gain resources, such as power (Lin,

2001)¹⁰. Policy network literature tends to emphasise that rules within networks codify power relations by, for example, distributing advantages and excluding actors. This provides stability and continuity, but it does not enlighten the process of change (Rhodes, 2006).

There is no consensus in the literature about how change occurs. Klijn and Koppenjan (2006) propose that networks are institutional frameworks in which the characteristics of the network (e.g. power relations) are codified as rules. Most rules are formed as the result of interaction between actors. They posit that rule changes in networks occur for three main reasons: 1) as a result of conscious design or intervention by a legitimate actor within the network, 2) reinterpretation of existing rules in a new way, and 3) when non-compliance by multiple actors without sanction causes the rule to lose meaning (Klijn and Koppenjan, 2006). Any attempt to change institutions thus requires changing rules in the network and necessitates a power struggle within a network. Deliberate institutional design involves pushing and pulling between actors in the network. Change can occur through direct intervention in rules (e.g. changes in legislation, attempts to change informal rules) or indirect interventions that attempt to influence perceptions and interactions within network. The latter involves reframing strategies, which are usually done in conjunction with direct intervention. These strategies might include using crisis situations or discussing major policy documents to encourage reinterpretation of existing rules or formation of new ones (Klijn and Koppenjan, 2006).

More broadly, Rhodes (2006) identifies three of the most promising categories of explanations for how change occurs through networks: advocacy coalitions, the dialectal model, and decentered analysis. Among those that employ the advocacy coalition approach (Section 4.1), change in policy networks is driven by coalition attempts to translate their beliefs into public policy (Rhodes, 2006). In the dialectical model (Marsh and Smith, 2000), networks can constrain or enable action, but they are not the driving force of change. In this model, change is a result of the interaction between the network and one or more factors, i.e. agents within the network, context, and policy outcomes (Rhodes, 2006). Hay and Richards (2000) note that this interaction is strategic, and that strategic actions change the setting itself. Actors must then adjust their strategies accordingly, thus in this view of change networks are constantly evolving. The final body of knowledge to explaining change through networks advocates for a decentered approach. This is heavily focused at the level of individual who are dealing with everyday policy problems. Networking is often informal and decisions are ad hoc, made by activists seeking concrete outcomes (Rhodes, 2006). This is consistent with the practice-oriented view of the discursive institutionalists (Section 1.3).

Particular types of networks can also be influential in enabling institutional change. This includes *shadow networks*, which are “informal networks that work both outside and within the dominant system to develop alternatives that can potentially replace the dominant regime if and when the right opportunity occurs” (Westley et al., 2011; p. 771). Shadow networks are partly independent because although they may have members that sit within the governance regime, they generally sit at the boundaries of formal institutions, “out on the fray” (Gunderson, 1999; Olsson et al., 2006). Members of these networks do not have to agree on particular institutional designs and their views on the appropriate policy and value choices can vary (Olsson et al., 2006). Such a network might include, for example, actors from government agencies alongside academics, NGOs, activists and other interested members of the public.

¹⁰ Institutional capital can also be used more generally to refer to the stock of organisational ability and social structures in society (i.e. the stock of institutions) (Berkes and Folke, 1998).

Shadow networks are thought to play an important role in the genesis of novel ideas and approaches. Sitting at the boundaries places them between the stability of formal institutions and the instability of informal institutions. This “bounded instability” creates a space for new ideas to emerge but the network membership ensures at least some degree of continuity with earlier innovations (Pelling et al., 2008). Free from their formal connections to their respective organisations, shadow networks have the flexibility and willingness to experiment with new and innovative ways of solving issues, thus they can contribute to the adaptive capacity of governance regimes. Along with key leaders, shadow networks prime a system for change by providing a space for social learning, exploring new ideas, designing and testing alternative policies and system configurations, and developing ways to choose between potential future scenarios (Gunderson, 1999; Olsson et al., 2006; Pelling et al., 2008).

Given the importance of shadow networks in fostering change, researchers have sought to identify the factors that facilitate formation of shadow networks. Gunderson (1999, p.5) contends that shadow networks “always seem to emerge” in cases of successful adaptive assessment and management. The nodes of these networks become banks of knowledge and memory that can be drawn upon in times of uncertainty and change (Olsson et al., 2006). Formation of shadow networks can be fast or slow, and it often occurs in response to a social or ecological crisis. Examining five case studies of systems in transition, Olsson *et. al.* (2006) identify emergence of leadership as an important precursor to shadow network formation. Response may start with a few key individuals working separately, but eventually evolve into multi-actor processes (Olsson et al., 2004; Olsson et al., 2006). Even when leaders emerge, improved governance is not an inevitable result. In addition, due to their varied interests and the time it takes to build trust, these networks can take some time to build (Olsson et al., 2006). The emergence of dialogue and spaces for collaboration is still an important part of shadow network formation, however, and creating space for this dialogue to explore pathways to transformation and adaptation is one way to encourage their formation (Olsson et al., 2006; Sendzimir et al., 2008; Westley et al., 2011). Westley *et al.* (2011) suggest a few pathways to build “shadow tracks”, primarily focused on bringing as many minds together as possible (e.g. via the Internet) and providing incentives for innovation. Most of these strategies for deliberately facilitating formation of shadow networks, however, remain untested.

5 Social-Ecological Systems (SES) and Resilience Thinking

5.1 Overview of SES and Resilience Thinking

Biodiversity conservation is a challenging problem to address because social and ecological systems are complex systems in which many factors interact. Like many policy and planning problems, this is a ‘wicked problem’, that cannot be defined completely and where most solutions are less than optimal (Rittel and Webber, 1973). In response to such challenges, some researchers and practitioners have issued calls for adaptation and even transformation of existing institutional arrangements (Biggs et al., 2010; Boyd and Folke, 2011; Westley et al., 2011). This suggests a need for institutional change, whether that be radical or incremental, to improve the performance of biodiversity conservation governance regimes.

There are a number of ways to approach institutional change, but my PhD will draw on the theoretical perspectives of SES and resilience thinking. These approaches call for a fundamental

change to the way ecosystems are understood and managed. Adopting an SES perspective requires a shift from the conventional efficiency-focused, top-down approach that seeks to achieve an 'optimal' state to one that recognises complex interactions across scales and the existence of multiple stable states in nature (Gunderson et al., 2010; Holling and Gunderson, 2002; Resilience Alliance, 2007). Rooted in complex systems thinking, an SES perspective acknowledges that social and biophysical systems are interlinked and interdependent and should be treated as such (Berkes et al., 2003; Walker and Salt, 2006). The approach emphasises that SESs are complex adaptive systems, in which change is not predictable, linear or incremental. As such, responses to interventions are not wholly predictable and cannot be understood by isolating variables or examining a particular interaction (Walker and Salt, 2006).

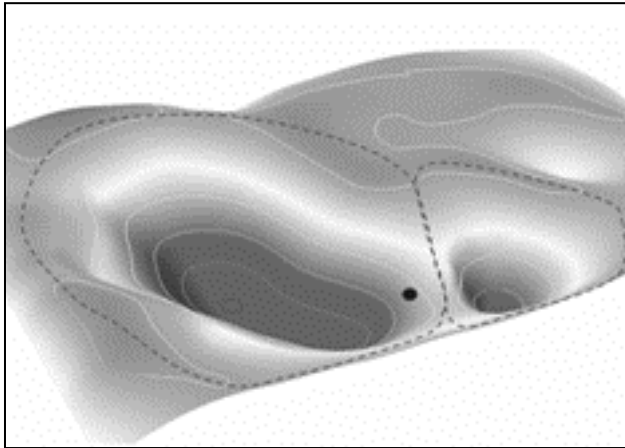


Figure 1. Visual representation of stability landscape and basins of attraction

Source: Walker et al., 2004, p. 5 (Figure 1b)

Two concepts that are central to resilience thinking are system state and thresholds. *System state* "refers to a set of social and ecological variables that can fluctuate and create either stabilising feedbacks to keep a system in a particular state (e.g. a clear lake) or amplifying feedbacks that push the system toward a new configuration and system state (e.g. a murky lake)" (Resilience Alliance, 2010; p. 7). Rather than viewing system states as locked in and static, resilience thinkers tend to emphasise the dynamic nature of these states. There can be multiple stable equilibria and domains of stability around these equilibria. Even these domains are dynamic, expanding, contracting, and even disappearing in response to drivers (Holling, 2010). Walker

et al. (2004) explains these dynamics through the metaphor of basins of attraction and a stability landscape (Figure 1). A *basin of attraction* is the state space in which a system tends to remain, and systems that tend toward equilibrium are drawn toward this basin (Walker et al., 2004).¹¹ Under real world conditions, systems are affected by exogenous variables, such as biophysical and social drivers, so systems move around within a basin, rather than directly toward equilibria. The *stability landscape* is comprised of the multiple basins that a system may occupy, and the boundaries that separate them. The landscape itself can shift through pressure from exogenous (e.g. rainfall) and endogenous drivers (e.g. management practices). Such drivers may change the borders between basins or the number of basins across the landscape (Walker et al., 2004). When a system leaves a basin of attraction, it is said to cross a threshold. Griffith *et al.* (2010; p. 9) define thresholds as "points on a trajectory of change for a particular variable (especially one that changes slowly) that, when crossed, can potentially change the structure, function and identify of the system affected." *Thresholds* can thus be described as the breakpoint between two system states (Walker and Salt, 2006). To explain how the dynamics of stability and change work with respect to these system states, resilience thinking tends to rely on the metaphor of an adaptive cycle.

¹¹ The term regime is used in the resilience literature to describe the set of states in this basin (also called a domain) of attraction (Resilience Alliance, 2007). This use of regime will be avoided to minimise confusion between regimes in governance and regimes in ecosystems.

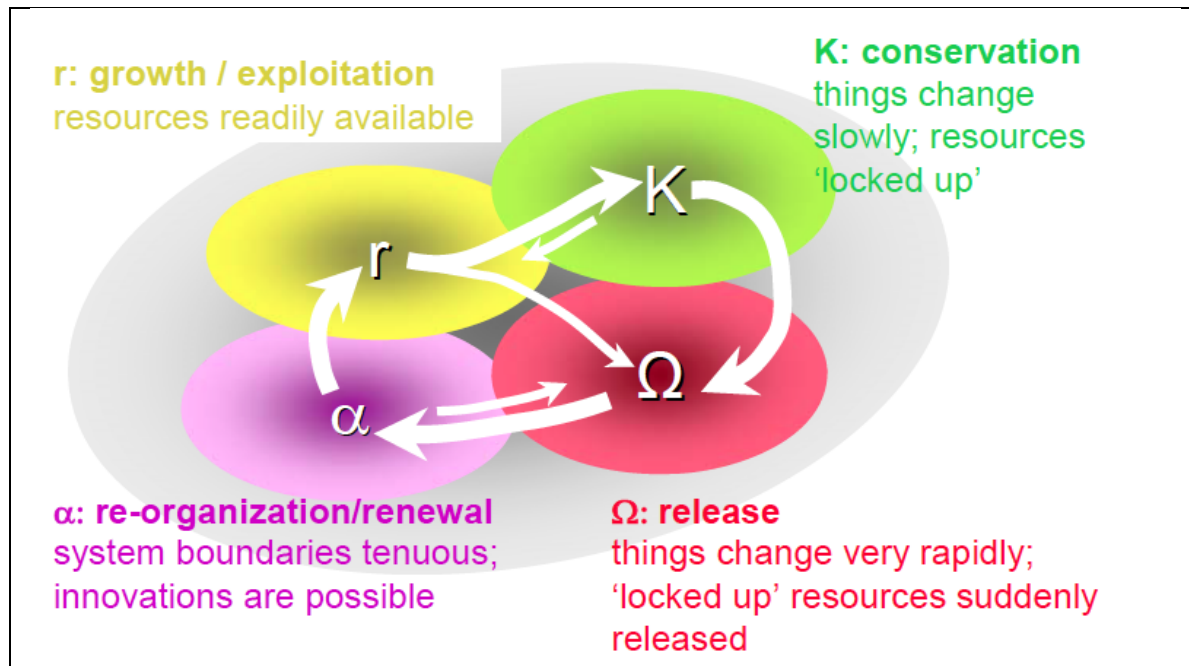


Figure 2. Visual representation of the adaptive cycle

Source: Resilience Alliance, 2007, p. 25

Dynamics of change and stability in SESs can be described by a four-phase adaptive cycle (Figure 2) (Gunderson et al., 1995; Holling and Gunderson, 2002). The cycle provides an alternative view to more traditional notions of ecosystem dynamics, grounded in a static view that emphasises equilibrium states. The traditional view, Holling (1973) argues, is not useful for describing ecosystems in transient states; however, both undisturbed ecosystems and those disturbed by humans are likely to be in a continually transient state. The adaptive cycle is a metaphor that has been developed based on study of ecosystems around the world, although it is not yet a generalised theory (Holling and Gunderson, 2002). The forward loop of the cycle consists of the rapid growth (r) and conservation (K) phases. This loop is characterised by slow accumulation of capital and relatively predictable dynamics. As the system moves through the K phase, it becomes less flexible and responsive to external shocks as resources become increasingly locked up. This phase is followed by the back loop, consisting of a release (Ω) and reorganisation (α) phase. The back loop can be described as chaotic and unpredictable, but this phase provides new opportunities and room for innovation (Walker et al., 2004). Systems may move through these phases in order; however, it is also possible to move out of order between phases, with the exception of a move from Ω phase directly to the K phase (Walker and Salt, 2006).

The dynamics of stability in SESs are said to arise from three complementary attributes: resilience, adaptability and transformability (Walker et al., 2004). Originally described in a paper by Holling (1973), *ecological resilience* refers to the buffer or absorptive capacity of a system, i.e. how much disturbance can be absorbed before a system changes its structure by changing the variables and processes that control behaviour (Gunderson et al., 1995). While there is some variation in how the term is used, most definitions of resilience build on Holling's earlier definitions. These discussions generally emphasise both exposure to disturbance and the ability to absorb or persevere. A resilient system is one that can be exposed to stress, disturbance or other outside

influences whilst still retaining essentially the same function, structure, feedbacks, and identity (Walker et al., 2006; Walker and Salt, 2006). Although resilience is discussed as an attribute of social and ecological systems when viewed as a single system (i.e. an SES), there are distinct features of human systems that make the term an awkward fit in the social realm.

5.2 Institutions, Governance, and Resilience

Resilience thinking has its roots in ecology; but it is increasingly being applied to social systems, including the institutional dimension. An attempt to foster SES resilience requires examination of the role of governance and institutions. As the link between social and ecological systems (Adger, 2000; Sikor, 2008), institutions, and the governance systems of which they are a part, can both enable and constrain SES resilience. Researchers who adopt a resilience thinking perspective tend to emphasise the need for change to cope with the complexity and uncertainty of social and ecological systems. This includes an emphasis on political and institutional flexibility and ongoing learning, evaluation and adaptation (Biggs et al., 2010; Holling et al., 2002). These characteristics suggest a particular meaning of institutional resilience that is distinct from ecosystem resilience.

A resilient ecosystem as previously defined retains the same function, structure, feedbacks, and identity in the face of stress or disturbance. Retention of function over the attributes of structure and identity is emphasised in the definition of *institutional resilience* used here. Steinberg (2009) uses institutional resilience to describe an institution that can maintain its effectiveness (e.g. fulfil its core mission) over time, despite changing conditions. This does not suggest that the institutional regime must retain its identity; rather, it implies that a shift in identity may be desirable if it will lead to a better outcome. In the case of biodiversity, a resilient institutional regime should be able to conserve biodiversity assets and processes. The regime should be robust enough to be sustained over time, but flexible enough to change as required, for example, in response to threatening processes such as climate change.

This suggests that institutional resilience requires a careful balancing act between stability and change. For instance, institutions must be stable enough to accommodate the long time scale of an environmental problem, but at the same time they cannot be so rigid that they are unable to bend when pressures change. To enable resilience in the ecological realm, institutions and governance regimes must have the capacity to cope with environmental change, societal dynamics, and to reorganise after unforeseen impacts (Galaz et al., 2008). This reorganisation may require only minor changes, or it may leave institutions in an unrecognisable form to those who knew them previously. “An institutional arrangement may perish if its mission is fundamentally altered, even if its operational machinery (procedures, budget, staff, infrastructure) persists” (Steinberg, 2009, p. 65). Institutional analysis and identification of needed reforms are thus important components in efforts to generate more resilient SESs. Accordingly, an emphasis on the potential for institutional change seems appropriate from resilience perspective, where change in ecosystems is inevitable yet somewhat unpredictable.

The ecological foundation of resilience has led to questions regarding the utility of the concept for social scientists. At this stage, resilience thinking is more heuristic than theory, and it is based on a relatively small number of empirical case studies (Griffith et al., 2010). Not surprisingly, the extent to which these debated ecological concepts can be generalised to social systems has been questioned. For example, the robustness of the adaptive cycle metaphor is contentious even within ecology; thus it is questionable how robust it is once transferred to human systems. Both

the concept of resilience and its measurement are still debated in ecology and the social sciences, and the relationship between ecological and social resilience concepts is still being explored (Adger, 2000; Davidson, 2010). Resilience in the social realm is still often viewed through an ecological lens, but the two types of resilience could be conceived quite differently (Adger, 2000). Adger (2000, p. 347) defines social resilience as “the ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change.” Ecological and social resilience can complement each other, with ecological resilience providing social systems with opportunities to innovate, learn, and cope with change (Adger, 2000).

At the same time, there are ways in which the two concepts can conflict. Resilience as an ecological concept is focused on the capacity of an SES to persist, independent of human values. It does not guarantee that the system will persist in a desirable form. For example, a polluted landscape or an economically depressed community could both meet the definition of resilient. On the other hand, management to maximise production or aesthetic value may suppress the natural variability of a forest, and such a system may lack resilience. What is resilient is thus not always socially desirable, and what is socially desirable is not always resilient (Adger, 2000; Chapin et al., 2006). Defining what regime is ‘desirable’ in both ecological and social systems is laden with value judgments. What is desirable and who decides are among the questions that should be addressed if the concept of resilience is to make inroads in the social sciences. Answering these questions will require an examination of power and values and consideration of the trade-offs in alternative courses of action.

Resilience thinking is also underdeveloped when applied to social systems because its model for ecological complexity imperfectly translates to a model of social complexity. Perhaps even more importantly, it fails to account for human agency, which not only sets human systems apart from ecological systems but can be one of society’s greatest assets in avoiding system collapse (Davidson, 2010). It is questionable whether social thresholds exist (Griffith et al., 2010), and identifying such thresholds in the social realm is challenging. Although there have been attempts to better integrate the concept of resilience in the social science literature, the social elements of the perspective are not robust, and significantly lacking in the area of institutional dynamics, change, and governance (Griffith et al., 2010).

Although resilience thinking is an imperfect metaphor for social systems, it can still provide a helpful way of thinking about the role of institutions. In the social realm, resilience thinking is most often associated with the adaptability component of the system. Walker *et al.* (2004) consider resilience to be purely a function of the ecological realm. *Adaptability*, they argue, is a function of the social realm, using the term to describe the capacity of actors in an SES to influence resilience (Walker et al., 2004). Resilience can be built when there is capacity to learn and adapt in the front loop and the ability to self-organise in the back loop (Holling and Gunderson, 2002). Adaptive management (Section 2.2) is one way to enhance resilience of an SES (Olsson et al., 2006; Walker et al., 2004). The third characteristic of an SES is *transformability*, which refers to the capacity to create a fundamentally new system when existing conditions make the existing system untenable (Walker et al., 2004).

Though they differ in degree, both adaptation and transformation are forms of change that can be influenced by the designed components of an SES (i.e. institutions and governance). Given that institutional and governance regimes have failed to address many challenging environmental problems, many researchers and practitioners have noted that changes are required to foster SES

resilience. Incremental changes may be sufficient, but a number of researchers have issued calls for transformation of existing institutional arrangements (Biggs et al., 2010; Boyd and Folke, 2011; Westley et al., 2011). The continued decline in biodiversity values, despite many international and national attempts to halt these losses, suggest it may be that transformation – rather than adaptation – of current regimes is required.

The metaphor of resilience can also aid an understanding of innovation in social systems (Section 4). Although the two concepts are distinct, one way of thinking about adaptability and transformation is as two degrees of innovation. In this way, transformation equates to a more radical shift to a new system and adaptation is akin to incremental change. Moore and Westley (2011b) distinguish the two based on the breadth and impact of change. Adaptive change is first-order or incremental, and its impact is not widespread or disruptive. Transformative innovations (also called ‘disruptive innovations’) change the rules of the system, leading to cascading effects across adaptive cycles and altering relationships at different scales (Moore and Westley, 2011). Adaptive and transformative changes in the institutional realm thus roughly correspond to the two types of change discussed earlier, i.e. incremental and radical change (Section 4).

Just as the ecological foundations of resilience present a challenge for integration for social scientists, so do the foundations of institutional analysis itself. As previously discussed, the role of institutions in explaining persistent patterns has been a focal point for institutional analysis, rather than on the attributes of institutions that allow change or enable resilience. Scholars have often focused on understanding the complexity of institutions, but biophysical conditions have been over-simplified in the process. For example, in earlier versions of the Institutional Analysis and Development Framework (IAD) (Section 8), the complex ecological systems were reduced to a single box, “the biophysical world” (Ostrom, 1982; Ostrom, 2011). Also, although Ostrom (1990) outlines the processes by which rules can change, this was in the context of an unchanging ecosystem, and how rules can change based on past experience (Anderies et al., 2004). In recent years, researchers have sought to integrate a more complex understanding of how biophysical conditions drive change and are impacted in SESs in the field of institutional analysis.

The field of institutional analysis recognises the need to develop better theories of institutional change. The recent attention to how institutions change over time and how they can facilitate change (Dacin et al., 2002) may aid integration between the institutional and resilience literatures. Recently, RC institutionalists have attempted to integrate the concept of SESs and resilience thinking into institutional analysis (e.g. Anderies et al., 2004; Cox and Ross, 2011; Ostrom, 2009; Schoon, 2008). It is important to note that this work focuses on robustness in the designed components of SESs (i.e. institutions and governance). This work acknowledges change in that it concedes persistence may not be a desirable feature in complex adaptive systems; rather, when ecological systems inevitably change, institutions may need to change with them (Anderies et al., 2004). However, there is an important caveat to that acknowledgement.

An emphasis on robustness has implications for the power of this work to explain change. *Robustness* can be defined here as an institution’s capacity to absorb stress without adaptive change. When robustness is eroded, a system is vulnerable to stress (Young, 2010). Young (2010) contrasts this with institutional resilience, which he defines as an institution’s ability to adapt to stress. Although this definition stops short of including transformative change, it highlights an important difference between robustness and resilience. Both address the capacity of a system to cope, but one incorporates change and the other does not. Anderies *et al.* (2004) note that they do

not abandon the concept of resilience, but they only incorporate it into the ecological component of an SES. Their view of the role of governance in resilience is to foster this attribute in the ecological system (Anderies et al., 2004). Young (2010) notes the interdependency of robustness, vulnerability, and resilience. For example, a regime may be very resilient, but it may have an “Achilles heel” that leaves it vulnerable to one or more specific types of stress (e.g. introduction of a new technology that increases harvest capacity) (Young, 2010). This relationship is important, as it highlights the idea that all three characteristics do not exist independently.

In contrast to the literature that focuses on robustness in the institutional realm, my PhD will also explore the concept of resilience in institutional systems. It also goes a step further to acknowledge there is sometimes a need for transformative change, which may even result in existing institutions dissolving completely and new ones emerging. This approach is favoured because it emphasises the potential for change in the institutional arrangements themselves, rather than the role of institutions in enabling resilience in ecological systems. Unlike the robustness approach, which neglects radical change in the institutional realm, in this approach neither radical nor incremental change is relegated to one area of the SES.

5.3 Related Frameworks

SES and resilience thinking are linked to the panarchy framework, a conceptual framework for analysing adaptive capacity and resilience in an SES (Holling and Gunderson, 2002). Key concepts in the framework include the adaptive cycle and panarchy. The latter term is used to describe the hierarchy of adaptive cycles in any SES that are linked across space and time (Walker and Salt, 2006). Panarchy thus emphasises the importance of cross-scale interactions, asking researchers to consider the scales both above and below the scale of interest, as these dynamics will affect the scale of interest. Walker *et al.* (2004) refer to panarchy as one aspect of resilience and emphasise that no SES can be understood through examination of a single scale, which is only one sub-system of the whole panarchy. In the social system, for instance, there will be multiple groups of people at multiple scales, and their views of what is a ‘desirable’ system state can differ (Walker et al., 2004). The panarchy framework provides a way of thinking about these cross-scale dynamics.

The panarchy framework is part of a broader attempt to develop a generalised theory of adaptive change (Holling and Gunderson, 2002), although at present the concepts are less theoretical framework and more metaphor or heuristic (Griffith et al., 2010). While it would be useful to employ a theoretical framework based on the adaptive cycle metaphor and the concept of resilience in this research, it is too abstract to be fully operationalised and the institutional components of SES are still underdeveloped (Ferguson et al., 2011). The theoretical framework for my PhD thus will not be based on this framework, although some of its concepts (e.g. scale and ecosystem dynamics) will be used to aid integration between the governance and resilience literature.

Although the framework itself will not be used, the metaphor of the adaptive cycle can still be useful in thinking about some aspects of the research. For example, some researchers have used the adaptive cycle to describe how shadow networks (Section 3) can facilitate change. Olsson *et al.* (2006) posit that shadow networks that form during the front loop of the adaptive cycle (r and K phases) create reserves of experience (social memory) that can facilitate transition in the back loop (Ω and α phases). This suggests that it may be useful to explore opportunities to foster these networks in the front loop, banking experience that may generate adaptation when it is needed.

Innovation can also be viewed through the lens of the adaptive cycle. Some researchers, such as Westley and others at the Waterloo Institute for Social Innovation and Resilience, have used the concepts of panarchy and resilience to describe the process of innovation using the metaphor of the adaptive cycle. As outlined in Moore and Westley (2011):

- The front loop is characterised by the accumulation of knowledge and social memory. It is here where skills are developed, resources are acquired, and norms are institutionalised. This process increases efficiency, and the system matures during this phase. At the same time, diversity is reduced and the system becomes vulnerable to major disturbances.
- During the back loop, creative destruction occurs in social systems in response to disturbance. This might be a natural disaster, financial crises, or political change.

Moore and Westley (2011b) also identify when barriers to innovation can occur during the adaptive cycle. For example, there are two traps that can occur in SESs: the rigidity trap and the poverty trap (Holling and Gunderson, 2002). These traps can act as barriers to innovation. When institutions become highly connected, inflexible, and self-reinforcing, the system can become stuck in a *rigidity trap* (Carpenter and Brock, 2008). Here, the potential for change is low and resilience is high (Allison and Hobbs, 2004). A rigidity trap occurs in the front loop, when the system is maturing and the need for innovation is stifled. In the front loop, social and ecological systems are said to become more homogenous and resistant to change (Moore and Westley, 2011). An example of a rigidity trap in governance would be if management systems sought to reduce variation in resource dynamics in a forest with the aim of maximising timber production. In such a situation, the traditional command-and-control management styles discussed earlier can lead to decreased diversity of the system and a reinforcing cycle of power and profit (Carpenter and Brock, 2008).

A *poverty trap* is essentially the opposite situation, in which resilience and connectivity is low. This trap occurs in the back loop, but it can prevent a system from entering the front loop. Diversity and competition are said to be high in a poverty trap, so there is no dominant set of ideas, organisations, or initiatives (Moore and Westley, 2011). Although there is potential for change, that potential is not realised (Allison and Hobbs, 2004; Carpenter and Brock, 2008). From an innovation perspective, ideas may be abundant, but innovation does not occur because the system lacks capacity to move these ideas forward (Westley et al., 2006). This might mean a lack of capacity to build political will and public support or a lack of energy and momentum. Even highly interesting ideas and products require the right timing and awareness. They also need entrepreneurs to frame them as legitimate, desirable, and needed (Moore and Westley, 2011). Although this work is based on a relatively small number of case studies, it suggests that identifying and testing interventions that foster innovation may be a useful way to move social and ecological systems out of these traps.

Moore and Westley (2011a; 2011b) have used the adaptive cycle as a metaphor to explain innovation and identify leverage points where policy interventions can enable innovation. Using case studies and examples, the authors applied a framework that illustrates how to facilitate change through policy interventions (Hämäläinen, 2007).¹² Moore and Westley (2011a) proposed four phases of social innovation and recommend policy solutions that foster innovation in each phase. For example, if a crisis or disturbance highlights a need to change the status quo,

¹² This framework is also based on the adaptive cycle metaphor.

establishing processes that allow disconnected groups to interact and build trust can create conditions that enable innovation. The policy interventions are intuitive and built upon case study examples; however, they are hypotheses and have not been systematically tested. Their ability to stimulate innovation, therefore, is not yet fully understood. In addition, it is difficult to say at this stage if the adaptive cycle is a good fit for describing the process of social innovation. While the metaphor has been applied to some case studies, the literature is largely self-referencing and is only a small subset of the larger body of social innovation literature.

6 Research Paradigm

The approach taken in my PhD is informed not only by the theoretical perspectives discussed previously, but also by my research paradigm. A paradigm is a basic set of beliefs or worldview that represents how the researcher views the nature of the world, and it guides research and practice in a field (Guba and Lincoln, 1994; Willis, 2007). A paradigm can be characterised by its answers to three fundamental questions: ontology (What is the nature and form of reality?), epistemology (What we can know and how we can know it?) and methodology (How can the inquirer obtain knowledge?) (Guba and Lincoln, 1994).

This research adopts an interpretive paradigm, although it draws from a significant body of literature that sits within the neo-positivist paradigm. Neo-positivism holds that reality and the researcher are separate, and that reality can be studied objectively. Interpretivism is predicated on a belief that context and the subjective experience of humans matter, and that studying human behaviour is fundamentally different from fields such as chemistry and physics. This paradigm favours research methods that allow the researcher to understand how participants interpret the world around them, such as case studies, interviews, and observation (Willis, 2007). My PhD sits mainly within the interpretive paradigm in that it seeks a nuanced appreciation of context and the subjective experience of actors, rather than universal, law-like truths. Neo-positivism and interpretivism are summarised in Table 3.

Table 3. Summary of neo-positivist and interpretivist paradigms

Meta-theoretical Assumptions	Neo-positivism	Interpretivism
Ontology	Person (researcher) and reality are separate.	Person (researcher) and reality are inseparable (life-world).
Epistemology	Objective reality exists beyond the human mind.	Knowledge of the world is intentionally constituted through a person's lived experience.
Method	Scientific methods (modified experimental); may be qualitative but often quantitative.	Subjective and objective research methods are acceptable. Favours interviews, Hermeneutics, phenomenology.

Sources: Guba and Lincoln, 1994; Weber, 2004; Willis, 2007

The discussion of paradigms is often polarised, but in practice the line between paradigms is blurred. Earlier discussions about paradigms organised these perspective around methodological approaches (i.e. quantitative versus qualitative), but this emphasis on data over foundational beliefs is incomplete and overly simplified (Willis, 2007). In fact, adopting a particular paradigm does not necessarily preclude use of the methods or tools of researchers from another paradigm. For example, an interpretive institutional analysis can incorporate aspects from the neo-positivist

literature (e.g. IAD framework, see section 8) to identify factors to be explored, but supplement this with interpretive elements (e.g. discourse) to access the subjective experiences of participants. This is the approach I have adopted in my PhD.

The interpretivist paradigm was selected for its suitability in accessing a *thick* understanding of institutions. This perspective seeks to understand the behavioural significance of institutions, in contrast to a *thin* perspective that focuses on institutions as articulated in constitutive documents. The thick perspective incorporates discourse, informal understandings, and norms. This perspective does not dismiss rules-on-paper; rather, it recognises that institutions may start with such rules and evolve over time (Young, 2002a). However, this understanding can be difficult to obtain, given that institutions are often subtle, unstated, and highly embedded in social structures. Institutions tend to be replicated without much reflection, taken for granted, and create path dependencies (Garud et al. 2007). This means the researcher must go beyond a review of the content of written documents to understand how actors interpret roles and responsibilities. This can be aided by examining the subjective experience of the actors involved in biodiversity governance. This approach to institutional analysis suits the relativist ontology of interpretivism, which acknowledges multiple mental constructions and experiences of institutions, rather than one objective truth that the researcher can access (Willis, 2007).

The craft perspective of policy analysis informs my PhD. This approach shifts focus away from dichotomous ways of thinking to balance empirical knowledge with useable knowledge in an often messy political reality. Adopting a craft perspective “usefully and appropriately informs the consideration of collective choices...policy analysis craft consists of more than a rational/empiricist methodology. Specifically, it incorporates discursive and interpretive elements that arise in the discovery of relevant values and goals in the formulation of policy alternatives” (Weimer, 1998; p. 114). This perspective is consistent with the deliberative policy analysis approach, which uses discourse theory to explore not only how institutions shape action, but the way actors shape institutions through language and politics (Fischer, 2003b; Hajer and Wagenaar, 2003). This PhD will thus examine the way institutions are expressed formally on paper and formally and informally by individuals and organisations to better understand how collective choices are made within the biodiversity governance regime.

7 Analytical Themes in Institutional Analysis

In addition to the theories and perspectives discussed in Sections 1 through 6, my PhD is focused on using the analytical theme of fit to improve institutional performance. This section outlines the basics of these concepts and their relationship to other prominent themes in institutional analysis.

7.1 Causality, Performance, and Design

Institutional analysis can take many forms, but a pattern emerges across studies. Young (2002) organises the field by its “principle science questions”. These questions confronting institutional analysts can be said to fall into three broad categories: causality, performance and design.

- **Causality:** *How much variance in the condition of ecosystems is attributable to institutions?*
- **Performance:** *Why do some institutional responses to environmental problems prove more successful than others in terms of criteria such as sustainability, efficiency and equity?*

- **Design:** *How can we structure institutions to maximise their performance?*

Causality

Studies of cause-and-effect are challenging in the social sciences. Complex causality is pervasive in SESs, making the use of traditional scientific methods to determine causality difficult (Young et al., 2006). There are multiple social, economic, and biophysical drivers that affect these systems, and these effects are not always direct. They also interact with one another and cannot be isolated. Institutional analysts must cope with the problem of endogeneity. “An endogenous variable is a factor in a causal model or a causal system whose value is determined by the states of other variables in the system” (Lewis-Beck et al., 2004; p. 309). Ideally, a pure endogenous variable is determined entirely by the states of other variables in a system, but in reality causal systems have a range of endogeneity (Lewis-Beck et al., 2004). Problems of endogeneity occur when all the variables are not included in a model (e.g. because of insufficient data or ignorance), and this is often the case in studies of SESs. Statistical models to determine causality thus must be supplemented or even replaced with a suite of methods to begin to tease out questions of causality (Young et al., 2006). In addition, specifying independent and dependent variables is complicated in institutional analysis. Dependent variables can also act as independent variables. For example, roads can cause deforestation, and deforestation can lead to the construction of roads. Institutions can introduce conservation measures, but damage to resources leads to formation of institutions (Young et al., 2006). Methods to solve this “chicken or the egg” problem are still in their infancy.

There are other problems associated with the question of causality. Although institutions have a role to play in both causing and solving environmental problems, the strength of influence of institutions on ecosystem condition is not always straightforward. Forces outside the institutional realm also impact biodiversity values, such as climate change and the ability of species to adapt to environmental change. Institutional forces from outside the domestic biodiversity governance framework, such as global financial markets, are also at play. It is a challenge to determine whether – and to what extent – institutional forces affect biodiversity conservation, and the task becomes even more complex if the researcher seeks to determine the relative contribution of institutions and other (e.g. biogeophysical) forces. Synergistic impacts between these forces also have an effect on outcomes, but understanding and predicting how factors interact in complex systems is not easy.

As yet, there is no cohesive theory to guide research in this area, and researchers typically must employ a suite of methods to contribute incrementally to our understanding of causality. Identifying the mechanisms and the effect of institutions on biodiversity conservation is thus crucial to institutional analysis, yet Young (2002) contends it remains “the most fundamental challenge” in the field of institutional analysis. My PhD does not attempt to quantify the causal impact of institutions relative to other forces on biodiversity outcomes. Although definitive evidence of causality may not be available, qualitative data (e.g. expert opinion) and monitoring data suggest that institutions are a part of the problem; and this study will explore how changes to biodiversity conservation institutions can improve their performance.

Performance

In situations where institutions are found (or assumed) to be significant causal forces, then research may focus on the question of performance. Evaluation of performance requires the specification of criteria for evaluation of the institutional framework or regime. These criteria for environmental regimes often include sustainability, efficiency, and equity. Performance can be assessed at two basic levels, i.e. simple or complex. Simple performance focuses on internal outcomes relevant to the problem the institution is meant to address, whereas complex performance considers broader outcomes flowing from institutional regimes (Young, 2002a). This might mean, for example, considering not only the biodiversity values protected by a policy that conserves biodiversity on private property, but also the effects on farm income and social welfare. Efforts to assess complex performance are much more difficult, as they require examination of a much longer causal chain and are much less advanced (Young, 2002a).

Performance of an institutional regime can also be framed in terms of its effectiveness in addressing the problem at hand. An environmental regime can be considered effective when it solves the problem it was created to address (Underdal, 2002). In biodiversity conservation governance, this would mean an effective regime would change human behaviours, resulting in a biophysical change in the environment and a net improvement in biodiversity. There are many ways to assess effectiveness, and a number of methodological challenges. This includes establishing a point of reference to compare the effectiveness of the regime and a metric of measurement that allows the regime to be measured (Underdal, 2002). All of this, of course, assumes that data on how the regime changed behaviour and how the state of the biophysical world also changed is available. In practice this data is not always available, and the matter is complicated when the variable to be measured is complex. Measuring the population or stock of a certain species, for instance, is simpler than measuring an underlying functional process. In monitoring programs, this is usually addressed by the measurement of indicators and establishment of thresholds of potential concern. These measures, however, are decision thresholds based on ecological or social values (Biggs et al., 2011). Regime performance could be gauged by how quickly they respond to these variables, but it is difficult to say whether it was the fault of the regime, a flaw in setting the threshold, or the speed of the driver that resulted in the condition of the environment (Biggs, 2008). This suggests that in order to assess effectiveness, one must also address the issue of causality if the aim is to isolate the performance of the institutional arrangements.

Design

The question of designing institutions to maximise performance has been a major focus in institutional analysis. If institutions are the major causal force, then institutional design may focus on modifying or replacing institutions to modify the behaviour of relevant actors. On the other hand, if biophysical drivers are major causal forces, then efforts in institutional design is better focused on giving actors the tools and incentives required to cope with these drivers. In either case, the impact of institutional design on behaviour of the relevant actors should remain central at all times in endeavours to redesign institutions. Hence, design is heavily influenced by the model of the actor a researcher adopts. That is, whether the analyst views the actors as utilitarians reacting to changes in costs and benefits (logic of consequences) or as behaving in ways they view as right or proper (logic of appropriateness) (Young, 2002a). The implications of each of these positions for institutional design were outlined in Section 1.1 (Table 2).

Institutional design can be a product of social learning within a particular policy domain. Single-loop learning might lead to minor changes, but double- and triple-loop learning can lead to changes in policy instruments, institutional arrangement, and even underlying paradigms (Grin and Loeber, 2007). This view of institutional design as a process of social learning highlights that there is no single ‘institutional designer’. In outlining the theory of institutional design, Goodin (1996) contends that the process of institutional design is actually just the result of multiple local attempts at changing institutional designs that cut across one another. Attempts at institutional design, he argues, should not seek to design institutions directly, rather they should be aimed at “designing schemes for designing institutions – schemes which will pay due regard to the multiplicity of designers and to the inevitably cross-cutting nature of their intentional interventions in the design process” (Goodin, 1996; p. 28). This view is consistent with the idea of discursive design (Dryzek, 1990), and thus in keeping with the discursive institutionalist perspective adopted in this PhD.

Institutions are not stagnate, particularly when they are part of an environmental governance regime that must respond to changing conditions. Institutional design can be accidental, intentional, or evolve from the logic of the institutions themselves (Dryzek, 1990). This means that although institutional design can be part of a deliberate attempt to improve institutional performance, it can also be the product of every day decision-making. Institutional designs can change in response to drivers and disturbances. For example, changes to the design of institutional arrangements may be the result of scientific research and conscious attempts to re-design institutions when the current institutions are underperforming. It is often, however, made on the fly by decision-makers and practitioners, based on practical considerations such as previous experience, a need to respond to crises, or as a means of coping with organisational constraints and capacities (Schoon, 2008). Schoon (2008) suggests that institutional robustness may also lead improved institutional design. This is because robust institutional arrangements should respond to drivers and disturbances and adjust as needed. Institutional design is thus to a certain extent context-specific, as institutional and governance arrangements must be designed in a way that allow them to cope with the specific problems at hand (Schoon, 2008). Institutional design efforts should thus take the need for dynamic arrangements into account.

7.2 The Problem of Fit

Underneath the questions of causality, performance, and design lie three analytic themes of inquiry that Young highlights on the frontier of institutional analysis, i.e. fit, interplay and scale. Young (2002) uses fit to refer to the compatibility between ecosystems and management institutions. When the two do not fit, then there is an *institutional misfit*. Interplay occurs in two directions – horizontally and vertically. Horizontal interplay occurs at the same level of social organisation, whereas vertical interplay refers to cross-scale interactions across levels of social organisation. Interplay can occur as the result of functional interdependencies or the politics of design and management. There are a number of other terms used for interplay in the literature, including cross-scale linkages (Heikkila et al., 2011) and boundary organisations (Termeer et al., 2010). Finally, scale is important not just for the environmental problems themselves, which vary in time and space, but also for the institutional systems (Young, 2002a).

There is also overlap between fit, scale, and interplay in the literature, with many authors discussing them under the umbrella of *the problem of fit*. Through the lens of SES and resilience thinking, fit should be conceived in this broader sense. A narrow focus only on the match between

the properties of the biophysical system and the properties of the institutions that manage them is inadequate in addressing institutional design, as it requires an arbitrary separation of social and ecological systems (Galaz et al., 2008). Folke *et al.* (2007) incorporate temporal, spatial and functional scale of institutions in examining how institutions fit the ecosystem being managed. Central to their examination of fit are the linkages from institutions to functional diversity, key structuring processes, and resilience (capacity to survive disturbance) in ecosystems (Folke et al., 2007). Berkes (2002) discusses cross-scale institutional linkages and horizontal and vertical interplay under the wider umbrella of fit.

Misfits come in many forms and have varied causes. Young (2002) identifies imperfect information, rent-seeking behaviour,¹³ and institutional constraints as sources of misfits. Misfits are also discussed as a failure of knowledge transfer. This may be a problem of large-scale scientific knowledge that is or is perceived to be irrelevant to local decision makers (e.g. climate models) (Cash, 2006). Failure to account for or transfer local or indigenous knowledge has also been highlighted as a problem of fit (Berkes, 2002; Frantzeskaki and Thissen, 2009; Robards and Lovcraft, 2010). Berkes (2002) highlights the importance of accounting for different systems of knowledge, as they can lead to significantly different views of the resources being managed.

According to Galaz *et al.* (2008, Table 5.1) misfits fall into four broad categories:

- **Spatial** misfits can occur where the institutional jurisdiction is too small/large to cover or affect the ecosystem being managed. Such misfits may not be able to cope with the actors or drivers relevant to the ecosystem.
- **Temporal** misfits occur when 1) institutions are formed too early or late to produce and effect, or 2) institutional decisions assume a shorter or longer time span than is required for the affected ecosystems and/or the social response is too slow, fast, short or long relative to biophysical conditions.
- Misfits can occur when institutions lead to ecological systems to **cross a threshold**. Institutions that do not recognise, cause, or are unable avoid abrupt shifts can lead to almost irreversible shifts in biophysical systems. When institutions fail to respond or respond inadequately to disturbances that could have been buffered, this also can lead systems to cross a threshold.
- **Cascading effects** occur when institutions cannot buffer effects between biophysical, social, and economic systems. This type of misfit can also trigger further effects, and can occur when institutional response is misdirected, nonexistent, or timed incorrectly, causing further changes along temporal or spatial scales.

An institutional misfit in a biodiversity governance regime can occur for a number of reasons. As Brown (2003) discusses, institutions often fail to protect biodiversity by suppressing variability and blocking out large-scale disturbance in an attempt to create a static system. However, this can actually increase the chance of large-scale disturbances and works against maximising biodiversity and resilience in ecosystems (Brown, 2003). Biodiversity institutions are also a part of politics, and

¹³ Rent seeking behaviour is when an actor seeks wealth by manipulating the environment (e.g. through political lobbying), rather than generating new wealth. This maximises individual benefit, but has a net negative impact on social welfare. This might mean an individual manipulates legislation to maximise resource extraction, without consideration of the long-term consequences to society (Young, 2002a).

the nature of politics can be maligned with the nature of the biodiversity conservation problem. For example, a focus on short-term rather than long-term goals is a political reality for politicians and government agencies as well as non-governmental actors and organisations that rely on short-term funding cycles (Brown, 2003). Efficiency is also a frequent focus of assessments of institutional performance and design, and governments often pride themselves on measures to improve efficiency. Unfortunately, measures to maximise efficiency and production (e.g. by removing 'redundancies') can create rigid, vulnerable systems that lack resilience (Galaz et al., 2008; Griffith et al., 2010; Walker and Salt, 2006).

It is notable that both institutions and other sources of misfits in governance regimes can be highly resistant to change (Galaz et al., 2008; Young, 2002a). Even if a change occurs in one area of the regime, this also does not mean the sources of misfit have been addressed in practice. For example, language can shift to make institutions 'fit' but actual practices may not reflect this shift in language (Fischer, 2007; Frantzeskaki et al., 2010; Winkel et al., 2011). This might mean that a particular coalition adopts the language of landscape scale and SES resilience, without shifting from previous practices. Language will be an important focus in this PhD, both in the institutions on paper and those in use.

8 Approach to Institutional Analysis

The following sections outline the approach that will guide the institutional analysis, and the rationale for adopting this approach over several others that are prominent in the literature. Some selected methods are also discussed here where relevant. For a full description of methods, refer to the Programme of Study.

8.1 Case Studies

My PhD will employ the case study method. A case study is a form of empirical inquiry that allows the researcher to investigate a contemporary phenomenon in depth whilst incorporating important contextual conditions (Yin, 2009). Case studies can be used to shed light on situations where there are multiple outcomes and variables (Yin, 2009), which describes most studies of institutions and governance. They are a useful way to understand SESs, where they can contribute to theory building and an understanding of the complex relationships between social and ecological systems (Poteete et al., 2010). Case studies are particularly useful for investigating 'how' and 'why' research questions and for exploration, evaluation, and investigation of social complexity (Yin, 2009). These characteristics mean the method requires relatively few assumptions about the cases in question, and researchers are encouraged to adopt an open-ended approach to investigation. The methodology enables examination of the fine-grained details of cases, allowing researchers to untangle complex relationships and discriminate between conceptually important factors. These attributes make case studies useful in the areas of conceptual refinement and theory development and testing, as well as enhancing data quality and construct and internal validity (Poteete et al., 2010).

Case studies are frequently employed in institutional analysis because they allow access to a depth of understanding that can be more difficult to access through other methods. Although document analysis will provide an important source of data, institutional research requires intense periods of field research to uncover informal and undocumented arrangements. This is a common feature in case studies investigating governance of natural resources (Poteete et al., 2010). The case study

method is a useful tool to move research beyond institutions as mere statements on paper and uncover the rules-in-use, norms, and strategies that form the structure of the institution (Ostrom, 1990, 2005), as well as the patterns of interaction between actors and the institutional setting (Giddens, 1984; Young et al., 2008).

Several limitations of case studies are worth noting. Although case studies are frequently used to study natural resource governance, they have drawbacks for advancement of the field. For example, most case studies are generally selected via purposive sampling in which cases are selected for their theoretical relevance and variation in significant variables. This is due to practical challenges that generally prevent researchers in this field satisfying the requirements of random or representative case selection. A purposive sampling strategy has the advantage of requiring the researcher to explicitly consider theoretically relevant variables; however, it requires knowledge of what those variables are as well as knowledge of the case(s) to be studied (Agrawal, 2001). Examples of successful institutional and governance arrangements are also likely to be over-represented in the case study literature. This is a common problem across the sciences because there is a tendency to prefer reporting (and publishing) successful cases. Failures may also be more difficult to locate in the case of natural resource governance, since failure in this context is quite frequently defined by inaction, rather than an overt failure (Poteete et al., 2010).

Many criticisms of case studies can be addressed through robust research design. For example, a common criticism of case studies is that they lack external validity (Poteete et al., 2010; Yin, 2009). The intention of case study designs is replication, in which the case studies will examine the same factors, rather than selection of a statistically representative sample. This distinction between replication and sampling logic is important, as it emphasises that the multiple case studies are more akin to multiple experiments than a survey of the population. Use of replication logic is one way to address external validity in multiple-case studies, and use of theory in each case study is also another important tactic (Yin 2009). Lessons from case studies can be applied to other areas, but there are limits to cross-case generalities and such extrapolation should be done with caution. At the same time, the fact that case studies call generalities into question is also a strength, as it can call into question simple relationships and advance theory by elaborating the limits of a theory's generality (Poteete et al., 2010).

Case studies are also criticised for favouring induction over deduction¹⁴. This research will utilise both forms of reasoning by using theory to inform data collection, and then using data to generate additional questions. Finally, indeterminacy can be an issue in case study research. Given the complexity of social interaction and causality, it is not uncommon for observations to be consistent with more than one hypothesis. This is not due to a lack of data, but from the close correlation between the variables of interest (Poteete et al., 2010). Case studies are thus not strong in the areas of theory confirmation or disconfirmation, particularly if a case study suggests a hypothesis supported by a large body of scholarly work should be rejected (Gerring, 2004). This challenge is true for most small-*n* research, but case studies still make a strong contribution to exploratory research. This strength is consistent with the aim of my PhD and the larger research hub in which it is a part, which is exploring tools to improve regional biodiversity planning.

¹⁴ An inductive approach moves from detailed observations to general abstractions, whereas deduction starts with an abstract relationship and moves toward a logical conclusion by collection of empirical data (Neuman, 1994)

8.2 Diagnostic Framework

One of the challenging aspects of the case study method is striking the balance between sufficient detail and an endless catalogue of information about the cases (Yin, 2011). I will develop a framework that will provide guidance on the data that needs to be collected for my PhD research. This framework will be fit-for-purpose, but it will draw upon existing concepts and frameworks in institutional and policy analysis. In doing this, it will draw on the work of RC institutionalists, but I will supplement this with a politicised, discursive approach. One drawback of the discursive institutionalist approach is that it is not associated with one of the popularised frameworks that provide the researcher with a specified set of factors and (in some cases) hypotheses, as is provided in the frameworks developed by RC institutionalists such as the IAD framework and the ACF. The alternative frameworks provided by discursive institutionalists that operate from constructivist and interpretivist paradigms have been accused of being unclear (Dudley et al., 2000). Discursive institutionalism does provide an alternative analytical framework in which to theorise about institutional change (Schmidt, 2010), but it does not necessarily fit the strict definition of framework employed by neo-positivist researchers. This section describes their distinction between frameworks, theories, and models, followed by a description of the key concepts and the primary RC and discursive institutionalist frameworks that will be used in my PhD.

8.2.1 Frameworks, Theories, and Models

The study of institutions falls under the purview of researchers from diverse social science disciplines, including economics, political science, environmental science, sociology and psychology. Social science has long struggled with becoming a “true science”, underpinned by theories that explain human behaviour and stand the test of systematic empirical testing (Coleman, 1964). Faced with the daunting task of generalising highly diverse phenomena without the controlled conditions of a laboratory, it is not surprising that the pursuit of theories that meet the scientific standards of empirical law has been an uphill struggle in the social sciences (Ostrom, 1982). The study of institutions has followed a similar path, no matter the disciplinary perspective from which they are viewed. Institutions come in many forms and permutations and vary from highly formal and written to highly informal and unspoken (Section 1).

This diversity of institutions is at the core of the challenge for the field. For an explanation to meet the criteria of a theory in science it should be highly specific, have a limited number of variables, and operate under stated conditions (Boynton, 1982). However, the diversity of institutions and social complexity involved in institutional settings suggests that such a narrow type of theory is not possible. Research has revealed that effective institutional arrangements come in a variety of forms, and what works in one context may fail in another. This suggests that rigorous institutional analysis requires examination of a large number of variables (Ostrom, 2005), and with this large number of variables comes many research challenges, both practical and intellectual.

Fortunately, political scientists and other researchers have developed a number of frameworks to guide institutional and policy analysis. The concept of *framework* employed here is that of a meta-theoretical conceptual map that organises diagnostic and prescriptive inquiry (Ostrom, 1999; Ostrom, 2005). While frameworks provide structure; specify variables and classes of variables; and general relationships among variables; they are not predictive of behaviour or outcomes (Schlager, 1999). This means that many theories can be compatible with a single framework, providing a

degree of flexibility and intellectual freedom to the researcher. Frameworks are distinct from theories and models. *Theories* provide focus to the analysis, by assisting the researcher in selecting among the variables in a framework. They direct attention to the variables that are most relevant and provide assumptions about these elements (Ostrom, 2005). In contrast to frameworks, theories are predictive (Schlager, 1999). *Models* provide the highest level of specificity, as they make precise assumptions and explore the consequences on a limited set of outcomes (Ostrom, 2005). Although distinct concepts, the challenge in drawing from a number of disciplines is that the terms are often used interchangeably in the literature, so theory can be used to describe anything from an empirically tested, generalised theory to philosophies, worldviews, and metaphors.

General frameworks exist for institutional and policy analysis; however, these frameworks are often modified to suit a particular setting and to conform to the researcher's theoretical perspectives. My PhD will adopt the latter approach, modifying existing frameworks to develop a diagnostic tool. Before describing the basic tenets of the diagnostic approach, however, a rationale for selecting this approach over the use of design principles is provided.

8.2.2 Design Principles

Institutions cannot be studied in the laboratory, and it can be difficult to predict how different institutional arrangements will perform in context. Even though there is a large body of case study data that can be synthesised to arrive at generalisations, attempts to provide a unifying theory that describes the causal relationships between the characteristics of environmental governance regimes and their performance have been challenging. This is true even in the well-researched area of CPR governance, where a great deal of attention has been directed to theory-building and principle development.

Perhaps the most recognised attempt in this area is the set of CPR design principles developed by Ostrom (1990). These principles are derived from empirical studies of management of the commons, such as smaller grazing areas, irrigation systems, and communal fisheries. The principles focus on the characteristics that are conducive to establishing and sustaining institutions that prevent overuse and deterioration of CPRs (e.g. small size, stable and well-delineated resource boundaries, relatively small negative externalities resulting from resource use, ability of resource users to monitor resource stocks and flows) (Ostrom, 1990). Later iterations of the principles include a number of additional variables believed to affect the success of self-organized governance systems, including effective communication, internal trust and reciprocity, and the nature of the resource system as a whole (Young, 2002a).

These design principles are but one attempt to synthesise the findings in the CPR literature. There have been many other attempts. Another notable attempt is that by Agrawal (2001). Starting with the principles developed by Ostrom (1990) and two other sets of principles (Baland and Platteau, 1996; Wade, 1988), Agrawal compares these results to many other existing case studies to determine if there is agreement on the causal variables relevant to institutional sustainability in the commons. He finds some agreement and lists 36 conditions from the CPR case study literature in the categories of resource system characteristics, group characteristics, institutional arrangements, and the external environment (Agrawal, 2001).

Use of this list of enabling conditions has a number of challenges and limitations, even when applied to a CPR situation. The sheer number of conditions presents a methodological challenge, and even though Agrawal (2001) attempts to narrow down this list to two dozen, he concludes that

there are likely between 30 and 40 important conditions or factors. The methodological challenges of studying several dozen conditions may be part of the reason that no CPR study at the time of this paper had applied every condition in a single study. Although Moore and Rodger (2010) have since applied these enabling conditions to understand whale shark tourism as a CPR issue, Agrawal (2001) notes that the CPR literature on which these conditions are based has significant problems of method (e.g. no explanation the causal model to be tested, omitted variables, emphasis on irrelevant variables, and spurious correlations). He also discusses challenges with data analysis with this extensive list, and suggests grouping the factors into an index that groups closely related variables. In addition to practical and methodological challenges, the conditions are general and pertain to all CPRs and institutions and are not linked to the particular context, e.g. resource characteristics (Agrawal 2001). Ostrom and Cox (2010) also acknowledge the validity of similar criticisms that have been levelled at the design principles, noting the significant methodological challenges that prevent specific contextual variables from being fully incorporated into design principles.

Context is important not only in determining which conditions matter, but it influences the state of these conditions and the contingent relationships between them (Agrawal, 2001). For example, one condition is that resource systems should be small in size with well-defined boundaries. However, Agrawal (2001) notes it could be that size of the resource can or should vary with group size, and that the boundaries could be fuzzy in cases where there is variation in group needs and resource flows. The degree of correlation between the enabling conditions, as well as between these conditions and other variables, is as yet unknown (Agrawal, 2001). Another issue is the small scale of the studies that have been conducted in this area, as the extent to which this knowledge can be applied on a larger scale is contentious (Young, 2002a). Although applying such enabling conditions or the design principles can provide useful tool for overcoming some methodological issues, it is clear that they do not resolve all challenges.

There are also a number of considerations specific to this research that limit the utility of both the design principles (Ostrom, 1990) and enabling conditions (Agrawal, 2001). These principles and conditions may provide a useful tool in certain situations, particularly in cases of governance in small-scale CPRs such as a small community irrigation system or common forest. While analysis of 91 case studies showed these principles to be moderately well-supported, this was across four dominant sectors: forests, fisheries, common pastures, and irrigation (Cox, 2010). This is because the principles are derived from CPR literature that focuses on collective action of local communities (Clement, 2010), and it emphasises situations where communal institutional arrangements are favoured over private or state ownership. Even though biodiversity conservation could meet some of the criteria of a CPR problem, the design principles and enabling conditions are based on case studies in which the problem characteristics are significantly different from the problem of biodiversity conservation and this particular context.

In addition, the principles are based on case studies where success is defined quite differently than it is in the resilience thinking and SES literature. Most researchers in this domain stress durability and efficiency of governance arrangements, conceiving of “successful institutions as those that last over time, constrain users to safeguard the resource, and produce fair outcomes” (Agrawal, 2001, p. 1650). While noble and sensible goals in a conventional management approach, these are not necessarily the criteria by which a regime should be judged in the context of biodiversity or through the lens of resilience. For example, in critiquing the principles from the perspective of biodiversity governance, Steinberg (2009, p. 65) notes: “A serious limitation of [the CPR principles]

approach, however, is that it focuses entirely on the machinery of longevity but not the principle to be sustained.” This is related to the problems discussed earlier with applying general CPR principles or conditions, particularly the generic approach and insufficient connection to context. Efficiency may be a frequent focus of institutional design because of its appeal for governments, but it comes at a cost. As previously noted, measures to maximise efficiency can create inflexible regimes, reduce resilience, and increase vulnerability (Galaz et al., 2008; Griffith et al., 2010; Walker and Salt, 2006). Thus while using CPR design principles can be useful when the goal is governance that is efficient and can be sustained over time, it is a less than ideal fit when the emphasis is on adaptive capacity, as it is in much of the resilience literature.

These problems are linked to perhaps the most prominent criticism of institutional design based on generic principles: that their use represents a “panacea approach” to solving environmental problems (Ostrom and Cox, 2010; Young, 2002b). A number of researchers have warned of the danger of applying blueprint approaches to governance and have called on researchers to move beyond panaceas in designing solutions to institutional problems in SESs (Brock and Carpenter, 2007; Huntjens et al., 2012; Korten, 1980; Ostrom, 2007; Ostrom and Cox, 2010; Pahl-Wostl et al., 2010). Blueprint or panacea approaches impose simple solutions to complex social-ecological problems, for example, often advocating for particular governance arrangements or policy instruments and excluding other options. Although the design principles (Ostrom, 1990) and enabling conditions (Agrawal, 2001) are more useful than applying a single policy to all problems, in many ways they still meet the criteria of a panacea. For example, all problems are treated as a generic problem type, rather than linked to the particular problem context (Agrawal, 2001; Young, 2002a). In addition, they fail to consider the interrelationships between conditions (Agrawal, 2001) and neglect many of the important factors influencing sustainability (Ostrom and Cox, 2010). In reality many governance regimes and institutional arrangements can be successful, and it cannot be assumed that a particular blueprint is optimal. This makes institutional design to address complex SES problems such as biodiversity conservation a poor candidate for generic design principles. This underpins the motivation to adopt a diagnostic approach in my PhD.

8.2.3 Institutional Diagnostics

Another approach is to conduct a diagnostic that can identify the areas in need of reform. Young (2002) contends that the diagnostic approach guards against the panacea problem by moving beyond a view that environmental problems can be characterised as a generic type, to an approach focused on identifying the significant elements of the challenge at hand. “The defining feature of the [diagnostic approach] is an effort to identify important features of issues arising from environmental changes that can be understood as diagnostic conditions.” (Young, 2002a; p. 176). In contrast to the principles discussed previously, this approach emphasises the importance of the problem attributes. It is flexible and allows the analyst to generate a framework that is tailored to the specific problem type. Like a doctor diagnosing a patient, the institutional analyst can diagnose the institutional problem and recommend potential courses of appropriate treatment (e.g. reforms or additional governance tools) (Young, 2002a). The approach is similar to that employed in theory-based program and policy evaluation, in which a practitioner seeks to understand how a program works or fails to work based on a set of logical assumptions about how the intervention works (Weiss, 1997). In this case, the intervention is the biodiversity governance regime, and the set of logical assumptions will be built from the research literature.

The diagnostic framework developed for this research will incorporate both general diagnostic conditions associated with governance and those that are specific problems of biodiversity

conservation and the most important drivers in the study regions. To aid researchers seeking to design institutional arrangements that will solve environmental problems, Young (2008) also provides a set of queries grouped into four categories: problems, politics, players, and practices. The basics of these categories are described below (Young 2008):

- **Problems:** An institutional diagnostic should begin with an assessment of the major characteristics of the problem. For example, is a one-off solution possible or is an ongoing or long-term solution required?
- **Politics:** Institutional design is a decidedly political process, and many actors involved in the process will have a stake in promoting their causes in the design process. In an institutional diagnostic, the focus is on surveying the political landscape, rather than fixating on the minutia of the bargaining process with specific stakeholders. Example questions here include: How is power dispersed or concentrated amongst stakeholders? Can the problem be readily addressed using tried and tested policy instruments?
- **Players:** The diagnostic method directs attention to the key actors or players who are causing the problem, likely to be affected by the problem, or in a position to solve it. Questions to be asked about the players include, for example, whether the actors are homogeneous or heterogeneous. This also includes the model of the actor that will be adopted, which in my PhD is the social-practice model (Table 1, Section 1.1).
- **Practices:** This category of questions is related to the institutional setting, such as the formal institutional frameworks, in which the problem takes place. Here the researcher should ask questions, for example, about who is permitted to participate and what the roles and responsibilities of the relevant actors are.

Guided by these questions, my PhD will seek answers from existing literature on biodiversity conservation governance, the relevant policy instruments, and interviews with actors in each of the study regions. An institutional diagnostic can begin with three categories of conditions: ecosystem properties, actor attributes, and implementation issues. These simple diagnostics can provide a starting point for developing complex diagnostics, which are necessary where individual diagnostic conditions interact in significant ways (Young, 2002a; Young, 2008). Other diagnostic conditions will be developed from the literature and information generated by other researchers in the LaP Hub (e.g. drivers and disturbances).

Although it offers many advantages, development of an original diagnostic framework also has a number of weaknesses. Although a useful approach for addressing design issues, it is important to note that a diagnostic tool is not meant to address the question of causality, which is one of the chief challenges in institutional analysis. As noted previously, institutions have a role to play in both causing and solving environmental problems, but the relative strength of influence of institutions as compared to other drivers and disturbances is difficult to measure (Young, 2002a). A diagnostic approach is not intended to answer the question of causality. Again theory-based evaluation provides an apt comparison, as this method strives to examine mechanisms of causality (Davidson, 2005; Rogers, 2007; Weiss, 1997). Weiss (1997) advised that most evaluation should examine both how the program is carried out (implementation theory) and the mechanisms that intervene between inputs and outcomes (programmatically theory). One of the ongoing challenges in theory-based evaluation is developing programmatic theories, which are central to understanding the mechanisms of causality (Rogers, 2007). Although the diagnostic conditions will be developed based on theories in the literature and the input of experts, the ability of institutional analysis to determine causality is similarly limited (Section 7.1). As yet, there is no cohesive theory to guide

research in the area of causality, and researchers typically must employ a suite of methods to contribute incrementally to our understanding of causality (Young, 2002a). Given these challenges, this research is based on an assumption that the regime is one source of biodiversity loss or decline, although the degree of causality will remain unknown.

The other weakness of the diagnostic approach is that the generality of the framework developed for this study will remain untested. For the same reasons that case studies are better for exploration than confirmation – and seek replication rather than statistical sampling – the generality of the framework cannot be evaluated in this research (Poteete et al., 2010). To address this issue, the study will draw upon an existing meta-theoretical framework, the IAD framework (Ostrom, 2005; Ostrom and Kiser, 1982), to inform development of the diagnostic tool.

8.2.4 The Institutional Analysis and Development (IAD) Framework

The use of a diagnostic approach does not necessarily preclude a researcher from starting with an existing framework. The IAD framework represents the most comprehensive attempt to synthesise case studies about natural resource governance of the commons. This has been a challenging task, as the case studies occur around the world and are uncoordinated, complex, approached from different theoretical and disciplinary perspectives, and focused on many different research questions and variables (Poteete et al., 2010). The IAD framework was chosen in part for its explicit emphasis on institutions. Although a number of frameworks exist to analyse policy, the IAD framework is currently the only framework based on institutions (Nowlin, 2011).

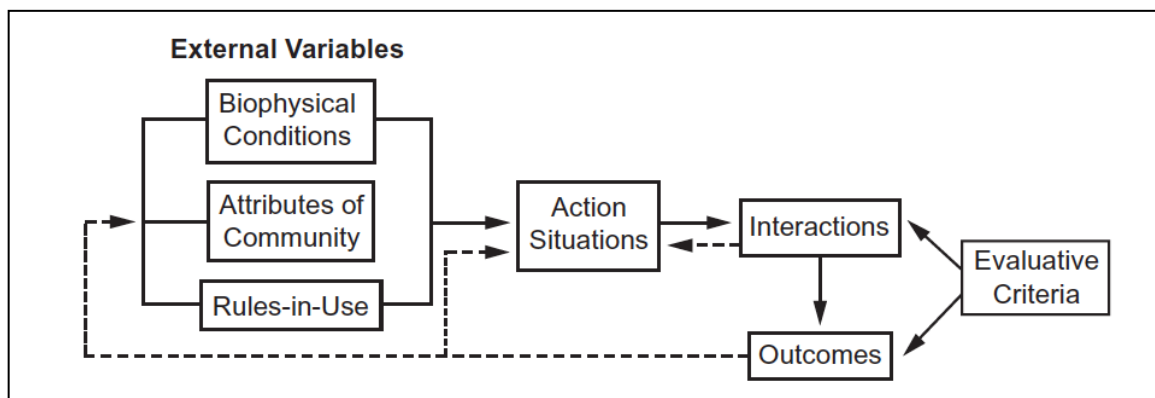


Figure 3. IAD Framework

Source: Ostrom, 2011, p. 10

The IAD framework (Figure 3) was originally developed by Kiser and Ostrom (1982) although it has been evolving ever since. It identifies the elements and relationships that should be considered in an institutional analysis (Ostrom, 2005). The IAD framework is essentially a “meta-theoretical, conceptual map that identifies an action situation, patterns of interaction and outcomes and evaluative criteria” (Poteete et al., 2010). The IAD framework has origins in RC institutionalism and the CPR literature (Ostrom, 1999). The framework is built on behavioural rational choice, a second generation of rational choice theory that incorporates effects of visual and verbal cues, norms of reciprocity and fairness, and willingness to sanction rule violators (McGinnis, 2011b). The model of the actors is that of bounded rationality (Section 1.3). Ostrom and McGinnis (2011b) summarise their interpretation of this concept in the view that actors intend to be rational but are limited in their cognitive and information-processing capability. Actors operate with incomplete information

and are subject to the subtle influences of cultural predispositions and beliefs (McGinnis, 2011b; Ostrom, 2011).

Ostrom and her colleagues at the Workshop in Political Theory and Policy Analysis have incorporated the concept of SES in an effort to provide a common language for interdisciplinary work that gives equal emphasis to biophysical and ecological foundations of institutional systems (McGinnis, 2011b; McGinnis and Ostrom, 2011; Ostrom, 2009; Ostrom, 2011). It is this form of the framework, sometimes called the Program in Institutional Analysis of Social-Ecological Systems (PIASES) framework that is most relevant to the study (Figure 4).¹⁵ The central component of the IAD framework is the *action situation*,¹⁶ which is the “black box” where policy choices are made (McGinnis, 2011b).

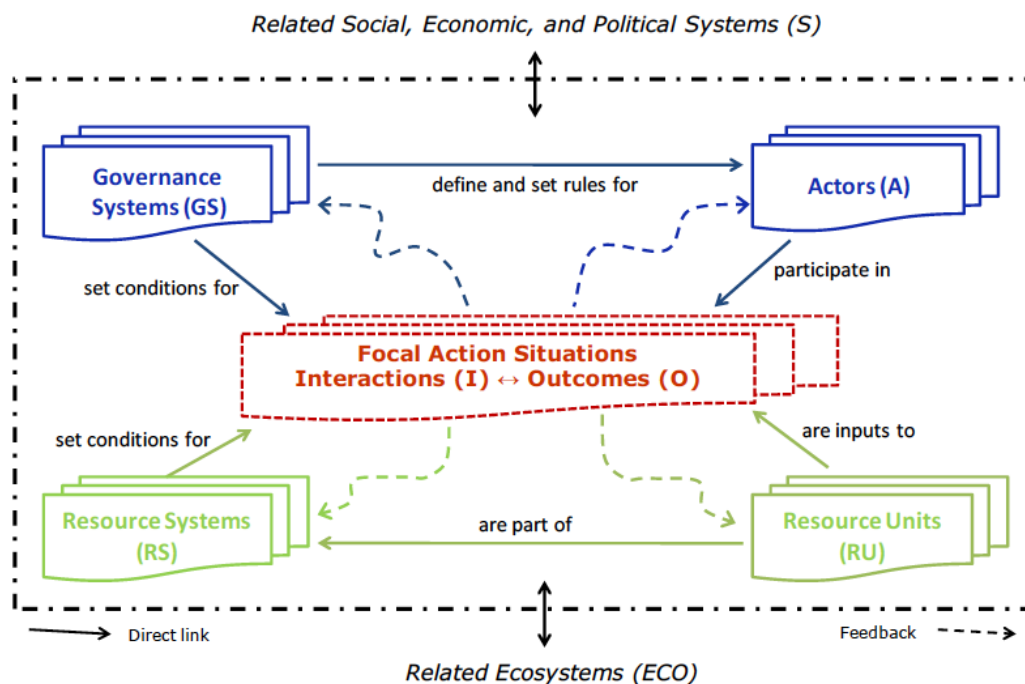


Figure 4. PIASES Framework – Top Tier Components

Source: McGinnis and Ostrom, 2011, p. 16

Action situations form a network of linked situations, and in the field it can be difficult to tell where one action situation stops and another begins (Ostrom, 2011). In these situations, patterns of interaction are influenced by three categories of exogenous variables: biophysical conditions, attributes of the community and rules-in-use (institutions). It is the impact of this last category that is the central focus of the IAD, which is built on the assumption that institutions impact policy by guiding and constraining decision-making by prescribing what actions are required, prohibited or

¹⁵ Ostrom and her colleagues use the name PIASES in some working papers, but more frequently refer to this form of the framework as the “SES Framework” in the literature. PIASES is used here to avoid confusion by distinguishing the analytical framework from the SES literature that informs the study. Other terms have also been used to refer to this framework, e.g. the SES Sustainability Framework.

¹⁶ Earlier incarnations of the framework distinguished between ‘action arenas’ and ‘action situations’; however, the most recent versions discard this distinction in an effort to simplify the framework and achieve integration with SESs (McGinnis 2011).

permitted. In particular, Ostrom focuses on rules-in-use as the defining characteristic of institutions (Ostrom, 2005).

Both the IAD and PIASES frameworks are nested, providing multiple levels of analysis. For example, action situations are networked, meaning they are nested within an action situation at a higher level. This is most easily illustrated with the three levels of analysis or ‘arenas of choice’ outlined in the IAD and PIASES: constitutional, collective choice, and operational (McGinnis, 2011b; Ostrom, 1982). Each arena has its own set of rules, and choice arenas are nested in the sense that changes in rules at a one level affect rules at a lower level. For instance, in the *operational arena*, actors implement practical decisions. The actors that are allowed to participate in this arena is determined in the *collective choice arena*, where institutions are constructed and policy decisions are made. Processes at that level originate in the *constitutional choice arena*, where collective entities are legitimised and the authorities of actors at the collective choice level are constituted (McGinnis, 2011b; Ostrom, 1999; Ostrom, 2011). Changes at deeper levels are more difficult to accomplish, which means that changes here can increase the stability of mutual expectations of actors operating according to a set of rules (Ostrom, 1990).

The framework is also nested in the sense that it has both top-tier variables (Figure 4) and second-tier variables (Figure 5). In the top-tier variables, actors are those who participate in action situations, resource units are viewed as inputs into the processes that take place in the action situation, and governance systems establish the conditions under which the action situation operates by determining the rules-in-use. Resource systems also establish important conditions in the action situation, including the attributes of the community and the nature of the goods in question (McGinnis and Ostrom, 2011). The influence of economic theory is quite evident in this language, which emphasises inputs and outputs.

As the IAD and PIASES frameworks are based on a collective-choice model of institutions, they are most compatible with theories that emphasis economic rationalism. Ostrom (2011) states that economic theory, game theory, transaction cost theory, social choice theory, covenantal theory, and theories of public goods and common-pool resources are all compatible with the frameworks. Both forms of the framework provide excellent tools for designing research and enabling comparisons across studies by providing a common research language (Ostrom and Cox, 2010). There are also a number of challenges associated with the underlying assumptions of the IAD framework that make use of the framework “as is” inappropriate for my PhD.

In particular, the IAD framework suits a neo-positivist paradigm and a rational choice institutionalism perspective, creating challenges for the interpretive paradigm and discursive institutionalist perspective I have adopted. Though it does not mandate use of a particular theory, both forms of the framework closely follow the collective-choice cluster of models that focus on costs and benefits. Its basis in rational choice institutionalism is evident in its language and structure, with a focus on economic value, expressed as opportunities and constraints for self-organisation by resource users (Poteete et al., 2010). These frameworks also have their origins in the CPR literature, just as the design principles and enabling conditions discussed in the previous section. The framework therefore directs attention to a set of variables that offer an incomplete account of the biodiversity conservation policy problem. While an economic perspective can account for ordered rational preferences, costs and benefits, and incentives and sanctions; it provides an insufficient account of the diverse motivations for conserving biodiversity (Steinberg, 2009).

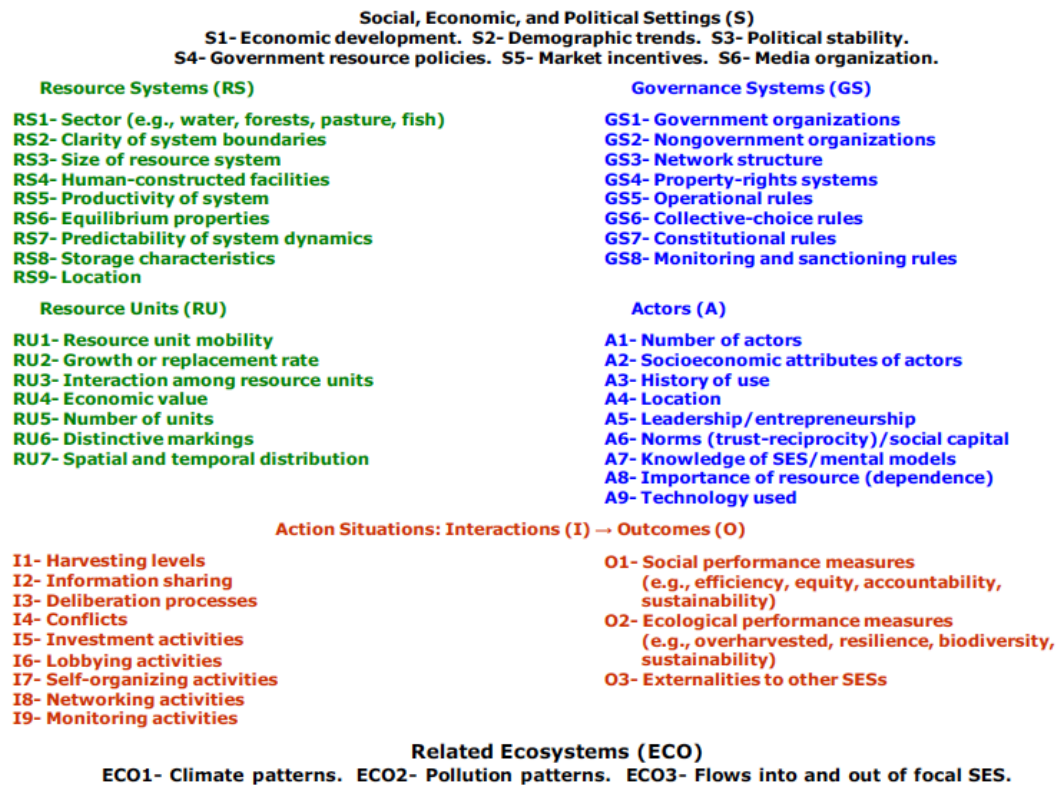


Figure 5. PIASES Framework – Second Tier Variables

Source: McGinnis and Ostrom, 2011, p. 18

The frameworks are also not an ideal fit because they tend to provide static descriptions of institutions. This is due in part to the focus on robustness (Section 5.2) and sustainability of institutional arrangements. Although more recently there have been attempts to discuss the framework in light of the SES perspective (Anderies et al., 2004; Cox and Ross, 2011; Ostrom, 2009), its philosophy of dynamics in an SES is quite different than the resilience thinking and institutional change perspective adopted here. The focus is still largely on the stability of institutions and examining the factors that generate this stability. Even when change is explored, the focus tends to be on incremental shifts (Dudley et al., 2000) and neither version of the frameworks appear to provide guidance on how such change may occur. Even the PIASES framework appears to take the position that that transformational change in governance is detrimental, seeking to avoid disturbance to maintain resilience. The framework is perhaps more aptly called the ‘SES sustainability framework’ (Ferguson et al., 2011) to distinguish it from the more dynamic accounts of complex systems in the SES literature.

The framework is also so complex that it can be challenging to implement. This has been conceded by the researchers who developed the framework: “Readers should be warned that the framework developed here is *complicated*, as an early commenter put it politely” (McGinnis and Ostrom, 2011). McGinnis (2011b) notes that although the purpose of the tool was to simplify the analytical task of trying to understand institutions in their full complexity, efforts to revise the framework over time have introduced complexity. The framework is also continuously changing in light of new

information and input from other researchers, making it a bit of a moving target. In reviewing studies that had applied the IAD and PIASES framework, it was apparent that many researchers are only able to focus on a small sub-set of variables in this framework, and many do not actually apply the framework but just use some of its language and structure. A similar approach will be taken here.

These challenges can be overcome, however, by using the IAD framework only as a starting point and modifying as required. The IAD framework has been chosen as a starting point above principles because of its flexibility. It does not adopt particular design principles or treat the problem as a generic problem type, and it explicitly calls for consideration of the specific resource characteristics. Even though the framework is most compatible with economic theories, it does not explicitly preclude other theories (Ostrom, 2011). A number of researchers have significantly modified the framework to suit their research questions and even to create new frameworks. For example, Clement (2010) developed a “politicised” version of the IAD to enhance its power in analysing policy processes and assessing policy impacts and policy change across multiple governance levels. Pahl-Wostl *et al.* (2010) developed the Management and Transitions Framework, a useful framework for organising transitions in water governance systems. The framework retains the basic structure of the IAD (i.e. the action situation and the action arena), but gives equal emphasis to actors and institutions (Pahl-Wostl *et al.*, 2010). The framework also emphasises the necessity of adaptive governance and learning as essential components of governance under transition (Pahl-Wostl *et al.*, 2010). The IAD is hardly recognisable in the Management and Transitions Framework, but it still served as a useful foundation for researchers to develop their own framework to explain transitional change in an urban water governance regimes. Here, the IAD will only provide broad guidance in conceptual development of the diagnostic framework. Even though the framework originates from a different perspective than adopted in my PhD, it can provide a solid foundation on which to build a new framework.

Institutional Grammar Tool (IGT)

One particular tool associated with the IAD framework is the Institutional Grammar Tool (IGT), which may be used to aid analysis of policy instruments. The IGT provides a structured method to identify and categorise written institutional statements, allowing researchers to aggregate the minutia of policy to reveal practically and theoretically relevant relationships (Siddiki *et al.*, 2011). As discussed, the IAD is an evolving framework that continues to be refined, and one of these refinements was the introduction of the IGT by Crawford and Ostrom (Crawford and Ostrom, 1995; Crawford and Ostrom, 2005). Although the concept of the tool was originally introduced in 1995, it was not until 2010 that clearer empirical guidelines were developed (Basurto *et al.*, 2010). Siddiki *et al.* (2011) have since further refined these guidelines. Although the IGT can be applied to both informal and formal institutions, it would only be applied to formal institutions (i.e. written policy instruments) in this research.

The IGT provides a way to uncover some of the inner workings in the “black box” where policy choices (i.e. action situations) are made. It consists of a grammatical syntax for understanding three types of institutional statements (rules, norms and strategies) in formal documents to help the analyst understand how policy choices are made. An institutional statement is “the shared linguistic constraint or opportunity that prescribes, permits, or advises actions or outcomes for actors (both individual and corporate). Institutional statements are spoken, written, or tacitly understood in a form intelligible to actors in an empirical setting” (Crawford and Ostrom, 1995, p.

583).

The tool provides a systematic way of analysing institutions, and allows the analyst to distinguish rules as distinct from strategies and norms, which are attributes of the community (Crawford and Ostrom, 2005). Application of the IGT generates a detailed description of what actions are prescribed, permitted or advised, who can participate, and under what conditions (Crawford and Ostrom, 2005). In short, it provides a structured way of understanding the intended target of policies and how policies prescribe opportunities and constraints. This is achieved by organising institutional statements into five subcomponents: attribute (A), deontic (D), aim (I), condition (C), or else (O) (alternatively called ADICO) (Crawford and Ostrom, 1995; Crawford and Ostrom, 2005) (Table 4). Based on a PhD thesis by Siddiki (2011), a sixth subcomponent has been proposed, the object (B). This code was introduced to resolve previously identified ambiguities in the grammar (Basurto et al., 2010), and allows a clearer distinction between the actor and what the actor is acting upon (Siddiki et al., 2011).

Table 4. Subcomponents of the IGT syntax

Subcomponent	Description
A tttribute	individual or organisation to which it applies
D eontic	what is permitted, obliged, or forbidden (e.g. will, shall, shall not)
I aim	goal or action to which D refers
C ondition	when or where the aim applies
O r else	punitive action if rule is not adhered to (e.g. fine)
oB ject	inanimate or animate part of a statement that receives the action (e.g. plan or policy)

Sources: Crawford and Ostrom, 1995; Crawford and Ostrom, 2005; Basurto et al., 2010; Siddiki et al., 2011

The IGT appears to be a useful methodological tool, although it has only been used in a few studies. To determine its utility for my PhD, it will be applied to a selection of policy instrument to test its analytical power in this context. It is notable that although the IGT was borne out of the IAD framework, it is also not necessarily wedded to the IAD framework. Siddiki *et al.* (2011) suggest that the resulting data may be analysed and interpreted from different theoretical perspectives and frameworks. If the IGT proves useful in this research, the data will be used both to describe the policy instruments and generate questions to be explored in the subsequent phases of research. In addition, no studies were found that used the IGT where the research operated from an interpretivist paradigm, so testing the tool in this study may provide useful insight into its utility for interpretive researchers.

8.2.5 Incorporating Discourse

One of the challenges of institutional analysis is that the rules, norms and strategies (i.e. institutions) are not objects that can be measured. The meaning of a statement or concept can vary considerably between actors, even as they are parties to the same conversation (McKeown and Thomas, 1988). This has significant implications for the way institutions shape behaviour, and understanding this discourse is at the heart of an interpretive approach. For example, researchers studying environmental discourse have found that language use may shift to reflect a particular paradigm (e.g. climate change or sustainability), even though the substance of actual practices may not change (Fischer, 2007; Frantzeskaki et al., 2010; Hajer and Wagenaar, 2003; Winkel et al.,

2011). In my PhD, it will be important to understand not only whether or not terms such as landscape scale and climate change are part of institutional statements, but also how actors interpret these challenges and their implications for biodiversity conservation.

My PhD adopts the perspective that rational choice institutionalism not only neglects these sorts of discourses, but it also provides an inadequate account of change. It turns to discursive institutionalism to fill that gap (Section 1.3). Schmidt (2011) contends that discourse is the key to understanding the dynamics of institutional change. Discursive institutionalism focuses on the substance of ideas and how they are developed and conveyed by actors through discursive interactions that inform policy-oriented actions. This discursive process can alter (or maintain) institutions: "Speaking of change, in other words, rather than just thinking it, is key to explaining the actions that lead to major policy transformations" (Schmidt, 2011; p. 107). A discursive framework directs attention to narratives, frames and frames of reference, discursive fields of ideas, argumentative practices, story-telling, and collective memories, among other ideas. The agents involved in discourse are important, but so is the institutional context, which is where the discourse takes place and also a point of origin for ideas and the content of discourse (Schmidt, 2011).

My PhD will incorporate elements of this perspective into the diagnostic framework by reviewing the discursive institutionalist literature to identify factors that can be explored in interviews with actors. In addition, the focus on the strategies of change agents (e.g. institutional entrepreneurs) will also require examination of discourse and ideas held by these agents (Section 4). Finally, interview data will be analysed using Q methodology to identify discourse coalitions. The concept of discourse coalitions and the basic principles of Q methodology are described below.

Discourse Coalitions

The ACF (Sabatier, 1988; Sabatier and Jenkins-Smith, 1993) is a theoretical framework that, to a certain extent, spans the divide between RC institutionalism and discursive institutionalism. Like the IAD, it adopts a bounded rationality view of the actor and is neo-positivist in origin. At the same time, it incorporates discursive elements and in recent years it has even spurred development of a related framework known as the Narrative Policy Framework, which is unique in offering a neo-positivist, quantitative approach to studying how narrative intersects with the ACF (Jones and McBeth, 2010; Shanahan et al., 2011). A central feature of the ACF is the concept of advocacy coalitions, a concept that was discussed in Section 4.1. Although Sabatier and other researchers who use the ACF may not count themselves among discursive institutionalists, Schmidt (2010) contends that the framework spans the divide between older institutionalisms and discursive institutionalism because it focuses on the role of these coalitions in the formation and spread of policy ideas.

Advocacy coalitions are the way actors are aggregated in the primary unit of analysis in the ACF, i.e. the policy subsystem. These coalitions are held together by beliefs, and policy designs are viewed as translations of those beliefs (Sabatier and Jenkins-Smith, 1999; Weible et al., 2011). The policy process in the ACF has no clear beginning or end, and the dynamics of policy are a results of interactions between advocacy coalitions (Fischer, 2003a; Sabatier and Jenkins-Smith, 1999). Actors in these coalitions are instrumentally rational, employing strategies and competing with other coalitions to ensure their coalition beliefs are integrated into political institutions (Winkel et al., 2011). Three lines of inquiry stem from the ACF: formation and maintenance of coalitions,

learning, and policy change (Weible et al. 2011). The framework offers a set of hypothesis for each of these categories. The ACF is used widely in policy studies, which is likely due to its strong theoretical integration. It brings together policy network theory, policy learning theory, ideas-based empirical research, and institutional rational choice theory alongside concepts such as policy communities and socio-economic correlates of policy outcomes (Fischer, 2003a).

There are several barriers to using the ACF in my PhD. Although the framework provides a much more dynamic account of change than the IAD and PIASES frameworks, but it does so over a long time scale. The ACF will not be used in this research, primarily because the study of advocacy coalitions should be done over fairly long periods and would require a retrospective focus rather than a contemporary one. The framework is predicated on the notion that advocacy coalitions are stable over time, and it directs researchers to take a time perspective of at least a decade to understand policy change (Weible et al., 2011). Although some researchers adopt a shorter time perspective, in order for the ACF hypotheses, the vintage test of ten years is required to ensure the subsystem is mature (Weible et al., 2011). Another problem is that the applicability and limitations of the frameworks in other political systems has been questioned. Although it has been used successfully in some studies outside of the United States, it is most robust in the American political system (Dudley et al., 2000; Weible et al., 2011). If the ACF is used at all in my PhD, it will likely only be to aid in understanding policy learning across discourse coalitions.

The concept of discourse coalitions is attributed to Hajer (1993), who contends the ACF is too thin analytically to account for the dynamics of change. In contrast to the ACF, Hajer (2003) describes his *discourse coalitions* as “communities of interpretation” organised around shared “identity stories” rather than shared beliefs. These narrative storylines not only hold coalitions together, but they are the lens through which events and courses of action are interpreted. This does not exclude beliefs, rather the idea is that storylines essentially condense the facts and values basic to the coalition’s belief system (Fischer, 2003a). This is not unlike the cultural cognition processes discussed earlier (Section 4.1), in which people filter new information through their existing attitudes and cultural identities. Discourse coalitions form part of his Argumentative Discourse Analysis (ADA) framework, in which argumentative disputes between discourse coalitions drive the policy process, with coalitions competing to have their rival discursive concepts integrated into public policy (Winkel et al., 2011).

The concept of discourse coalitions is not entirely different than the advocacy coalition concept, and both concepts have been used frequently to understand discourse in the realm of environmental policy disputes.¹⁷ There are, however, several key differences between advocacy coalitions and discourse coalitions. The glue holding the coalitions together (beliefs versus storylines) is chief among these differences. Many of the other differences are related to the neo-positivist approach adopted in the ACF and the interpretive approach of the ADA. For example, their account of change is different. In the ACF, policy change occurs if a coalition succeeds in integrating its belief into institutions that previously represented opposite belief systems. In the ADA, change occurs through interactive discourse. A new discourse becomes dominant when it becomes a part of many actors’ view of the world and if it becomes integrated into institutions and organisational practices (Winkel et al., 2011).

¹⁷ Wikel et al. (2011), for example, combined the two concepts to explain discourses in the area of forest management and climate change.

The neo-positivist approach adopted in the ACF also requires a number of simplifications, such as removing statements from their context for analysis and treating coalitions as stable, unitary actors and neglecting disputes within coalitions. As a result, the framework performs well in describing aspects of policy change, but not the how or why. The material that is removed from the ACF is explored in the ADA because it is viewed as the key to understanding how and why policy change occurs (Fischer, 2003a). Although the approach outlined in the ADA acknowledges that statements can be analysed empirically, it focuses on the use of the qualitative method of discourse analysis. My PhD adopts a slightly different approach, using Q methodology in an attempt to bridge the qualitative-quantitative divide.

Q Methodology

As part of my PhD, several dozen actors will be interviewed to understand how institutions and actors constrain or enable biodiversity conservation. In addition to analysing these interviews qualitatively, Q methodology will be used to study these policy-relevant discourses and to identify discourse coalitions. Q-technique and its methodology has its origins in psychology and is generally attributed to a paper by Stephenson in the 1930s, followed by a book (Stephenson, 1953). Q methodology provides an inductive yet systematic way to study individual subjectivity by asking participants to rank a series of statements from their own point of view (McKeown and Thomas, 1988). The technique is useful for those seeking to combine qualitative and quantitative methods (Brown, 1993). The method is most useful when respondents fully understand the research methodology and questions (Dryzek and Berejikian, 1993). It is suitable in this research, as participants will be actors who are involved in biodiversity conservation. An overview of the methodology and research questions will be provided to all participants.

The method involves the following steps (Barry and Proops, 1999; Clark, 2002; Dryzek and Berejikian, 1993; Frantzi et al., 2009):

- Identify a theme and the target population (i.e. biodiversity governance and interview participants).
- Generate a series of opinion statements from those made by the stakeholders. Statements can be drawn from conversations, commentary, and discourse. In this case, statements will be drawn from interviews.
- These statements are then reduced to a manageable number of themes using a 'concourse matrix' (36 statements are thought to be ideal).
- Participants score these statements by how strongly they agree or disagree with them. The technique assumes that context is important, thus participants are asked to consider how their preferences relate to each other.
- Statistical analysis (correlations and factor analysis) to identify factors.
- Interpret the factors to examine the discourses revealed in the data.

The benefit of this method is that it does not require a large sample size to get statistically valid results, thus it is useful for small-*n* datasets (Dryzek and Berejikian, 1993). It is also cost effective and does not require specialist computer programs for analysing large data sets (Brown, 1993; Frantzi et al., 2009; McKeown and Thomas, 1988). Perhaps its most unique characteristic is that statements are drawn directly from participants, yet it still allows statistical analysis (Barry and

Proops, 1999). On the other hand, it is important to note that Q methodology is limited in several respects. It measures subjectivity, thus it is not a technique to find the 'right' or 'wrong' answers (or factors) (Brown, 1993). This also means it is not a statistically representative sample of the entire population, thus it does not indicate what proportion of the larger population subscribes to each discourse (Dryzek and Berejikian, 1993). It is also time intensive for the researcher (Barry and Proops, 1999). Open source software (PQMethod) is now available to assist in this regard and will be employed in this study.

Governmentality

The concept of governmentality will also be considered as means to incorporate political discourse into the framework of the study. In its most general conception, *governmentality* can be defined as the mentality of government, i.e. how we think about government (Dean, 1999). The concept of governmentality forms the basis of a useful framework for researchers interested in the 'how' of governing. This framework offers a means of "investigating the surfaces of emergence of political discourse and action" (Dean, 1999, p. 198). The foundations of governmentality can be traced to a lecture by Michel Foucault in the late 1970s, but it is a concept that has had significant influence even outside of Foucauldian schools of thought. It is in line with the contemporary focus on governance, as it emphasises that the job of "government" is carried out at many levels and at many sites. The framework is a response to neo-liberalism, which Foucault argued had obscured the fact that governance is conducted in the plural, not just by the state (Dean, 1999). Like the new governance literature, governmentality adopts a broader meaning of government, to one that is beyond the state and includes a plurality of agencies, authorities, aspects of behaviour, norms, purposes, effects, and outcomes (Dean, 1999). This broad view of the notion of government has important implications for an analysis of governance.

Analyses based on the governmentality framework are thus concerned with "the means of calculation, both qualitative and quantitative, the type of governing authority or agency, the forms of knowledge, techniques and other means employed, the entity to be governed and how it is conceived, the ends sought and the outcomes and consequences" (Dean, 1999, p. 11). Governance is seen as a rational activity, but the meaning of rational here is different than that used by economists. Rather, rational here simply means that the thinking employed involves making calculations, is relatively clear and systematic, employs knowledge, and purposeful (i.e. defines how things are or how they ought to be) (Dean, 1999). Rationality is described in many different ways in the literature, and this type of rationality is more consistent with an interpretivist perspective than the model of bounded rationality discussed earlier.

As a framework governmentality is most useful for answering "how" questions. The framework draws attention to the conditions under which governance regimes emerge, operate, and transform, focusing on how we govern and how we are governed. Dean (1999) identifies four interrelated dimensions of a governmentality analysis, visibilities, knowledge, techniques and practices, and identities, which he describes as follows (Dean, 1999, p. 23):

1. *Characteristic forms of visibility, ways of seeing and perceiving.*
2. *Distinctive ways of thinking and questioning, relying on definite vocabularies and procedures for the production of truth (e.g. those derived from the social, human and behavioural sciences)*

3. *Specific ways of acting, intervening and directing, made up of particular types of practical rationality ('expertise' and 'know-how'), and relying upon definite mechanisms, techniques and technologies.*
4. *Characteristic ways of forming subjects, selves, persons, actors or agents.*

The governmentality framework emphasises power and ethics, distinguishing it from the rational choice approaches discussed earlier, which emphasised well-ordered preferences and cost versus benefit calculations. However, governmentality has faced similar challenges to the frameworks discussed previously, as the development of a generalised theory has been challenging. Although a large body of case studies exist, attempts to synthesise the framework into a generalised theory have been unsuccessful (Dean, 1999). Some have also criticised the framework as an attempt by Foucault to employ his theory of government processes at the micro scale to a macro scale (Kendall and Wickham, 2004). Kendall and Wickham (2004) contend that this approach can be applied at any scale of government, from the individual level (governance of the self) to the national state. They therefore refer to the approach as "...a kind of meta-analysis. It is not so much a way of doing political science, as a kind of philosophical intervention into the objects of political science" (p. 130). Viewed this way, governmentality does not fit the strict definition of meta-theoretical framework (Section 8.2.1).

The concept, then, is perhaps better viewed not as a tool, but an attitude that can be adopted to understanding the mentalities and rationalities of governance. The approach can be used in combination with traditional methodologies, and offers the researchers a series of questions to be explored (Kendall and Wickham, 2004). The governmentality framework is flexible and open enough to be used in combination with the other tools in an institutional analysis. It provides an approach to understanding the more philosophical and abstract components of governance and could lead to novel discoveries about the nature of governance. The potential utility of this approach will be explored in developing the framework for my PhD.

8.3 Conclusion and Next Steps

The next step in my PhD will be to develop the diagnostic framework that will guide the analysis. Specifically, the research falls under the analytical themes of fit and design, examining how the current institutional framework fits the problem of conserving biodiversity in the face of key drivers and disturbances (e.g. climate change). Along with the literature on institutional misfits, this will require further research into the attributes of the problem. The framework will incorporate these attributes along with elements of resilience thinking, the IAD Framework, and discursive institutionalism. To understand how formal institutions currently describe the problem of biodiversity conservation and prescribe solutions, the relevant formal laws, policies, plans, and strategies will be reviewed. My PhD seeks a deeper understanding of how institutions on paper affect institutions in practice. This will require examination of the subtler characteristics of institutional arrangements through interviews with actors involved in biodiversity governance. The study will be aided by the literature discussed throughout this review, with further review focused on literature in the areas of institutional change, policy learning, network governance, and institutional entrepreneurship.

9 References

- ADGER, W. N. 2000. Social and ecological resilience: are they related? *Progress in Human Geography*, 24, 347-364.
- AGRAWAL, A. 2001. Common Property Institutions and Sustainable Governance of Resources. *World Development*, 29, 1649-1672.
- AGRAWAL, A. 2003. Sustainable Governance of Common Pool Resources: Context, Methods, and Politics. *Annual Review of Anthropology*, 32, 243-262.
- ALLAN, C. & CURTIS, A. 2005. Nipped in the Bud: Why Regional Scale Adaptive Management Is Not Blooming. *Environmental Management*, 36, 414-425.
- ALLISON, H. E. & HOBBS, R. J. 2004. Resilience, adaptive capacity, and the lock-in trap of the Western Australian agricultural region. *Ecology and society*, 9.
- ANDERIES, J. M., JANSSEN, M. A. & OSTROM, E. 2004. A framework to analyze the robustness of social-ecological systems from an institutional perspective. *Ecology and society*, 9.
- ANGELSTAM, P., MIKUSIŃSKI, G., RÖNNBÄCK, B., ÖSTMAN, A., LAZDINIS, M., ROBERGE, J., ARNBERG, W. & OLSSON, J. 2003. Two-Dimensional Gap Analysis: A Tool for Efficient Conservation Planning and Biodiversity Policy Implementation. *Ambio*, 32, 527-534.
- ARCHER, M. S. 2010. Morphogenesis versus structuration: on combining structure and action. *The British Journal of Sociology*, 61, 225-252.
- ARGYRIS, C. 1976. Single-loop and double-loop models in research on decision making. *Administrative Science Quarterly*, 363-375.
- ARGYRIS, C. 1993. *Knowledge for action : a guide to overcoming barriers to organizational change*, San Francisco, Jossey-Bass.
- ARMITAGE, D. 2005. Adaptive Capacity and Community-Based Natural Resource Management. *Environmental Management*, 35, 703-715.
- ARMITAGE, D. & PLUMMER, R. (eds.) 2010. *Adaptive capacity and environmental governance*, Heidelberg, Germany: Springer
- ARMITAGE, D. R., PLUMMER, R., BERKES, F., ARTHUR, R. I., CHARLES, A. T., DAVIDSON-HUNT, I. J., DIDUCK, A. P., DOUBLEDAY, N. C., JOHNSON, D. S., MARSCHKE, M., MCCONNEY, P., PINKERTON, E. W. & WOLLENBERG, E. K. 2009. Adaptive Co-Management for Social-Ecological Complexity. *Frontiers in Ecology and the Environment*, 7, 95-102.
- ARNSTEIN, S. R. 1969. A ladder of citizen participation. *Journal of the American Institute of Planners*, 35, 216-224.
- BÆRENHOLDT, J. O. & AARSÆTHER, N. 2002. Coping Strategies, Social Capital and Space. *European Urban and Regional Studies*, 9, 151-165.
- BALAND, J. M. & PLATTEAU, J. P. 1996. *Halting degradation of natural resources: is there a role for rural communities?*, Food & Agriculture Org.
- BARRY, J. & PROOPS, J. 1999. Seeking sustainability discourses with Q methodology. *Ecological Economics*, 28, 337-345.
- BASURTO, X., KINGSLEY, G., MCQUEEN, K., SMITH, M. & WEIBLE, C. M. 2010. A Systematic Approach to Institutional Analysis: Applying Crawford and Ostrom's Grammar. *Political Research Quarterly*, 63, 523-537.
- BASURTO, X. & OSTROM, E. 2009. Beyond the Tragedy of the Commons. *Economia delle fonti di energia e dell'ambiente*, 1, p. 35-60.
- BATTILANA, J., LECA, B. & BOXENBAUM, E. 2009. How Actors Change Institutions: Towards a Theory of Institutional Entrepreneurship. *The Academy of Management Annals*, 3, 65-107.

- BEMELMANS-VIDEC, M. L., RIST, R. C. & VEDUNG, E. (eds.) 2003. *Carrots, sticks, and sermons: Policy instruments and their evaluation*: Transaction Pub.
- BERKES, F. 2002. Cross-Scale Institutional Linkages: Perspectives from the Bottom Up. In: OSTROM, E., DIETZ, T. & DOLSAK, N. (eds.) *The drama of the commons*. Washington, DC ; [Great Britain] :: National Academy Press.
- BERKES, F., COLDING, J. & FOLKE, C. 2003. *Navigating social-ecological systems: Building resilience for complexity and change.*, Cambridge, Cambridge University Press.
- BERKES, F. & FOLKE, C. 1998. Linking social and ecological systems for resilience and sustainability. In: FOLKE, C. & BERKES, F. (eds.) *Linking social and ecological systems: management practices and social mechanisms for building resilience* Cambridge, U.K.: Cambridge University Press.
- BERRY, F. S. & BERRY, W. D. 1999. Innovation and Diffusion Models in Policy Research. In: SABATIER, P. A. (ed.) *Theories of the policy process*. 1st edition ed. Boulder, Colo.: Westview Press.
- BIGGS, H., FERREIRA, S., FREITAG-RONALDSON, S. & GRANT-BIGGS, R. 2011. Taking stock after a decade: Does the 'thresholds of potential concern' concept need a socio-ecological revamp? *Koedoe-African Protected Area Conservation and Science*, 53, 9 pages.
- BIGGS, R. 2008. *Uncertainty, learning and innovation in ecosystem management*. Doctor of Philosophy, University of Wisconsin-Madison.
- BIGGS, R., WESTLEY, F. R. & CARPENTER, S. R. 2010. Navigating the Back Loop: Fostering Social Innovation and Transformation in Ecosystem Management. *Ecology and society*, 15, 475.
- BORRINI-FEYERABEND, G., JOHNSTON, J. & PANSKY, D. 2006. Governance of protected areas. In: LOCKWOOD, M., WORBOYS, G. & KOTHARI, A. (eds.) *Managing protected areas: a global guide*. London: Earthscan.
- BOYD, E. & FOLKE, C. 2011. *Adapting Institutions: Governance, Complexity and Social-Ecological Resilience*. Cambridge: Cambridge University Press.
- BOYNTON, G. D. 1982. On getting from there to here: Reflections on two paragraphs and other things. In: OSTROM, E. (ed.) *Strategies of political inquiry*. Beverly Hills, California: Sage Publications.
- BRESSERS, H. T. A. & O'TOOLE, L. J., JR. 1998. The Selection of Policy Instruments: A Network-Based Perspective. *Journal of Public Policy*, 18, 213-239.
- BROCK, W. A. & CARPENTER, S. R. 2007. Panaceas and diversification of environmental policy. *Proceedings of the National Academy of Sciences*, 104, 15206-15211.
- BROWN, K. 2003. Integrating Conservation and Development: A Case of Institutional Misfit. *Frontiers in Ecology and the Environment*, 1, 479-487.
- BROWN, S. R. 1993. A primer on Q methodology. *Operant subjectivity*, 16, 91-138.
- BUCKLEY, W. 1967. Sociology and modern systems theory.
- CARPENTER, S. & BROCK, W. A. 2008. Adaptive capacity and traps. *Ecology and society*, 13, 40.
- CASH, D. W. 2006. Scale and cross-scale dynamics: governance and information in a multilevel world. *Ecology and society*, 11, 8.
- CHAPIN, F. S., LOVECRAFT, A. L., ZAVALETA, E. S., NELSON, J., ROBARDS, M. D., KOFINAS, G. P., TRAINOR, S. F., PETERSON, G. D., HUNTINGTON, H. P. & NAYLOR, R. L. 2006. Policy strategies to address sustainability of Alaskan boreal forests in response to a directionally changing climate. *Proceedings of the National Academy of Sciences*, 103, 16637-16643.
- CLARK, T. W. 2002. *The policy process : a practical guide for natural resources professionals*, New Haven, Yale University Press.

- CLEAVER, F. 2001. Institutional Bricolage, Conflict and Cooperation in Usangu, Tanzania. *IDS Bulletin*, 32, 26-35.
- CLEAVER, F. 2002. Reinventing Institutions: Bricolage and the Social Embeddedness of Natural Resource Management. *The European Journal of Development Research*, 14, 11-30.
- CLEMENT, F. 2010. Analysing decentralised natural resource governance: proposition for a "politicised" institutional analysis and development framework. *Policy Sciences*, 43, 129-156.
- COFFEY, B. & WESCOTT, G. 2010. New directions in biodiversity policy and governance? A critique of Victoria's Land and Biodiversity White Paper. *Australasian Journal of Environmental Management*, 17, 204-214.
- COLEMAN, J. S. 1964. Introduction to mathematical sociology. *London Free Press Glencoe*.
- COLLIVER, R. 2012. *Community-based governance in social-ecological systems: An inquiry into the marginalisation of Landcare in Victoria, Australia*. PhD, Murdoch University.
- CONNOR, R. & DOVERS, S. 2004. *Institutional change for sustainable development*, Cheltenham, U.K., Edward Elgar.
- COX, M. 2010. *Exploring the dynamics of social-ecological systems: the case of the Taos valley acequias*. Doctor of Philosophy PhD dissertation, Indiana University.
- COX, M. & ROSS, J. M. 2011. Robustness and vulnerability of community irrigation systems: The case of the Taos valley acequias. *Journal of Environmental Economics and Management*, 61, 254-266.
- CRAWFORD, S. & OSTROM, E. 1995. A Grammar of Institutions. *The American Political Science Review*, 89, 582-600.
- CRAWFORD, S. & OSTROM, E. 2005. A Grammar of Institutions. *Understanding institutional diversity*. Princeton University Press.
- CUNDILL, G. & FABRICIUS, C. 2010. Monitoring the governance dimension of natural resource co-management. *Ecology and society*, 15.
- DACIN, M. T., GOODSTEIN, J. & SCOTT, W. R. 2002. Institutional Theory and Institutional Change: Introduction to the Special Research Forum. *The Academy of Management Journal*, 45, 43-56.
- DAVIDSON, D. J. 2010. The Applicability of the Concept of Resilience to Social Systems: Some Sources of Optimism and Nagging Doubts. *Society & Natural Resources*, 23, 1135-1149.
- DAVIDSON, E. J. 2005. *Evaluation Methodology Basics: The Nuts and Bolts of Sound Evaluation*. Thousand Oaks, USA: SAGE Publications, Inc.
- DEAN, M. 1999. *Governmentality : power and rule in modern society*, Thousand Oaks, Calif., SAGE.
- DEQUECH, D. 2001. Bounded rationality, institutions, and uncertainty. *Journal of Economic Issues*, 35, 911-929.
- DIETZ, T., OSTROM, E. & STERN, P. C. 2003. The Struggle to Govern the Commons. *Science*, 302, 1907-1912.
- DIMAGGIO, P. J. 1988. Interest and agency in institutional theory. In: ZUCKER, L. (ed.) *Institutional patterns and organizations*. Ballinger.
- DIMAGGIO, P. J. & POWELL, W. W. 1983. The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review*, 48, 147-160.
- DOVERS, S. 1995. Information, sustainability and policy. *Australian Journal of Environmental Management*, 2, 142-156.
- DOVERS, S. 2005. *Environment and sustainability policy : creation, implementation, evaluation*. Annandale, Federation Press.

- DOVERS, S. R. & HEZRI, A. A. 2010. Institutions and policy processes: the means to the ends of adaptation. *Wiley Interdisciplinary Reviews: Climate Change*, 1, 212-231.
- DRUCKMAN, J. N. & BOLSEN, T. 2011. Framing, motivated reasoning, and opinions about emergent technologies. *Journal of Communication*, 61, 659-688.
- DRYZEK, J. S. 1990. *Discursive democracy: politics, policy, and political science*, Cambridge : New York, Cambridge University Press ;.
- DRYZEK, J. S., - 2000. *Deliberative democracy and beyond: liberals, critics, contestations*, Oxford ; New York :, Oxford University Press.
- DRYZEK, J. S. & BEREJIKIAN, J. 1993. Reconstructive democratic theory. *American Political Science Review*, 48-60.
- DUDLEY, G., PARSONS, W., RADAELLI, C. M. & SABATIER, P. A. 2000. Symposium: Theories of the Policy Process. *Journal of European Public Policy*, 7, 122-140.
- EAGLES, P. F. J. 2008. Governance models for parks, recreation, and tourism. In: HANNA, K. S., CLARK, D. A. & SLOCOMBE, D. S. (eds.) *Transforming parks and protected areas: policy and governance in a changing world*. New York: Routledge.
- EAGLES, P. F. J. 2009. Governance of recreation and tourism partnerships in parks and protected areas. *Journal of Sustainable Tourism*, 17, 231-248.
- EVANS, J. 2012. *Environmental governance*, Milton Park Abingdon, Oxon Routledge.
- FALL, J. 2002. Divide and rule: Constructing human boundaries in 'boundless nature'. *GeoJournal*, 58, 243-251.
- FERGUSON, B., BROWN, R. R. & DELETIĆ, A. 2011. Towards a socio-technical framework for mapping and diagnosing transformational dynamics in urban water systems. *12th International Conference on Urban Drainage (ICUD)*. Porto Alegre, Brazil.
- FISCHER, F. 2003a. *Reframing public policy: discursive politics and deliberative practices*, Oxford, Oxford University Press.
- FISCHER, F. 2003b. Beyond empiricism: policy analysis as deliberative practice. In: HAJER, M. A. & WAGENAAR, H. (eds.) *Deliberative policy analysis : understanding governance in the network society*. Cambridge, UK :: Cambridge University Press.
- FISCHER, F. 2007. *Handbook of Public Policy Analysis : Theory, Politics, and Methods*. Hoboken: CRC.
- FOLKE, C., HAHN, T., OLSSON, P. & NORBERG, J. 2005. Adaptive governance of social-ecological systems. *Annual Review of Environment and Resources*, 30, 441-473.
- FOLKE, C., PRITCHARD JR, L., BERKES, F., COLDING, J. & SVEDIN, U. 2007. The problem of fit between ecosystems and institutions: Ten years later. *Ecology and society*, 12.
- FRANTZESKAKI, N., SLINGER, J., VREUGDENHIL, H. & VAN DAALEN, E. 2010. Social-ecological systems governance: from paradigm to management approach. *Nature and Culture*, 5, 84-98.
- FRANTZESKAKI, N. & THISSEN, W. Year. Institutional architectures for social-ecological systems governance towards sustainability. In, 2009. 2-4.
- FRANTZI, S., CARTER, N. T. & LOVETT, J. C. 2009. Exploring discourses on international environmental regime effectiveness with Q methodology: A case study of the Mediterranean Action Plan. *Journal of Environmental Management*, 90, 177-186.
- GALAZ, V., OLSSON, P., HAHN, T., FOLKE, C. & SVEDIN, U. 2008. The problem of fit among biophysical systems, environmental and resource regimes, and broader governance systems: Insights and emerging challenges. In: YOUNG, O., KING, L. A. & SCHROEDER, H. (eds.) *Institutions and environmental change : principal findings, applications, and research frontiers / edited by Oran R. Young, Leslie A. King, and Heike Schroeder*. Cambridge, Mass.: MIT Press.

- GARUD, R., HARDY, C. & MAGUIRE, S. 2007. Institutional Entrepreneurship as Embedded Agency: An Introduction to the Special Issue. *Organization Studies*, 28, 957-969.
- GERRING, J. 2004. What is a case study and what is it good for? *American Political Science Review*, 98, 341-354.
- GIDDENS, A. 1984. *The constitution of society: Outline of the theory of structuration*, Univ of California Press.
- GILOVICH, T., KAHNEMAN, D. & GRIFFIN, D. W. 2002. *Heuristics and biases : the psychology of intuitive judgment* Cambridge, Cambridge University Press.
- GOODIN, R. E. 1996. *The theory of institutional design*, Cambridge Cambridge University Press.
- GRIFFITH, R., MITCHELL, M., WALLKERDEN, G., BROWN, V. & WALKER, B. 2010. Building a framework for transformative action in the Wakool Shire: Transformation for resilient landscapes and communities project Working Paper 1. Albury, NSW: Institute for Land, Water and Society, Charles Sturt University.
- GRIN, J. & LOEBER, A. 2007. Theories of policy learning: Agency, structure, and change. In: FISCHER, F. (ed.) *Handbook of Public Policy Analysis : Theory, Politics, and Methods*. Hoboken: CRC.
- GUBA, E. G. & LINCOLN, Y. S. 1994. Competing Paradigms in Qualitative Research. In: DENZIN, N. K. & LINCOLN, Y. S. (eds.) *Handbook of qualitative research*. Thousand Oaks :: Sage Publications.
- GUNDERSON, L. 1999. Resilience, flexibility and adaptive management - antidotes for spurious certitude. *Conservation Ecology*, 3, 7.
- GUNDERSON, L. H., ALLEN, C. R. & HOLLING, C. S. (eds.) 2010. *Foundations of ecological resilience*, Washington: Island Press.
- GUNDERSON, L. H., HOLLING, C. S. & LIGHT, S. S. (eds.) 1995. *Barriers and bridges to the renewal of ecosystems and institutions*, New York: Columbia University Press.
- HAJER, M. 1993. Discourse coalitions and the institutionalizations of practice: the case of acid rain in Great Britain. In: FISCHER, F. & FORESTER, J. (eds.) *The argumentative turn in policy analysis and planning*. Durham, NC: Duke University Press.
- HAJER, M. 2003. Policymaking and the reinvention of politics. In: HAJER, M. A. & WAGENAAR, H. (eds.) *Deliberative policy analysis : understanding governance in the network society*. Cambridge, UK: Cambridge University Press.
- HAJER, M. A. & WAGENAAR, H. (eds.) 2003. *Deliberative policy analysis : understanding governance in the network society*, Cambridge, UK: Cambridge University Press.
- HALL, P. A. 1993. Policy Paradigms, Social Learning, and the State: The Case of Economic Policymaking in Britain. *Comparative Politics*, 25, 275-296.
- HALL, P. A. & TAYLOR, R. C. R. 1996. Political Science and the Three New Institutionalisms. *Political studies*, 44, 936-957.
- HÄMÄLÄINEN, T. J. 2007. Policy implications: How to facilitate the structural adjustment and renewal of advanced societies? In: HÄMÄLÄINEN, T. J. & HEISKALA, R. (eds.) *Social innovations, institutional change, and economic performance: making sense of structural adjustment processes in industrial sectors, regions, and societies*. Cheltenham: Edward Elgar Publishing.
- HARDIN, G. 1968. The Tragedy of the Commons. *Science*, 162, 1243-1248.
- HARDIN, R. 1982. *Collective action*, Baltimore, Maryland, The John Hopkins University Press.
- HAY, C. & RICHARDS, D. 2000. The tangled webs of Westminster and Whitehall: the discourse, strategy and practice of networking within the British core executive. *Public Administration*, 78, 1-28.

- HEALEY, P. 2003. Collaborative Planning in Perspective. *Planning theory (London, England)*, 2, 101-123.
- HEALEY, P. 2006a. Transforming governance: Challenges of institutional adaptation and a new politics of space. *European Planning Studies*, 14, 299-320.
- HEALEY, P. 2006b. *Collaborative planning : shaping places in fragmented societies*, Basingstoke, Hampshire ; New York :, Palgrave Macmillan.
- HEALY, T., CÔTÉ, S., HELLIWELL, J. F. & FIELD, S. 2001. *The well-being of nations: The role of human and social capital*, OECD Publishing.
- HEIKKILA, T. & GERLAK, A. K. 2005. The Formation of Large-scale Collaborative Resource Management Institutions: Clarifying the Roles of Stakeholders, Science, and Institutions. *Policy Studies Journal*, 33, 583-612.
- HEIKKILA, T., SCHLAGER, E. & DAVIS, M. W. 2011. The Role of Cross-Scale Institutional Linkages in Common Pool Resource Management: Assessing Interstate River Compacts*. *Policy Studies Journal*, 39, 121-145.
- HILL, R., GRANT, C., GEORGE, M., ROBINSON, C. J., JACKSON, S. & ABEL, N. 2012. A typology of indigenous engagement in Australian environmental management: Implications for knowledge integration and social-ecological system sustainability. *Ecology and society*, 17.
- HODGSON, G. M. 2006. What are institutions? *Journal of Economic Issues*, 40, 1-25.
- HOLLING, C. S. 1978. *Adaptive environmental assessment and management*, Chichester, Wiley.
- HOLLING, C. S. 2010. The resilience of terrestrial ecosystems. In: GUNDERSON, L. H., ALLEN, C. R. & HOLLING, C. S. (eds.) *Foundations of ecological resilience: Local surprise and global change*. Washington: Island Press.
- HOLLING, C. S. & GUNDERSON, L. (eds.) 2002. *Panarchy : understanding transformations in human and natural systems*, Washington: Island Press.
- HOLLING, C. S., GUNDERSON, L. & LUDWIG, D. 2002. In quest of a theory of adaptive change. In: HOLLING, C. S. & GUNDERSON, L. (eds.) *Panarchy : understanding transformations in human and natural systems / edited by Lance H. Gunderson and C. S. Holling*. Washington :: Island Press.
- HOWLETT, M. 1991. Policy Instruments, Policy Styles, and Policy Implementation. National Approaches to Theories of Instrument Choice. *Policy Studies Journal*, 19, 1-21.
- HUNTJENS, P., LEBEL, L., PAHL-WOSTL, C., CAMKIN, J., SCHULZE, R. & KRANZ, N. 2012. Institutional design propositions for the governance of adaptation to climate change in the water sector. *Global Environmental Change*, 22, 67-81.
- IMPERIAL, M. T. 1999. Institutional analysis and ecosystem-based management: The institutional analysis and development framework. *Environmental Management*, 24, 449-465.
- INNES, J. E. & BOOHER, D. E. 2000. Public Participation in Planning: New Strategies for the 21st Century. *IURD Working Paper Series*. Berkeley, CA: Institute of Urban and Regional Development, UC Berkeley.
- INNES, J. E. & BOOHER, D. E. 2003a. The Impact of Collaborative Planning on Governance Capacity. *IURD Working Paper Series*. Berkeley, CA: Institute of Urban and Regional Development, UC Berkeley.
- INNES, J. E. & BOOHER, D. E. 2003b. Collaborative policymaking: governance through dialogue. In: HAJER, M. A. & WAGENAAR, H. (eds.) *Deliberative policy analysis: understanding governance in the network society*. Cambridge, UK: Cambridge University Press.
- INTERNATIONAL ASSOCIATION FOR PUBLIC PARTICIPATION. 2007. *IAP2 Spectrum of Public Participation* [Online]. Thornton: IAP2. Available:

- http://www.iap2.org/associations/4748/files/IAP2%20Spectrum_vertical.pdf [Accessed 4 July 2012].
- JAMIESON, D. 2011. The nature of the problem. In: DRYZEK, J. S., NORGAARD, R. B. & SCHLOSBERG, D. (eds.) *Oxford handbook of climate change and society* Oxford: Oxford University Press.
- JONES, M. D. & MCBETH, M. K. 2010. A Narrative Policy Framework: Clear Enough to Be Wrong? *Policy Studies Journal*, 38, 329-353.
- JORDAN, A., WURZEL, R. K. W. & ZITO, A. 2005. The Rise of 'New' Policy Instruments in Comparative Perspective: Has Governance Eclipsed Government? *Political studies*, 53, 477-496.
- KAHAN, D. M. & BRAMAN, D. 2006. Cultural cognition and public policy. *Yale Law and Policy Review*, 24, 147-170.
- KAVANAUGH, A. L., REESE, D. D., CARROLL, J. M. & ROSSON, M. B. 2005. Weak Ties in Networked Communities. *The Information Society*, 21, 119-131.
- KENDALL, G. & WICKHAM, G. 2004. The Foucaultian Framework. Qualitative Research Practice. SAGE Publications Ltd. In: SEALE, C., GOBO, G., GUBRIUM, J. F. & SILVERMAN, D. (eds.) *Qualitative Research Practice*. London, UK: SAGE Publications Ltd.
- KLIJN, E. H. & KOPPENJAN, J. F. M. 2006. Institutional design: Changing institutional features of networks. *Public Management Review*, 8, 141-160.
- KORTEN, D. C. 1980. Community organization and rural development: A learning process approach. *Public Administration Review*, 480-511.
- KRASNER, S. D. 1982. Structural Causes and Regime Consequences: Regimes as Intervening Variables. *International Organization*, 36, 185-205.
- KUNDA, Z. 1990. The case for motivated reasoning. *Psychological Bulletin; Psychological Bulletin*, 108, 480.
- LAING, J. H., LEE, D., MOORE, S. A., WEGNER, A. & WEILER, B. 2009. Advancing conceptual understanding of partnerships between protected area agencies and the tourism industry: a postdisciplinary and multi-theoretical approach. *Journal of Sustainable Tourism*, 17, 207-229.
- LAWRENCE, T. B. & SUDDABY, R. 2006. Institutions and Institutional Work. In: CLEGG, S. R., HARDY, C., LAWRENCE, T. B. & NORD, W. R. (eds.) *Handbook of organization studies*. London: Sage Publications Ltd.
- LEE, M. 2003. Conceptualizing the New Governance: A New Institution of Social Coordination. Presented at the *Institutional Analysis and Development Mini-Conference*. Indiana University, Bloomington, Indiana, USA.
- LEWIS-BECK, M., BRYMAN, A. & LIAO, T. F. 2004. SAGE Encyclopedia of Social Science Research Methods. Thousand Oaks: SAGE Publications, Inc.
- LIN, N., - 2001. *Social capital: a theory of social structure and action* Cambridge, Cambridge University Press.
- LINDENMAYER, D. B., LIKENS, G. E., HAYWOOD, A. & MIEZIS, L. 2011. Adaptive monitoring in the real world: Proof of concept. *Trends in Ecology and Evolution*, 26, 641-646.
- LOCKWOOD, M. 2010. Good governance for terrestrial protected areas: A framework, principles and performance outcomes. *Journal of Environmental Management*, 91, 754-766.
- LOCKWOOD, M., DAVIDSON, J., CURTIS, A., STRATFORD, E. & GRIFFITH, R. 2009. Multi-level Environmental Governance: lessons from Australian natural resource management. *Australian Geographer*, 40, 169-186.
- MAIR, J. & MARTI, I. 2006. Social entrepreneurship research: A source of explanation, prediction, and delight. *Journal of World Business*, 41, 36-44.

- MARCH, J. G. & OLSEN, J. P. 1998. The Institutional Dynamics of International Political Orders. *International Organization*, 52, 943-969.
- MARCH, J. G. & OLSEN, J. P. 2006. Elaborating the "new institutionalism". In: RHODES, R. A. W., BINDER, S. A. & ROCKMAN, B. A. (eds.) *The Oxford handbook of political institutions*. Oxford: Oxford University Press.
- MARSH, D. & SMITH, M. 2000. Understanding Policy Networks: towards a Dialectical Approach. *Political studies*, 48, 4-21.
- MAY, P. J. 1992. Policy Learning and Failure. *Journal of Public Policy*, 12, 331-354.
- MCGINNIS, M. & OSTROM, E. 1996. Design principles for local and global commons. *The International political economy and International*.
- MCGINNIS, M. D. 2011a. Networks of Adjacent Action Situations in Polycentric Governance. *Policy Studies Journal*, 39, 51-78.
- MCGINNIS, M. D. 2011b. An Introduction to IAD and the Language of the Ostrom Workshop: A Simple Guide to a Complex Framework. *Policy Studies Journal*, 39, 169-183.
- MCGINNIS, M. D. & OSTROM, E. 2011. SES Framework: Initial Changes and Continuing Challenges. Bloomington, IN: Workshop in Political Theory and Policy Analysis, Department of Political Science, and School of Public and Environmental Affairs, Indiana University.
- MCKEOWN, B. & THOMAS, D. 1988. Q Methodology. Thousand Oaks, USA: SAGE Publications, Inc.
- MCLAIN, R. J. & LEE, R. G. 1996. Adaptive management: Promises and pitfalls. *Environmental Management*, 20, 437-448.
- MEIJERINK, S. & HUITEMA, D. 2010. Policy Entrepreneurs and Change Strategies: Lessons from Sixteen Case Studies of Water Transitions around the Globe. *Ecology and society*, 15, 268.
- MILES, E. L., UNDERDAL, A., ANDRESEN, S., WETTESTAD, J., SKJÆRSETH, J. B. & CARLIN, E. M. (eds.) 2002. *Environmental regime effectiveness : confronting theory with evidence*, Cambridge: MIT Press.
- MINTROM, M. & NORMAN, P. 2009. Policy Entrepreneurship and Policy Change. *Policy Studies Journal*, 37, 649-667.
- MOE, T. M. 2005. Power and Political Institutions. *Perspectives on Politics*, 3, 215-233.
- MOORE, M. L. & WESTLEY, F. 2011. Surmountable Chasms: Networks and Social Innovation for Resilient Systems. *Ecology and society*, 16, 50.
- MOORE, S. A. & RODGER, K. 2010. Wildlife tourism as a common pool resource issue: Enabling conditions for sustainability governance. *Journal of Sustainable Tourism*, 18, 831-844.
- NORTH, D. C. 1990. *Institutions, institutional change, and economic performance* Cambridge ; New York :, Cambridge University Press.
- NOWLIN, M. C. 2011. Theories of the Policy Process: State of the Research and Emerging Trends. *Policy Studies Journal*, 39, 41-60.
- OLSSON, P., FOLKE, C. & BERKES, F. 2004. Adaptive Comanagement for Building Resilience in Social-Ecological Systems. *Environmental Management*, 34, 75-90.
- OLSSON, P., GUNDERSON, L. H., CARPENTER, S. R., RYAN, P., LEBEL, L., FOLKE, C. & HOLLING, C. S. 2006. Shooting the rapids: Navigating transitions to adaptive governance of social-ecological systems. *Ecology and society*, 11.
- OSTROM, E. (ed.) 1982. *Strategies of political inquiry*, Beverly Hills, Calif: Sage Publications.
- OSTROM, E. 1990. *Governing the commons : the evolution of institutions for collective action / Elinor Ostrom*, Cambridge : New York, Cambridge University Press ;.

- OSTROM, E. 1999. Institutional Rational Choice: An Assessment of the Institutional Analysis and Development Framework. In: SABATIER, P. (ed.) *Theories of the policy process* Boulder, Colorado, USA: Westview Press.
- OSTROM, E. 2005. *Understanding institutional diversity*, Princeton, N.J., Princeton University Press.
- OSTROM, E. 2007. A diagnostic approach for going beyond panaceas. *Proceedings of the National Academy of Sciences*, 104, 15181-15187.
- OSTROM, E. 2009. A General Framework for Analyzing Sustainability of Social-Ecological Systems. *Science*, 325, 419-422.
- OSTROM, E. 2010. The challenge of self-governance in complex contemporary environments. *The Journal of speculative philosophy*, 24, 316-332.
- OSTROM, E. 2011. Background on the Institutional Analysis and Development Framework. *Policy Studies Journal*, 39, 7-27.
- OSTROM, E. & COX, M. 2010. Moving beyond panaceas: a multi-tiered diagnostic approach for social-ecological analysis. *Environmental Conservation*, 37, 451-463.
- OSTROM, E. & KISER, L. L. 1982. The three worlds of action: a metatheoretical synthesis of institutional approaches. In: OSTROM, E. (ed.) *Strategies of political inquiry*. Beverly Hills, Calif: Sage Publications.
- PAAVOLA, J. 2007. Institutions and environmental governance: A reconceptualization. *Ecological Economics*, 63, 93-103.
- PAAVOLA, J., GOULDSON, A. & KLUVÁNKOVÁ-ORAVSKÁ, T. 2009. Interplay of actors, scales, frameworks and regimes in the governance of biodiversity. *Environmental Policy and Governance*, 19, 148-158.
- PAHL-WOSTL, C. 2007. Transitions towards adaptive management of water facing climate and global change. *Water Resources Management*, 21, 49-62.
- PAHL-WOSTL, C. 2009. A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*, 19, 354-365.
- PAHL-WOSTL, C., HOLTZ, G., KASTENS, B. & KNIEPER, C. 2010. Analyzing complex water governance regimes: the Management and Transition Framework. *Environmental Science & Policy*, 13, 571-581.
- PELLING, M., HIGH, C., DEARING, J. & SMITH, D. 2008. Shadow spaces for social learning: a relational understanding of adaptive capacity to climate change within organisations. *Environment and Planning A*, 40, 867-884.
- PORTES, A. 1998. Social Capital: Its Origins and Applications in Modern Sociology. *Annual Review of Sociology*, 24, 1-24.
- POTEETE, A. R., JANSSEN, M. & OSTROM, E. 2010. *Working together: collective action, the commons, and multiple methods in practice*, Princeton, N.J. :, Princeton University Press.
- POWELL, W. W. & DIMAGGIO, P. J. 1991. *The new institutionalism in organizational analysis*, University of Chicago Press.
- PRONIN, E., PUCCIO, C. & ROSS, L. 2002. Understanding misunderstanding: Social and psychological perspectives. In: GILOVICH, T., KAHNEMAN, D. & GRIFFIN, D. W. (eds.) *Heuristics and biases : the psychology of intuitive judgment* Cambridge: Cambridge University Press.
- PUTNAM, R. D. 1995. Bowling Alone: America's Declining Social Capital. *Journal of democracy*, 6, 65-78
- RESILIENCE ALLIANCE 2010. Assessing resilience in Social-Ecological Systems: Workbook for practitioners. Revised Version 2.0. Resilience Alliance.

- RESILIENCE ALLIANCE 2007. Assessing resilience in social-ecological systems: A workbook for scientists. Version 1.1. Draft for testing and evaluation. June 2007. Version 1.1 ed.: Resilience Alliance.
- RHODES, R. A. W. 1996. The new governance: governing without government¹. *Political studies*, 44, 652-667.
- RHODES, R. A. W. 1997. *Understanding governance: policy networks, governance, reflexivity, and accountability*, Buckingham, Open University Press.
- RHODES, R. A. W. 2006. Policy network analysis. In: MORAN, M., REIN, M. & GOODIN, R. E. (eds.) *The Oxford handbook of public policy*. New York: Oxford University Press.
- RHODES, R. A. W. 2007. Understanding Governance: Ten Years On. *Organization Studies*, 28, 1243-1264.
- RITTEL, H. W. J. & WEBBER, M. M. 1973. Dilemmas in a general theory of planning. *Policy Sciences*, 4, 155-169.
- RITVALA, T. & SALMI, A. 2010. Value-based network mobilization: A case study of modern environmental networkers. *Industrial Marketing Management*, 39, 898-907.
- RITZER, G. (ed.) 2005. *Encyclopedia of social theory*, Thousand Oaks, CA: Sage Publications.
- ROBARDS, M. D. & LOVECRAFT, A. L. 2010. Evaluating Comanagement for Social-Ecological Fit: Indigenous Priorities and Agency Mandates for Pacific Walrus. *Policy Studies Journal*, 38, 257-279.
- ROGERS, P. J. 2007. Theory-based evaluation: Reflections ten years on. *New Directions for Evaluation*, 2007, 63-67.
- ROSS, H., BUCHY, M. & PROCTOR, W. 2002. Laying down the ladder: a typology of public participation in Australian natural resource management. *Australian Journal of Environmental Management*, 9, 205-217.
- RYDIN, Y. & HOLMAN, N. 2004. Re-evaluating the Contribution of Social Capital in Achieving Sustainable Development. *Local Environment*, 9, 117-133.
- SABATIER, P. A. 1988. An Advocacy Coalition Framework of Policy Change and the Role of Policy-Oriented Learning Therein. *Policy Sciences*, 21, 129-168.
- SABATIER, P. A. & JENKINS-SMITH, H. C. (eds.) 1993. *Policy Change and Learning: An Advocacy Coalition Approach*, Boulder: Westview Press.
- SABATIER, P. A. & JENKINS-SMITH, H. C. 1999. The advocacy coalition framework: An assessment. In: SABATIER, P. A. (ed.) *Theories of the policy process*. Boulder: Westview Press.
- SCHLAGER, E. 1999. A comparison of frameworks, theories, models and policy processes. In: SABATIER, P. A. (ed.) *Theories of the policy process*. Boulder, Colo.: Westview Press.
- SCHMIDT, V. A. 2010. Taking ideas and discourse seriously: explaining change through discursive institutionalism as the fourth 'new institutionalism'. *European Political Science Review* 2, 1-25.
- SCHMIDT, V. A. 2011. Speaking of Change: Why discourse is key to the dynamics of policy transformation. *Critical Policy Studies*, 5, 106-126.
- SCHOON, M. L. 2008. *Building robustness to disturbance: Governance in southern African peace parks*. Doctor of Philosophy PhD, Indiana University.
- SCHWEBER, H. H. 2011. *Democracy and Authenticity : Toward a Theory of Public Justification*. Cambridge: Cambridge University Press.
- SCOTT, W. R. 2001. *Institutions and organizations*, Thousand Oaks, CA, Sage Publications, Inc.
- SENDZIMIR, J., MAGNUSZEWSKI, P., FLACHNER, Z., BALOGH, P., MOLNAR, G., SARVARI, A. & NAGY, Z. 2008. Assessing the resilience of a river management regime: Informal learning in a shadow network in the Tisza River Basin. *Ecology and society*, 13.

- SEWELL JR, W. H. 1992. A theory of structure: Duality, agency, and transformation. *American journal of sociology*, 1-29.
- SHANAHAN, E. A., JONES, M. D. & MCBETH, M. K. 2011. Policy Narratives and Policy Processes. *Policy Studies Journal*, 39, 535-561.
- SIDDIKI, S., WEIBLE, C. M., BASURTO, X. & CALANNI, J. 2011. Dissecting Policy Designs: An Application of the Institutional Grammar Tool. *Policy Studies Journal*, 39, 79-103.
- SIDDIKI, S. N. 2011. *Rules and decision making: Understanding the factors that shape regulatory compliance*. Ph.D. 3492277, University of Colorado at Denver.
- SIKOR, T. (ed.) 2008. *Public and Private in Natural Resource Governance. A False Dichotomy?*, London, UK: Earthscan.
- SIKOR, T., BARLOSIUS, E. & SCHEUMANN, W. 2008. Introduction: Public-private relations and key policy issues in natural resource governance. In: SIKOR, T. (ed.) *Public and Private in Natural Resource Governance. A False Dichotomy?* London, UK: Earthscan.
- SIMON, H. A. 1972. Theories of bounded rationality. *Decision and organization*, 1, 161-176.
- SNIDERMAN, P. M. & LEVENDUSKY, M. S. 2007. An institutional theory of political choice. In: DALTON, R. J. & KLINGEMANN, H.-D. (eds.) *The Oxford handbook of political behavior* Oxford: Oxford University Press.
- STEINBERG, P. F. 2009. Institutional resilience amid political change: The case of biodiversity conservation. *Global Environmental Politics*, 9, 61-81.
- STEPHENSON, W. 1953. *The study of behavior: Q-technique and its methodology*, Chicago, University of Chicago Press.
- STONEHAM, G., CROWE, M., PLATT, S., CHAUDHRI, V., SOLIGO, J. & STRAPPAZZON, L. 2000. Mechanisms for biodiversity conservation on private land. *Department of Natural Resources and Environment Victoria, ISBN 0, 7311, 0*.
- SWIDERSKA, K., ROE, D., SIEGELE, L. & GRIEG-GRAN, M. 2008. The governance of nature and the nature of governance: Policy that works for biodiversity and livelihoods. International Institute for Environment and Development (IIED)
- TERMEER, C. J. A. M., ART, D. & MAARTJE VAN, L. 2010. Disentangling Scale Approaches in Governance Research: Comparing Monocentric, Multilevel, and Adaptive Governance. *Ecology and society*, 15, 296.
- THEESFELD, I. 2008. Devolution in Bulgaria's Irrigation System: Contesting the Public. In: SIKOR, T. (ed.) *Public and Private in Natural Resource Governance. A False Dichotomy?* London, UK: Earthscan.
- TVERSKY, A. & KAHNEMAN, D. 1986. Rational Choice and the Framing of Decisions. *The Journal of Business*, 59, S251-S278.
- UNDERDAL, A. 2002. One question, two answers. In: MILES, E. L., UNDERDAL, A., ANDRESEN, S., WETTESTAD, J., SKJÆRSETH, J. B. & CARLIN, E. M. (eds.) *Environmental regime effectiveness : confronting theory with evidence*. Cambridge: MIT Press.
- VEDUNG, E. 2003. Policy Instruments: Typologies and Theories. In: BEMELMANS-VIDEC, M. L., RIST, R. C. & VEDUNG, E. (eds.) *Carrots, sticks, and sermons: Policy instruments and their evaluation*. New Brunswick, NJ: Transaction Publishers.
- WADE, R. 1988. *Village republics: economic conditions for collective action in South India* Cambridge, Cambridge University Press.
- WALKER, B., GUNDERSON, L., KINZIG, A., FOLKE, C., CARPENTER, S. & SCHULTZ, L. 2006. A handful of heuristics and some propositions for understanding resilience in social-ecological systems. *Ecology and society*, 11.
- WALKER, B., HOLLING, C. S., CARPENTER, S. R. & KINZIG, A. 2004. Resilience, adaptability, transformability in social-ecological systems. *Ecology and Society*, 9, [online].

- WALKER, B. & SALT, D. 2006. *Resilience thinking: Sustaining ecosystems and people in a changing world*, Washington, DC, Island Press.
- WALTERS, C. J. & HOLLING, C. S. 1990. Large-Scale Management Experiments and Learning by Doing. *Ecology*, 71, 2060-2068.
- WEBER, R. 2004. The rhetoric of positivism versus interpretivism: a personal view. *Mis Quarterly*, 28, iii-xii.
- WEIBLE, C., HEIKKILA, T., DELEON, P. & SABATIER, P. A. 2012. Understanding and influencing the policy process. *Policy Sciences*, 45, 1-21.
- WEIBLE, C. M., SABATIER, P. A., JENKINS-SMITH, H. C., NOHRSTEDT, D., HENRY, A. D. & DELEON, P. 2011. A Quarter Century of the Advocacy Coalition Framework: An Introduction to the Special Issue. *Policy Studies Journal*, 39, 349-360.
- WEIMER, D. L. 1998. Policy analysis and evidence: A craft perspective. *Policy Studies Journal*, 26, 114-128.
- WEISS, C. H. 1997. Theory-based evaluation: Past, present, and future. *New Directions for Evaluation*, 1997, 41-55.
- WESTLEY, F. & ANTADZE, N. 2010. Making a difference: Strategies for scaling social innovation for greater impact. *Innovation Journal*, 15, 1-19.
- WESTLEY, F., OLSSON, P., FOLKE, C., HOMER-DIXON, T., VREDENBURG, H., LOORBACH, D., THOMPSON, J., NILSSON, M., LAMBIN, E., SENDZIMIR, J., BANERJEE, B., GALAZ, V. & VAN DER LEEUW, S. 2011. Tipping toward sustainability: Emerging pathways of transformation. *Ambio*, 40, 762-780.
- WESTLEY, F., PATTON, M. Q. & ZIMMERMAN, B. 2006. *Getting to maybe: How the world is changed*, Toronto, Vintage Canada.
- WIJEN, F. & ANSARI, S. 2007. Overcoming Inaction through Collective Institutional Entrepreneurship: Insights from Regime Theory. *Organization Studies*, 28, 1079-1100.
- WILLIS, J. W. 2007. Foundations of qualitative research: Interpretive and critical approaches. Thousand Oaks, USA: Sage Publications, Inc.
- WINKEL, G., GLEISSNE, J., PISTORIUS, T., SOTIROV, M. & STORCH, S. 2011. The sustainably managed forest heats up: discursive struggles over forest management and climate change in Germany. *Critical Policy Studies*, 5, 361-390.
- WOOLCOCK, M. 2001. The place of social capital in understanding social and economic outcomes. *Canadian Journal of Policy Research*, 2.
- WORLD BANK. 1999. *What is social capital?* [Online]. Washington, DC: World Bank. Available: <http://go.worldbank.org/K4LUMW43B0> [Accessed 4 June 2012].
- YANOW, D. 2003. Accessing local knowledge. In: HAJER, M. A. & WAGENAAR, H. (eds.) *Deliberative policy analysis : understanding governance in the network society*. Cambridge, UK: Cambridge University Press.
- YIN, R. K. 2009. *Case study research: Design and methods*, Thousand Oaks, CA, Sage publications, Inc.
- YIN, R. K. 2011. *Applications of case study research*, Sage Publications, Inc.
- YOUNG, O. 2002a. *The Institutional Dimensions of Environmental Change: Fit, Interplay and Scale*, Cambridge, MIT Press.
- YOUNG, O. 2008. Building regimes for socioecological systems: Institutional diagnostics. In: YOUNG, O. R., KING, L. A. & SCHROEDER, H. (eds.) *Institutions and environmental change : principal findings, applications, and research frontiers*. Cambridge, Mass.: MIT Press.
- YOUNG, O. R. 2002b. Evaluating the success of international environmental regimes: where are we now? *Global Environmental Change*, 12, 73-77.

- YOUNG, O. R. 2010. Institutional dynamics: Resilience, vulnerability and adaptation in environmental and resource regimes. *Global Environmental Change*, 20, 378-385.
- YOUNG, O. R., KING, L. A. & SCHROEDER, H. (eds.) 2008. *Institutions and environmental change : principal findings, applications, and research frontiers*, Cambridge, Mass.: MIT Press.
- YOUNG, O. R., LAMBIN, E. F., ALCOCK, F., HABERL, H., KARLSSON, S. I., MCCONNELL, W. J., MYINT, T., PAHL-WOSTL, C., POLSKY, C., RAMAKRISHNAN, P. S., SCHROEDER, H., SCOUVART, M. & VERBURG, P. H. 2006. A portfolio approach to analyzing complex human-environment interactions: Institutions and land change. *Ecology and society*, 11.
- ZBICZ, D. C. 2003. Imposing Transboundary Conservation. *Journal of Sustainable Forestry*, 17, 21-37.