Chapter 1

Natural Resource and Environmental Policy

Considerable effort is being directed to reversing the decline in the condition of our land, water and biodiversity assets in rural landscapes. Despite this, we are continuing to lose native vegetation, see reductions in the viability of threatened species and communities of native flora and fauna, increasing salinity, and degradation of our land and water resources. (The State of Victoria 2003:1)

Under current resourcing and management paradigms our efforts to protect and sustainably manage natural capital are not keeping pace with the breadth of degradation symptoms depreciating the natural capital base. (Victorian Catchment Management Council 2002:vi)

In the long run it is clear that Victoria's natural resource base will significantly degrade if we continue to impart the same management paradigm across the landscape. It is cheaper to adjust and manage our natural resources properly rather than pay the exorbitant repair bill we are accumulating. (Victorian Catchment Management Council 2002:110)

Introduction

The above observations, expressed with respect to the Australian State of Victoria, reflect national and global concern that environmental degradation continues to outstrip the capacity of current management paradigms to deal with it (Dryzek 1987a; Johnson 1994; Holling & Meffe 1996; Elliot 1998; Glantz 1998; Gibson 1999; Kellert, Mehta, Ebbin & Lichenfeld 2000; Ludwig 2001; Berkes 2004). Environmental degradation, like poverty and discrimination, is one of the issues of greatest concern to humanity. These sorts of issues have become widely known as 'wicked' or 'messy' because they are so multifaceted and have such long term and serious consequences that they can be overwhelming, everything is connected to everything else and the more we learn about them the more we realise how much we don't know (Rittel & Webber 1973; Lissack 1999; Ludwig 2001).

Ackoff (1979) argues that this is because wicked issues involve a complex system of changing problems that interact with each other. This means that cause-effect relationships can be circular, dynamic and difficult to identify and individual problems can be seen as a symptom of many interrelated problems. It follows that for wicked or messy issues, the solutions to individual problems will depend on the solutions to related problems. This implies that it will not be possible to address such issues by extracting individual problems from the larger issue and attempting to solve them as if they were independent. Rather, successfully addressing such issues is likely to be contingent upon understanding and accounting for the dynamics involved. Hence, in their statement on the World Summit on Sustainable Development the G-8 environment ministers argue that:

> In order to reverse environmental degradation, we must attain
> more sustainable patterns of consumption and production,
> alleviate poverty, further improve domestic and international
> institutions, resolve conflict and curtail pollution. To secure global

Natural resource and environmental policy in social democracies is about managing
wicked or messy issues (or how to repeatedly resolve them) (Rittel & Webber 1973;
Ludwig 2001). A major challenge that governments and their agencies face in this task is
that there are multiple and often competing perspectives in the community on the nature
of these issues and appropriate ways of addressing them. When there is a lack of
consensus on these fundamentals, there is an expectation that, in defining the issue,
setting policy goals and formulating and implementing policies, governments will ensure
that multiple and competing perspectives will be balanced in the interests of the
community as a whole.

At the same time, there is increasing recognition that, while governments may have the
authority to set natural resource and environmental policy goals, they are expected to
realise such goals in an environment of limited control. For instance, public sector
reforms over the last two decades (particularly those associated with New Public
Management (Lynn Jr. 1998; Lane 2000)) have sought to increase the efficiency and
accountability of government agencies by: creating competitive markets for public
services; promoting the adoption of private sector management practices; corporatising
and privatising government services; instituting purchaser-provider arrangements among
government agencies; separating policy formulation from policy implementation; and
requiring that government agencies demonstrate their contribution to public value by way
of measurable results (Boston 1989; Weller & Lewis 1989; Quiggin 1996; Hood 1997;
Fenna 1998; Hughes 1998; Lynn Jr. 1998; Howden & Gooey 2005). These reforms had a
dramatic impact on the nature of public organisations and what is expected of them, as
Davis observes:

> A department is no longer an administrative unit, created to serve
> ministers and implement their choices. It is now a flexible

portfolio centre, with its own culture, working to a mission articulated in a strategic plan. Such idiom does not just change the letterhead. It carries assumptions about the overriding importance of efficiency, rules about acceptable organisational design, precepts for personal practice and doubts about the utility of expensive public service checks and balances. Corporate management is built not just on the fine phrases, but on the implied values of the private sector. (Davis 1988:171)

Public sector reforms have promoted the adoption of private sector values and management practices in the public policy process not only through restructuring public agencies and the interrelationships among them, but also through outsourcing public services to private organisations. The net result is that achieving natural resource and environmental policy goals is increasingly contingent upon the degree to which it is possible to co-ordinate the activities of multiple and diverse public and private organisations.

Organisational Management

The degree to which it is possible to co-ordinate and control the activities of the multiple organisations engaged in policy formulation and implementation in line with natural resource and environmental policy goals is constrained by a number of organisational management problems. These problems relate to how natural resource and environmental goals are interpreted, the potential for conflicts of interest and the capacity of the organisations involved to contribute to advancing policy goals. These problems are amenable to varying degrees of management control and emerge at organisational, intra-organisational and inter- organisational levels.

At an organisational level, if a high degree of coincidence does not exist between the interests of the organisation and what is required to advance natural resource and environmental policy goals then individual organisations will have a greater incentive to pursue the former over the latter. Research suggests that this may be a significant problem with respect to the New Public Management reforms. Particularly, research on these reforms in New Zealand has found that, while they have increased the efficiency with which government agencies produce short term measurable results (or outputs), this has been at the expense of their capacity to contribute to longer term policy goals (or outcomes) (Gregory 2000; Kibblewhite 2000).

At an intra-organisational level, the degree to which the activities of an organisation can be co-ordinated and controlled in line with natural resource and environmental policy goals will be constrained by a number of interrelated factors (Kast & Rosenzweig 1973; Burrel & Morgan 1979; Mullins 1993; Stacey 1996; Cooksey 2000). Such factors would include psychosocial factors such as: the needs and aspirations of individual employees and groups of employees; organisational culture; role hierarchies; and group dynamics. Such factors would also include technological factors such as: technological knowledge; techniques; equipment; processes; and facilities.

Additionally, the degree to which the activities of an organisation are co-ordinated and controlled in line with natural resource and environmental policy goals will be constrained by the internal structure of the organisation, incorporating things such as: the organisational design; job descriptions; organisational rules; standard operating procedures; patterns of communication; and patterns of authority. Psychosocial, technological and structural factors, in turn, will be influenced by factors in the environment external to the organisation such as competitive pressures, economic conditions, expectations of the broader community, the availability of inputs to the organisation's production process, legal requirements, political forces, changes in technology, climatic changes and the external affiliations of employees.

At an inter- organisational level, the degree to which the separate activities of multiple organisations are co-ordinated and controlled, in line with natural resource and environmental policy goals, will be constrained if collaboration among organisations is required to achieve policy goals and the incentives to collaborate are outweighed by disincentives such as competition among organisations, conflicts in organisational culture, mismatches in technology, and inadequate communication networks. Among government agencies alone there is significant competition for budgetary resources, policy territory and political recognition; there are also substantive differences in culture and ways of going about things, all of which can act as disincentives to collaborate (Bardach 1977; Elmore 1978; Howlett & Ramesh 1995; Bardach 2003).

The greater the diversity and number of organisations, the more difficult it will be to identify the interrelationships among incentives and disincentives to collaborate and to anticipate their implications for co-ordinating and controlling activities in line with policy goals (Bridgman & Davis 1998). The tendency for organisational participants to continually negotiate and renegotiate among themselves and develop competitive and collaborative strategies accordingly further reduces the degree to which it will be possible to anticipate and control the activities of participants in line with policy goals (Kickert, Klijn & Koppenjan 1997; Salamon 2002).

Stakeholder Management

Realising natural resource and environmental policy goals is also contingent upon the capacity of governments and their agencies to effectively engage stakeholders in the process of policy formulation and implementation. Stakeholders include representatives from the community with an interest in a particular policy issue. They also include non-government organisations, industry groups and people who will be directly affected by policy proposals.

Stakeholder participation is critical to realising policy goals for a number of reasons. It provides an opportunity for stakeholders to bring their knowledge of their particular social, economic and biophysical reality to bear on the process of policy formulation and implementation. Stakeholder participation also provides an opportunity to enhance community ownership and responsibility for realising policy goals. Moreover, it is a mechanism for achieving the degree of community consensus and support required to ensure that community action is consistent with natural resource and environmental policy goals. Wildavsky illustrates this logic with reference to agricultural policy:

> In agriculture, for example, knowledge of the elements of the
> policy itself - the technology of production, the mechanisms of
> distribution, the availability of markets - must be right for the
> policy to work. If the farmers will not plant the crops called for or
> if the prices do not bring them sufficient remuneration, they will
> sabotage the policy, either overtly or through passive resistance.
> If there is insufficient money for seeds or fertilizer or if the farmer
> lacks the education or the motivation to employ the necessary
> techniques, the policy will fail. (Wildavsky 1973:131)

Hence, while stakeholder participation processes are likely to increase the costs of policy formulation and implementation in the short term, a major motivation for the government to invest adequate resources in such processes is that they reduce the risk of policy failure or backlash in the longer term.

Another key motivation for stakeholder participation processes, from the perspective of governments, is that such processes provide an opportunity for governments and their agencies to exert control over the way in which stakeholders engage in policy formulation and implementation. In other words, it provides an opportunity for governments and their agencies to set some rules of engagement. A continuing problem for governments in this regard is that there are a range of incentives and disincentives for stakeholders to abide by such rules of engagement, and when the disincentives outweigh

the incentives stakeholders are likely to seek out ways of circumventing or changing the rules, for example through protest action, involving the media in issues, or by direct representations to the minister (Halpin 2002; Mobbs 2003).

Experience suggests that stakeholders are more likely to abide by the rules of engagement set by governments and their agencies when such rules allow them to have a real influence on policy decisions (Sarkissian, Perlgut & Ballard 1986; Doyle & Kellow 1995; Orchard, Ross & Young 2003). Moreover, even when stakeholders abide by the rules of engagement the positions they pursue on particular issues are likely to evolve as a result of their interactions with each other (Becker & McCall 1990; Warner 2001; Colebatch & Dawkins 2002; Halpin 2002; Horn 2002). The net result is that, whether or not stakeholders abide by the rules of engagement set by governments and their agencies, stakeholder participation processes are likely to influence policy formulation and implementation in ways that cannot be fully anticipated in advance. As a consequence, the implications of stakeholder engagement for the realisation of policy goals will tend to emerge only as particular participation processes unfold.

Ecosystem Management

Natural resource and environmental policy is about managing the interactions between human activities and complex ecological systems. Managing such interactions is necessarily based on incomplete and uncertain scientific knowledge about the structure and dynamics of ecological systems at different spatial and temporal scales (Clayton & Radcliffe 1996; Holling & Meffe 1996; Gunderson, Holling, Pritchard & Peterson 2002; Walker, Carpenter, Anderies, Abel, Cumming, Janssen, Lebel, Norberg, Peterson & Pritchard 2002; Allison & Hobbs 2004). This means that, while it may be possible to predict and observe the short term consequences of particular management interventions, under certain circumstances management interventions may have cascading effects on the

functioning of ecosystems at different spatial and temporal scales that can not be anticipated in advance.

Examples of such cascading effects include the large scale destruction of native vegetation and subsequent soil erosion following the introduction of rabbits into Australia in the nineteenth century (Rolls 1969, 1994). By the time such cascading effects become apparent, irreversible changes may have occurred in the functioning of the ecological systems involved. Under other circumstances the functioning of natural ecosystem can be highly resistant to management efforts to induce change. An example that contrasts with the introduction of rabbits into Australia would be the concerted efforts to establish other exotic animals into Australia that were unsuccessful. Thus Rolls observes that in the 1860s:

> Australia sent magpies to England, England sent nightingales to Australia. And they sent starlings, sparrows, blackbirds, more hares and deer, trout, skylarks, creatures that thrived and did not thrive, the harmless and the harmful. Every ship's cook had a menagerie in his galley. (Rolls 1994:29)

While irreversible changes in the functioning of ecological systems may come about as a result of human activities, they can also come about as a result of 'natural' dynamics (Clayton & Radcliffe 1996). Thus, there have been major climatic shifts over the earth's history as a result of natural processes in the evolution of the earth's atmosphere. Similarly, it is reasonable to expect that particular species will appear and disappear as a result of naturally occurring evolutionary processes. A major problem for formulating and implementing natural resource and environmental policy is that these dynamics interact with each other, so that it is not possible to anticipate and isolate the effects of management interventions on ecosystem functioning from the effects of natural processes. Nor is it often possible to anticipate the effects of multiple and interacting management interventions on the functioning of natural ecosystems.

Scientific uncertainty about the structure and functioning of ecosystems has a number of implications for the pursuit and realisation of natural resource and environmental policy goals. One is that it can be difficult to specify and justify such policy goals when there is a high degree of scientific uncertainty about the current state of ecological systems and the prognoses for the future. This provides a basis for alternative framings of the problem and divergence of opinion as to whether there is a problem at all. Scientific uncertainty can then become a key element in political debates about appropriate government priorities. This is exemplified by Frank Luntz's political strategy for dealing with global warming:

> The scientific debate remains open. Voters believe that there is
> no consensus about global warming within the scientific
> community. Should the public come to believe that the scientific
> issues are settled, their views about global warming will change
> accordingly. Therefore you need to continue to make the lack of
> scientific certainty the primary issue in the debate. (Frank Luntz,
> political strategist 2002, quoted in Houck (2003:1926))

Another implication of scientific uncertainty is that it makes it difficult for government agencies and service providers to identify, monitor and demonstrate progress towards the realisation of longer term policy goals. One of the ways in which government agencies have responded to this challenge is to develop short-term indicators of progress towards longer-term goals. While this may improve the capacity of government agencies to meet accountability requirements it does not alleviate the fundamental uncertainties associated with managing complex ecosystems. Moreover, it tends to reinforce single-loop learning responses whereby failures to meet short-term targets are responded to by intensifying efforts to make current solutions work better; rather than standing back and questioning the key assumptions, variables and goals associated with current solutions. The latter type of response would involve double-loop learning, a process aimed at enhancing organisational learning (Argyris 1990; Argyris & Schon 1996). Whereas single-loop

learning tends to call for quantitative change or change by degree, double-loop learning tends to call for qualitative change, or change in kind (Downs, Durant & Carr 2003).

Adaptive and Integrated Management

There is increasing recognition of the interrelatedness of natural resource and environmental problems and the high degree of uncertainty associated with attempts to manage them. This recognition is reflected in an increasing body of literature on adaptive management and integrated management in natural resource and environmental policy. While the emphasis in adaptive management is on recognising uncertainty and ensuring that policy processes are sufficiently flexible to allow them to evolve over time in light of evolving knowledge and changing circumstances, the emphasis in integrated management is on accounting for the interrelationships that exist among different natural resource and environmental problems.

Adaptive management is a 'learning by doing' framework which combines ecological and participatory principles (Gunderson, Holling & Light 1995; Dovers & Mobbs 1997; Allen, Bosch, Gibson & Jopp 1998; Dovers 2003a). This approach to management views policy formulation and implementation as iterative and systematic learning processes and management interventions as purposeful experiments. The five core principles of adaptive management are that:

1) policy and management processes should be purposeful, driven by widely supported goals and objectives;

2) persistent support of policy and management processes is required to allow results to emerge that can inform learning and adaptation;

3) policy and management experiments and the environment should be closely monitored and the information elicited should be intensively used and widely shared in the interests of learning and wide ownership of information;

4) policy and management processes should be inclusive, ensuring the participation of those involved and affected; and

5) policy and management processes should be flexible, allowing for change in light of learning experiences (Dovers 2003a).

These principles establish conditions for building capacity to change and for identifying when there is a need for change. Thus adaptive management can be seen as a way of contributing to the effective pursuit of policy goals in a changing environment (McGuire 1989; Mullins 1993; Simons 1995; Robbins, Bergman, Stagg & Coulter 2003).

The principles of adaptive management are general and were not conceived to be universally applicable (Dovers & Mobbs 1997; Dovers 2003a). This recognises that some principles may be more relevant in some contexts than others and that in any given context there are likely to be interactions and tensions among them. Although these principles are widely accepted as desirable properties of policy processes and institutional arrangements, they are often not met in practice or the extent to which they are met is highly variable (McLain & Lee 1996; Walker et al. 2002; Dovers 2003b). This raises questions as to the conditions under which adaptability is appropriate, the principles that are relevant in particular contexts, managing interactions among principles and creating appropriate conditions when the principles are not already met.

Integrated management emphasises the interrelationships that exist among different natural resource and environmental problems on the basis that better outcomes will be achieved through holistic perspectives on such problems than through perspectives that address individual problems in isolation. In practice, the focus of integrated management in natural resource and environmental policy is on achieving and maintaining co-ordinated and coherent action across different natural resource and environmental sectors and within particular sectors (Colebatch 1998; Carter 2001). This is a necessary condition for making the most of the benefits and minimising the costs associated with the multiple and diverse contributions of participants engaged in the policy process over time.

Thus integrated management can be seen as a way of contributing to the efficient pursuit of given policy goals over time, so that 'Each member of the enterprise contributes something different, but all must contribute towards a common goal. Their efforts must all pull in the same direction, and their contributions must fit together to produce a whole - without gaps, without friction, without unnecessary duplication of effort' (Drucker 1979:336). In the context of natural resource management, Bammer and the participants of the Land and Water Australian Integration Symposium add that:

> Innovation benefits from pluralism, competition and conflict. Smothering these is not an aim of integration. Instead, integration aims to maximise the benefits and minimise the costs of these forces. Integration practice and research requires negotiation of numerous paradoxes and complexities. These include the requirement to act under time pressure and with incomplete information, the ability to deal effectively with political exigencies, the skill to sensitively handle power and cultural differences, the ability to develop on-going relationships in environments of rapid staff turnover, the capacity to compensate for loss of corporate memory, as well as to effectively distil masses of complex information, the ability to integrate at small and large scales, and the balancing of logical analysis and discursive interpretation. (Bammer & Land and Water Australia Integration Symposium Participants 2005:6)

The description of integration referred to in this quote highlights the multiple dimensions on which integration can be based. This is similarly reflected in the vast and diverse literature on integration in natural resource and environmental management. So, for instance, integration can be based on integrating multiple:

- goals (Hobbs & Saunders 1993; Lahdelma, Salminen & Hokkanen 2000; Vanclay 2004; Phillips & Lowe 2005);

- values (Inglehart 1993; Stern & Dietz 1994; Doyle & Kellow 1995; Dryzek 1997; Coffey & Major 2005; Lockwood 2005);

- legislative frameworks (Gardner 1999; Productivity Commission 1999; Howlett 2000; Huennemeyer & Rollins 2001; Potoski & Prakash 2004);

- stakeholders (Marsh 2000; Nocon 2004; Lockwood 2005);

- government agencies and service providers (Kickert, Klijn & Koppenjan 1997; Bressers & O'Toole 1998; Abrahams 2005; Howden & Gooey 2005);

- scales (Productivity Commission 1999; Shiva & Bedi 2002; Norton & Ulanowicz 2003; Abrahams 2005; Park & Alexander 2005);

- sources of knowledge (Bowen 1985; Keller 1990; Christensen 1991; Olson 1992; Wolfenden 1999; Bellamy, Ross, Ewing & Meppem 2002; Whitford, Barber, Breedlove & Wolt 2002; Brown 2004);

- social institutions (Young 1982; Dryzek 1996; Dovers 2003a; Hertin & Berkhout 2003); and

- policy tools (Kohn 1994; Young & Gunningham 1997; Sterner 2002; Chaudhri 2003).

These dimensions are interrelated and operate at various levels of management. Moreover, the more dimensions one seeks to integrate the more complex the management task is likely to be. It is understandable, then, that although integrated management, like adaptive management, is widely accepted as a desirable thing to aim for, in practice, it has been applied to varying degrees and in a variety of ways with different degrees of success (Productivity Commission 1999; Scrase & Sheate 2002; Hertin & Berkhout 2003; Jänicke 2003; Productivity Commission 2003; Coffey & Major 2005). This raises questions as to the conditions under which integration is appropriate, the dimensions upon which to integrate in particular circumstances and managing interrelationships among dimensions.

A review of the literature on integrated and adaptive management also suggests that they have evolved as two separate management paradigms in the realm of natural resource and environmental policy. This raises questions as the degree of adaptability and integration

that is desirable in policy processes, their relative roles and the tensions between them. For instance, management research suggests that organisational design characteristics conducive to integration (such as hierarchical structures of control and tightly defined role definitions) constrain adaptability (Katz & Kahn 1966; Kast & Rosenzweig 1973; Mintzberg & Waters 1985; Stacey 1990; Robbins et al. 2003). Management research also suggests that once a particular organisational design has been established it can be highly resistant to change (Henderson & Clark 1990; Robbins et al. 2003). This implies that, in any given policy process, there will be tensions between the degree to which it will be desirable or possible to achieve integration and adaptability over time.

The Knowledge Gap

These questions raised above suggest that neither adaptive management nor integrated management provide a sufficient basis for understanding the system of interacting problems that governments face in their attempts to co-ordinate the activities of multiple and diverse organisations in pursuit of natural resource and environmental policy goals. This means that there is a substantive gap in knowledge about how problems associated with integration and problems associated with adaptability might interact with each other, as well as with other sorts of problems in natural resource and environmental policy systems. It follows that there is also a gap in knowledge of the implications of such interactions for the pursuit of policy goals. These gaps in knowledge were the focus of this study.

A comprehensive and cohesive understanding of the relevant system of interacting problems would improve the capacity of governments to identify which problems are detracting from, or contributing to, their capacity to realise policy goals and the relationships among them. In any given context, such problems may well include the degree to which policy and management processes are adaptive and integrative. Having identified the strategically relevant problems and interrelationships the potential then

exists for governments to better harness the capabilities of the various organisations involved in policy formulation and implementation in the pursuit of natural resource and environmental policy goals.

The aim in this study was to develop and explore the value of an analytical approach for: 1. identifying the system of problems relevant to the pursuit of policy goals in a particular natural resource and environmental policy context; 2. identifying the interactions among them; and 3. identifying which problems and interactions would be critically important to address in the pursuit of policy goals. The policy context chosen for the study was the conservation of native vegetation in Victoria.

Research Process

This study began as an investigation of the role of social values in the processes of policy formulation and implementation. My interest in this area developed as a result of my involvement in a previous study which suggested that there were substantive relationships among the social values held by people involved in managing native vegetation in rural landscapes, their landscape preferences and their views on the role of government and other institutions in managing native vegetation (Sandall, Kaine & Cooksey 2001). Thus, the initial focus on social values was motivated by the idea that, if conflicts in social values could be addressed and shared social values could be built upon, this would improve the capacity of policy processes to promote the conservation of native vegetation in rural landscapes.

However, ongoing engagement with people involved in the processes of formulating and implementing native vegetation policy revealed the wicked or messy nature of such processes. Specifically, it became apparent that the social values problem was only one problem in a complex system of interacting problems that influence the capacity of such processes to realise policy goals. Moreover, it became apparent that, at any given time,

the impact of social values on the capacity of policy processes to realise policy goals may well be overridden or mediated by a host of other problems and interactions. These insights motivated a shift in the focus of the study from the role of social values in policy processes to the system of interacting problems that influence the capacity of policy processes to realise native vegetation policy goals.

Complexity theory did not require simplifying assumptions to be made about the relevance or otherwise of particular policy problems a priori. This theory takes the perspective that, as far as possible, a detailed understanding of the complexities involved should be built up before simplifying (Cooksey 2001). At the same time, Complexity Theory recognises that complete understanding of any complex system is not possible. This points to the existence of multiple perspectives on any given process under study so that a particular research design will reflect only one pathway among many possible pathways to understanding. It also points to the need for an adaptive research design which facilitates multiple perspectives on the process under study (Norgaard 1985; Flood & Romm 1996; Wicklund 1999; Stake 2000).

In keeping with Complexity Theory, the interpretive research design adopted for the study was strongly grounded in the individual perspectives of participants in the policy process. The individual perspectives of participants were elicited through relatively unstructured interviews throughout the study. Earlier in the study, knowledge elicited from participants informed the selection of a policy initiative around which to focus the study, the selection of a case study region and the selection of people to interview later in the study. Later in the study 59 in-depth interviews were conducted with people in a range of roles throughout the policy process. The aim in these interviews was to elicit the system of problems of concern to each participant given their role in the policy process. Causal maps were constructed to represent the causal logic underpinning the problems and interactions that the participants had discussed.

An in-depth interpretive analysis was then conducted for ten of these causal maps. The causal maps included in this analysis were selected purposively. Specifically, they were

selected to provide coverage of the roles that emerged from participants' discussions as the core organisational roles in formulating and implementing the policy under study. The aims in the interpretive analysis were as follows. The first was to identify which problems represented critical leverage points in the policy system. These were points where management intervention could flow on to produce a chain of events that would either hamper or promote the realisation of policy goals. They were also points where management intervention could affect the dynamics of system behaviour so as to promote stability or instability. The second was to identify which problems represented critical constraints. These constraints were points in the policy system that set limits on potential management options. The third and final aim in the interpretive analysis was to draw conclusions about the critical leverage points and constraints identified for the strategic management of the policy system under study.

Thesis Outline

In Chapter 2 a discussion of natural resource and environmental policy goals is presented. This discussion outlines three of the key theoretical perspectives that inform debate about what goals should be pursued in natural resource and environmental policy and the priorities that should be placed on them. These theoretical perspectives are described as the economic, ecological and social perspectives. These perspectives have different philosophical foundations. This is reflected in the different positions they take on the nature of natural resource problems and appropriate solutions. A comparison of these perspectives helps to explain why stakeholder conflict over policy goals and the means of achieving them is an enduring and pervasive feature of natural resource and environmental policy. It also helps to explain why the process of managing such conflicts in pursuit of policy goals is likely to be highly idiosyncratic and unpredictable, depending upon the stakeholders involved and the mix of theoretical perspectives invoked.

In Chapter 3 three perspectives on strategic management are reviewed: rational strategy; incremental strategy; and emergent strategy. The central focus in strategic management is on how to translate goals into co-ordinated action. It is predicated on the idea that it is possible to develop an understanding of the dynamics that critically influence the capacity of an organisation to realise the goals set for it. This understanding is then used as a basis for developing strategies that will enable organisations to realise the goals set for them while making the most efficient use of available resources.

In Chapter 4 it is proposed that Complexity Theory can provide an overarching framework for synthesising the alternative perspectives on strategy reviewed in Chapter 3. Specifically Complexity Theory provides a framework for identifying the dynamics that are important to monitor and respond to in a given policy context. In the process it can help to identify when the assumptions associated with particular theories on strategy are likely to hold. Complexity theory also suggests that complex systems share some fundamental dynamic properties that have implications for strategic management. In this chapter these properties will be described and their implications for strategic management discussed.

In Chapter 5 the approach that was used to elicit and analyse the system of problems of concern to participants will be justified and described. Consistent with the overarching lens of Complexity Theory and the management orientation of the research purpose, an interpretive methodological perspective guided the research design and the choice of data collection and analytical methods.

In Chapter 6 the causal maps representing the system of interacting problems that participants described in the in-depth interviews are presented and discussed in detail. In this chapter the results of the interpretive analysis aimed at identifying which of the problems were critical leverage points and constraints in the policy system are also presented.

In Chapter 7 the results of the interpretive analysis aimed at comparing and contrasting critical leverage points and constraints across the sample as a whole are reported. The implications of these results for strategic management of the policy system are also explored.

In Chapter 8 conclusions are drawn about what was learnt from the study in relation to the knowledge gap and the aims set for the study. After identifying some implications for theory, method and practice the limitations of the study are outlined and some suggestions are made for further research.

Chapter 2

Theoretical Perspectives on Natural Resource and Environmental Policy Goals

Objectives are not just out there, like ripe fruit waiting to be plucked, they are manmade, artificial, imposed on a recalcitrant world. Inevitably they do violence to reality by emphasising some activities (hence organisational elements) over others... Strategically located participants often refuse to accept definitions of objectives that would put them at a disadvantage or in a straitjacket should they wish to change their designation of what they do in future. Arguments about which really, but really and truly, are the objectives of the organisation may stultify all future action. (Wildavsky 1987:216)

Introduction

A characteristic of natural resource and environmental policy is that there is no universal agreement on the goals that government policies should aim to achieve or the priorities that should be placed on alternative goals. Rather, there is a general expectation that governments have a responsibility to balance and integrate multiple and often conflicting goals (Commonwealth of Australia 1992; Dovers 2003a; Midgley & Reynolds 2004). In this Chapter three of the key theoretical perspectives that inform debate about natural resource and environmental policy goals will be outlined, namely the economic, ecological and social perspectives.

A comparison of these theoretical perspectives reveals that they have different philosophical foundations. Thus these perspectives start from different positions on the nature of natural resource and environmental problems and appropriate solutions. Governments and stakeholders invoke various mixes of these perspectives to develop and support their views on what policy goals should be pursued, the priorities that should be placed on alternative goals and appropriate means of achieving such goals. This helps to explain why stakeholder conflict over policy goals and the means of achieving them is an enduring and pervasive feature of natural resource and environmental policy; a feature that can stultify progress towards the realisation of policy goals. It also helps to explain why the process of managing such conflict in pursuit of policy goals can be highly idiosyncratic and unpredictable, depending upon the stakeholders involved and the mix of theoretical perspectives invoked.

The structure of the Chapter is as follows. For each theoretical perspective, the way in which environmental problems are framed will be outlined. This will be followed by a discussion of the position that the perspective takes on the relationship between human kind and the natural environment. After outlining the implications of the perspective for the role of government in resolving environmental problems, policy prescriptions typical of the perspective are presented and discussed.

Economic Perspectives

Introduction

> Arguably, in recent times economists have been highly
> successful in promoting the view that the economic framework is
> the "correct" one for evaluating natural resource issues (Mercer
> 1991a:35)

Mercer's statement reflects the dominant influence of economics on contemporary natural resource and environmental policy. Economics is also widely considered to be the most cohesive theoretical framework for policy analysis with the most developed analytical tools (Young 1982; Martinez-Alier 1991; Watson & Johnson 1993)

Economic schools of thought include: neoclassical (which uses a model of self-interested rational decision-making based on trade-offs among substitutable wants) (Kapp 1983; Proops 1989) ; ecological (which integrates economic and ecological principles) (Costanza 1991; Sahu & Nayak 1994); humanistic (where the rational decision-making model is superseded by a model based on human welfare and a hierarchy of needs)(Lutz 1992); institutional (where the rational decision-making model is superseded by a cultural decision-making model) (Hamilton 1919; Pearce 1993). Of these schools of thought neoclassical economics is the predominant school of thought in natural resource and environmental policy (Young 1982; Eckersley 1995; Hodgson 2004). Thus this review will focus primarily on the neoclassical school of thought.

For economic schools of thought, economic prosperity is the core policy goal (Moran, Chisholm, Hartley & Porter 1991b). Economic prosperity is maximised when individuals

in society are free to make the most economically efficient[1] use of the resources available to them. Thus economic schools of thought tend to take the view that natural resource and environmental problems are symptoms of economic inefficiencies. The solution from an economic perspective then is to maximise or at least improve economic efficiency. This reasoning is evident in the Productivity Commission's statement of its task in evaluating the impacts of Australian native vegetation and biodiversity regulations on Australian landholders:

> In essence, the Commission's task is to explore the most efficient policies for promoting overall community well-being and, where necessary, to facilitate adjustment to resultant structural change.
>
> Where policies promote whole-of-community well-being (that is, increase the size of the 'pie'), there will be at least the potential to ensure that each member of the community is made better off or at least left no worse off. (Productivity Commission 2003:5)

Among economic schools of thought however, there is some variation in the way in which economic efficiency is defined and the extent to which interaction between economic and other social, political and ecological systems are incorporated into policy analyses. This variation is reflected in the policy prescriptions advocated by different schools of thought.

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[1] Economic efficiency includes technical and allocative efficiency (Henderson & Quandt 1980; Randall 1987; Godden 2006). Technical efficiency is about obtaining the maximum possible output from a given set of inputs. Allocative efficiency in its simplest application is about identifying the optimal combination of inputs for maximising profit (thus accounting for the relative price of inputs and outputs). A more complex application of allocative efficiency is about identifying the optimal combination of inputs and outputs for maximising the satisfaction of consumer preferences.

Problem framing

The model of the perfectly competitive market is a cornerstone in the economic framing of natural resource and environmental problems. The conditions of a perfectly competitive market include the existence of atomistic competition and perfect knowledge among producers and consumers and homogeneity in the product or service being traded (Jones 1994; Godden 2006). These conditions provide the opportunity for individuals to express the trade-offs that they are willing to make to satisfy their preferences given limited wealth (Kinrade 1995). Individuals express such trade-offs through voluntary exchanges of goods and services (including their labour). When the conditions of a perfectly competitive market are met the exchanges that individuals make will result in economic efficiency at the individual and social levels. Economic efficiency, in turn, is a necessary (though not sufficient) condition for maximising economic prosperity and therefore social welfare (Randall 1987).

From an economic perspective, natural resource and environmental problems arise when there are inefficiencies in, or a lack of markets for, environmental goods and services (Pigou 1920; Pearce & Turner 1990; Young & Gunningham 1997). Environmental goods and services range from simple consumer goods, such as food, to things like the capacity of the environment to assimilate pollutants and scenic and spiritual amenity (Young 1982; Kneese & Sweeney 1985; Hahn 1989; Kolstad 2000). For a market to work efficiently, the price of environmental goods and services must account for the full costs of supplying the product. Such costs would include the environmental costs associated with the use of the product, the opportunity costs of not producing alternative products and the costs that use of the product incurs on others (Pigou 1920; Coase 1960; Watson & Johnson 1993).

When the full costs of supplying a product are accounted for in its price, then the product will be supplied to the point where the additional costs of supplying the product are equal to the additional benefits that it provides. In short, the supply of the product will be socially optimal. A recent application of this logic, in the context of native vegetation, is

presented in Box 2.1, which is an extract from the Productivity Commission's (2004) inquiry into the impacts of native vegetation and biodiversity regulations in Australia. While the Productivity Commission acknowledges that the benefits and costs of supplying native vegetation will change over time, depending on a range of factors such as changes in tastes, incomes and market conditions, this is a highly simplified application of the market model. A more sophisticated application would account for the various qualities of native vegetation for which supply and demand characteristics may differ, the co-occurrence of these qualities and differences in intergenerational preferences (Randall 1987; Godden 2006).

Usually, markets for environmental goods and services, such as those provided by native vegetation, work inefficiently or don't exist. This means that the prices that people pay for products that rely on environmental goods and services do not usually reflect the full costs of supplying them. When the prices that people pay for such products do not reflect the full cost of supplying them their supply will not be socially optimal and the market will fail to maximise social welfare. This logic explains why, from an economic perspective, breakdowns in the price system for products that rely on environmental goods and services are a key source of natural resource and environmental problems:

> Many if not all environmental problems are due to a breakdown in
> the price system: for one reason or another it fails to convey a
> message about the relative scarcity of the resources to the users
> of these resources. (Hjalte, Lidgren & Stahl 1977:7).

In short, breakdowns in the price system occur when the true value of a product is not reflected in the price that people pay for it. From an economic perspective, the true value of a product is a reflection of individual preferences and the costs of meeting such preferences.

Box 2.1	Socially-optimal provision of native vegetation

<div align="center">

Box 2.1   Socially-optimal provision of native vegetation

(Productivity Commission 2004: 11)

</div>

Demand and supply for native vegetation are stylised in figure 2.1. The quantity of vegetation is measured on the horizontal axis, the value of benefits and costs on the vertical axis.

Figure 2.1
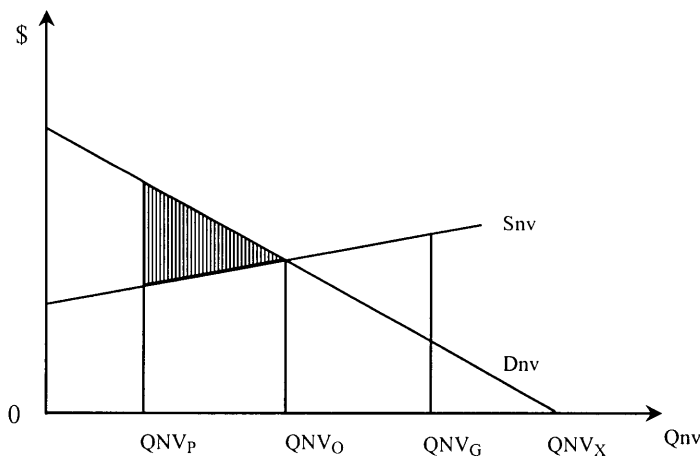
The Snv curve plots the incremental (efficient) costs of supplying native vegetation — these costs include the opportunity costs of taking land out of alternative production, plus the costs of labour and other inputs required to maintain vegetation, such as fencing and weed and pest control. Its upward slope reflects the relative scarcity of factors of production, especially land. Additional amounts of native vegetation can only be provided at increasing marginal cost. The Dnv curve represents the willingness to pay, or the demand, for the services from native vegetation — it sums the community valuation of these benefits. Its downward slope reflects the general preference of individuals to consume a bundle of goods and services — as they consume more of one item (in this case native vegetation) relative to others, they value it less at the margin because it becomes *relatively* more abundant, even though total benefits (measured by the area under the demand curve) may be very large.

Welfare maximisation (or economic efficiency) requires that native vegetation is supplied to the point where the additional costs of supplying it equal the additional benefits that it produces. Provided that the marginal value of benefits falls as consumption increases, an efficient equilibrium exists that balances marginal costs and marginal benefits (QNV_O). The supply of native vegetation beyond this level will cost more than the additional benefits it generates; a lower level (such as QNV_P) implies that net benefits are forgone (equal to the shaded area).

A focus of debate is the valuation of these benefits, which sets the position of the demand schedule relative to the costs of supply and, hence, influences the optimal level of provision of services from native vegetation. In addition, benefits and costs (and hence the optimal level of provision) change over time, influenced by a range of factors including changes in tastes, incomes and market conditions.

Externalities are widely analysed sources of breakdowns in the price system.[2] Externalities occur when a party using a product imposes costs on a third party who was not involved in its use (Randall 1987; Moran, Chisholm & Porter 1991; Armsworth & Roughgarden 2001). Externalities can be negative or positive. This implies that in some cases externalities may involve one or more parties bearing costs that they were not involved in generating, while in other cases externalities may involve one or more parties receiving benefits that they were not involved in generating. When externalities exist, there is a disparity between the private costs and benefits of an environmental good or service and its social costs and benefits (Coase 1960).

Often cited examples of externalities with respect to natural resource and environmental problems include: the discharge of pollutants by industrial firms into the atmosphere and waterways (Moran, Chisholm, Hartley & Porter 1991a; Doyle & Kellow 1995) and the impacts of the industrial activities of developed nations on lesser-developed nations (Shiva 1989; Elliot 1998; Roberts 2004). Some of the externalities associated with the clearing of native vegetation for agricultural production include loss of biodiversity, soil erosion and salinity and soil acidity (Reeve 1988; Johnson 1994; State of the Environment Advisory Council 1996; Recher 1999; Gillespie 2000).

In sum, for economic schools of thought, natural resource and environmental problems are economic problems. The solution is to correct for breakdowns in the price system to ensure that the price that people pay for products that rely on environmental goods and services reflect their true value. This would bring about, or mimic, the internalising of externalities and therefore satisfy a necessary condition for maximising economic prosperity and social welfare.

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[2] Also known as spillover or third-party effects (Randall 1987; Moran, Chisholm & Porter 1991).

Human-natural environment relationship

Economic schools of thought tend to adopt an anthropocentric position on the human-natural environment relationship, assuming that the natural environment should be managed in the interests of human welfare (Young 1982; Devall & Sessions 1985). In neoclassical economics, the natural environment is valued on the basis of individual preferences, which are taken as given. Individual preferences may or may not involve the attribution of intrinsic value to the natural environment. This distinguishes neoclassical economics from some ecological schools of thought, which argue that the natural environment has intrinsic value regardless of the values and interests of humankind (Devall & Sessions 1985; Hay 1988).

For economic schools of thought the production process, which transforms natural resources into goods and services, is the basis of humanity's relationship with the natural environment (Kapp 1983; Pearce & Turner 1990). This relationship is captured in Gillespie's description of the economic values of native vegetation:

> Areas of native vegetation can have many economic values,
> whether occurring in markets or as implicit values, as is often the
> case with non-commercial environmental goods and services.
> (Implicit values are values that are held by individuals but are not
> readily apparent as the goods or services are not traded in
> markets.) These economic values relate to the contribution of
> native vegetation to community welfare or social well-being.
> (Gillespie 2000:11)

In the case of neoclassical economics, natural resources are conceived of as one of many potentially substitutable inputs into the production process (along with capital, labour and knowledge for example). Similarly, the various products that rely on natural resources are conceived of as potentially substitutable wants in consumers' preferences. These

conceptions are consistent with the rational comprehensive decision-making model that underpins much of neoclassical economics and the scientific method of problem solving (Cohen & Nagel 1934; Northrop 1953; Larrabee 1964; Hirschman & Lindblom 1969; Bridgman & Davis 1998). On the basis of this model it is assumed that, in making production or consumption decisions, alternative inputs or wants can be ranked and trade-offs can be made among them (Young 1982; Pearce 1993). If this assumption holds then the potential exists for individuals as producers and consumers to trade off one want for another in order to maintain the same level of satisfaction.

The proposition that individuals as consumers and producers trade off elements of the natural environment, such as species diversity, against commodities, such as money in the bank, has been criticised on the basis that some things are incommensurable both philosophically and in reality (Kelman 1981; Christensen 1989; Martinez-Alier 1991; Eckersley 1992, 1995; Kinrade 1995). These criticisms raise questions about the applicability of an economic framing of decision-making to natural resource and environmental problems both as a model of how decisions should be made and as a model of how decisions are actually made. Counter to these criticisms it can also be argued that an economic framing of decision-making makes explicit the often implicit trade-offs that are made in natural resource and environmental management (Randall 1987). This provides a basis for informed decisions to be made about whether or not such trade-offs are appropriate.

The relationships between economic systems and natural ecosystems have been of particular interest to economists from various economic schools of thought for some time. For instance, in ecological economics the economic system is conceived of as a sub-system of the natural ecosystem (Christensen 1991; Costanza 1991; Armsworth & Roughgarden 2001). Ecological economics incorporates models of ecosystem behaviour into policy analysis and recognises ecological constraints on economic growth (Proops 1989; Peet 1992). Ecological constraints on economic growth have also been of particular concern to economists ranging from Malthus (1798), to Boulding (1966), Daly (1968) and Isard (1975).

Role of Government

Neoclassical economics is grounded in a liberal political philosophy. Accordingly neoclassical economists tend to argue that the operation of competitive markets will lead to better solutions to natural resource and environmental problems than will government intervention, which constrains individual autonomy (Smith 1958). This argument is supported by public choice theory. Public choice theory draws attention to the role of self-interest in decision-making by those involved in government processes, such as bureaucrats and politicians (Buchanan & Tullock 1962; Hughes 1998). In consequence public choice theory questions the degree to which government decisions reflect the self-interests of government decision-makers over the interests of the broader community. Accordingly, neoclassical economics tends to support a minimal role for government in resolving natural resource and environmental problems (Randall 1987).

From the perspective of neoclassical economics there are two justifications for government intervention. The first justification is the need for governments to redress inefficiencies arising from market failure and market imperfections. Market failure occurs when the costs of establishing a market are greater than the benefits of establishing a market. Such costs are known as transaction costs and include the costs of defining and enforcing property rights and the costs of the information required to participate in market trading (Godden 2006). Hence, circumstances that contribute to market failure include:

- the existence of public goods which makes it difficult to exclude people who do not have rights to environmental products from using them or to restrict access to the extent of the right (for example scenic amenity, clean air and biodiversity) (Young 1982; Baumol, Blinder, Gunther & Hicks 1988) ; and

- the existence of information costs, deficiencies and asymmetries which can result in the costs of the information required to participate in market trading being greater than the benefits (Moran et al. 1991b; Watson & Johnson 1993).

Market imperfections occur when a market exists but it is not perfectly competitive. Market imperfections occur for example when:

- production and consumption externalities exist so that production and consumption levels will not account for all the production and consumption costs (Jones 1994);
- when merit goods exist such that consumers are unlikely to make rational choices in the market place, as for example with addictive products (Jones 1994);
- economies of scale exist that favour the concentration of market power among a few large firms as in markets for telecommunications, electricity, steel, intensive poultry and cars (Randall 1987);
- where there is competitive excess among firms in a market to the point that prices to consumers increase without corresponding increases in consumer satisfaction (Jones 1994);
- barriers to entry exist that deny access to new firms as when intellectual property rights are monopolised (Godden 2006); and
- anti-competitive alliances exist among firms as in some markets for oil and natural gas (Young 1982).

From the perspective of neoclassical economics, government interventions to redress market failure and market imperfections may be justified when the social benefits of doing so outweigh the social costs (including the costs involved in the intervention itself). When this is the case governments might intervene for example to fund research to correct for information deficiencies, to fund extension services, and to apply market oriented policy tools and regulations (Moran et al. 1991b; Gillespie 2000; Productivity Commission 2003). At the same time Jones (1994) cautions that even when the social benefits of government intervention outweigh the social costs it does not necessarily follow that government intervention is the only or most appropriate way to redress

market failure and market imperfections. He points to the role played by corporate sponsorship and advertising in radio broadcasting as an instance where alternatives to government intervention can redress inefficiencies resulting from market failure.

The second justification for government intervention is the need for governments to modify the distribution of income on the grounds of equity. On such grounds it might be argued that governments should intervene to ensure: minimum incomes through minimum wages and welfare payments; equal economic opportunity for all members of society; and that all members of society have equal access to legal protection (Jones 1994). In cases where government intervention is judged appropriate on the grounds of equity, neoclassical economics might then be used to analyse the efficiency implications of alternative interventions.

Policy prescriptions

As discussed above, from the perspective of neoclassical economics, for economic prosperity to be maximised individuals in society must be free to make the most efficient use of the resources available to them. Economic efficiency, in turn, is predicated on ensuring that the prices that people pay for natural resource and environmental goods and services reflect the full cost of their supply. Accordingly, two elemental policy prescriptions of neoclassical economic are to:

- maintain the freedom of individuals to express their preferences through market transactions; and
- identify the underlying causes of market failure and market imperfections in relation to environmental goods and services (e.g. do markets in the product exist?; are public goods involved?; are there information problems?; what is the relationship between buyers and sellers?).

These policy prescriptions provide a foundation for redressing breakdowns in price systems for products that rely on environmental goods and services. In order to actually bring about, or mimic the internalising of externalities, additional prescriptions are required. In neoclassical economics such prescriptions can be drawn from the Coasian and the Pigouvian approaches.

The Coasian approach emphasises the role of well-defined private property rights in assigning appropriate responsibility to those who benefit from environmental goods under conditions where relatively low transaction costs are involved (Coase 1960; Randall 1987). On the basis of the Coasian approach the following policy prescription would be added to the two presented above:

- where possible, establish well-defined and enforceable private property rights to environmental goods and services (in relation to native vegetation this might involve introducing individual transferable quotas; instituting a native vegetation market for carbon sequestration; and the developing of farm forestry opportunities (Dore, Binning & Hayes 2000)).

The Pigouvian approach emphasises a role for corrective taxes and subsidies in ensuring that those who benefit from environmental goods pay a price that reflects their true value (Pigou 1920; Buchanan 1969). On the basis of the Pigouvian approach the following policy prescriptions would be added to those already outlined:

- identify and estimate the value of individual and social benefits and costs associated with environmental goods and services (in the case of native vegetation this may involve estimating the value of goods and services for which markets do not currently exist, such as biodiversity); and
- use price mechanisms to correct failures in the price system for environmental goods and services (in the case of native vegetation this might involve: introducing taxes on activities that reduce the quality and extent of native vegetation; removing tax concessions associated with cleared land and introducing subsidies or incentives for activities that enhance the quality and extent of native vegetation such as weed management and fencing off remnants

from stock; instituting a differential local government rating system that provides lower rates for those who undertake conservation measures with respect to native vegetation)

In the context of native vegetation, from Box 2.2 below, it can be seen that many of the recommendations of the Productivity Commission (2004), resulting from its analysis of the impacts of native vegetation and biodiversity regulations, reflect the economic prescriptions outlined in this section.

Summary

In summary, neoclassical economics tends to be the dominant theoretical framework for policy analysis in natural resource and environmental management. This dominant position is reinforced by its cohesiveness and its arsenal of analytical tools. From an economic perspective, environmental problems are a symptom of inefficiencies in, or an absence of, markets for environmental goods. These inefficiencies lead to situations where the prices that people pay for environmental products do not reflect the full cost of supplying them. This prevents the maximisation of economic prosperity. The solution then, from an economic perspective, is to identify and correct for such inefficiencies and then allow the invisible hand of market forces to make the most efficient allocation of natural resource and environmental goods.

Box 2.2　　　Recommendations of Productivity Commission investigation

(Productivity Commission 2004:XLVII)

Recommendation 10.1

Before introducing new or amending existing native vegetation and biodiversity policy, a comprehensive regulation impact statement or its equivalent should be prepared that includes an assessment of the problem being targeted, expected costs and benefits of the proposed policy, and an assessment of alternative instruments. This assessment should be made public.

Recommendation 10.

All native vegetation and biodiversity policies should be subject to ongoing monitoring and regular independent reviews of all costs and benefits in the light of articulated objectives. Reviews of performance should be published.

Recommendation 10.3

Ongoing efforts are required to improve the quality of data and science on which native vegetation and biodiversity policy decisions are based, particularly 'on-the-ground' assessments to test the accuracy of vegetation mapping based on satellite imagery.

Recommendation 10.4

Current regulatory approaches should comply with good regulatory practice, including:

- clear specification of objectives of the legislation so that guidelines and decisions clearly link back to these objectives, and performance of the regimes can be monitored and assessed;

- minimisation of duplication and inconsistency by amalgamating and simplifying regulations and permit requirements, for example, by rationalising legislation and regulation within each State and Territory and/or by coordination between agencies;

- assistance to, and education of, landholders to meet and to understand their responsibilities by providing accessible information about those responsibilities, and how they relate to sustainable land-management practices and environmental problems;

- statutory time-frames for assessing permit applications;

- consideration of economic and social factors where applications to clear otherwise would be rejected on environmental grounds (a 'triple bottom line' approach), with reasons for decisions to be given and reported; and

- provision of accessible, timely and impartial appeals and dispute-resolution mechanisms.

Recommendation 10.5

Greater flexibility should be introduced within existing regulatory regimes to allow variation in requirements at a regional level. To this end:

- greater use should be made of the extensive knowledge of landholders and local communities;

Box 2.2	Recommendations of Productivity Commission investigation cont..

- regional committees and bodies should be given greater autonomy (and support) to develop appropriate requirements; and

- some across-the-board rules, particularly those currently applying to native vegetation regrowth, could be relaxed and replaced with requirements that meet environmental objectives but which reflect regional environmental characteristics and agricultural practices.

Recommendation 10.6

As a matter of priority, governments should seek to remove impediments to, and facilitate, increased private provision of environmental services. Actions could include:

- removal of tax distortions or lease conditions that discourage conservation activity relative to other activities;

- removal of impediments to efficient farm rationalisation and/or management and operation;

- research into, and facilitation of, sustainable commercial uses of native vegetation and biodiversity; and

- enhanced provision of education and extension services to demonstrate to landholders the private benefits of sustainable practices.

Recommendation 10.7

Landholders individually, or as a group, should bear the cost of actions that directly contribute to sustainable resource use (including, for example, land and water quality) and, hence, the long-term viability of agriculture and other land-based operations. Redistributive mechanisms may be appropriate in some instances to share costs among landholders and regional communities.

Recommendation 10.8

Regional institutions should be further developed and charged with addressing regional and inter- regional resource sustainability issues within broad parameters determined at national, State and Territory levels. Regional bodies should provide for genuine regional consultation, representation and decision-making and be granted sufficient flexibility, authority and resources to implement their decisions.

Recommendation 10.9

Over and above agreed landholder responsibilities, additional conservation apparently demanded by society (for example, to achieve biodiversity, threatened species and greenhouse objectives), should be purchased from landholders where intervention is deemed cost-effective.

Recommendation 10.10

Public-good native vegetation and biodiversity objectives ideally should be fed through regional institutions to promote coordination and consistency of approaches and, therefore, least-cost 'joint' solutions.

Ecological Perspectives

Introduction

As is the case for economics, there are a number of schools of thought that take an ecological perspective on natural resource and environmental policy. However, none of these ecologically oriented schools have gained dominance or general acceptance. The principle that ecological integrity should take precedence over other social and economic goals distinguishes ecological perspectives from economic and social perspectives. Hence, for ecological schools of thought the core policy goal is ecological integrity:

> The health, economic and cultural well being of this and future generations is underpinned by the health of the environment. Yet the environmental health of Australia's land, water and biodiversity are declining rapidly.
>
> It is therefore imperative that the protection and restoration of Australia's landscapes and biodiversity be taken as a fundamental objective of this inquiry. Until environmental degradation is reversed, there can be no certainty, no real prosperity and there will be increasing impacts on Australia's agricultural regions and communities. (Australian Conservation Foundation 2003:3-4)

Ecologically orientated schools of thought include the ecological reformist school (Hardin 1968), bioregionalism (Sale 1985), eco-theology (Lynn White 1967), ecological rationalism (Dryzek 1987b) and deep ecology (Naess 1988). Ecologically orientated schools of thought share an emphasis on the interrelationships between human societies and natural ecosystems. Generally, they also emphasise the need for human societies to live within ecological limits.

At the same time, there is considerable diversity in the positions that ecologically orientated schools of thought take on the nature of human-environment relationships, human nature, social relationships, the role of government, and the capacity of the prevailing social order and its institutions to maintain the integrity of natural ecosystems. This diversity is reflected in the policy prescriptions advocated by different schools of thought.

For the purposes of this thesis, three ecologically orientated schools have been selected to illustrate both the diversity of ecological perspectives and some points at which they converge: ecological reformism, ecological rationalism and deep ecology.

Problem framing

From an ecological perspective, natural resource and environmental problems stem from 'human disruption of otherwise self-regulating and resilient natural ecosystems' (Cardin 1992:3). In general, ecological perspectives contend that addressing natural resource and environmental problems requires first, an understanding of the functioning of natural ecosystems and second, an understanding of the impact of human activities on that functioning. This provides an opportunity for humankind to better respond to the functioning of natural ecosystems. Ecological schools of thought differ in the degree to which they emphasise the role of the individual or the collective in natural resource and environmental problems and these differences are reflected in the sorts of solutions advocated by different schools.

The ecological reformist school emphasises the role of individual self-interest in human interaction with natural ecosystems. The ecological reformist school also tends to represent natural ecosystems as sources of finite resources that limit carrying capacity. The classic illustration of this problem framing is Hardin's (1968) model of the 'Tragedy

of the Commons.' The model involves a pasture to which all herders have open access.[3] In the pursuit of their self-interest, individual herders increase their stocking rates until the carrying capacity of the pasture is exceeded and the commons collapse. This occurs because individual herders experience direct and immediate returns from putting as many animals in the pasture as they can, while the costs of doing so are delayed and shared by the herding community as a whole.

The Tragedy of the Commons demonstrates that what is rational for individual herders is not rational for the herding community as a whole, nor is it consistent with maintaining the ecological functioning of the pasture. The tragedy is that individual herders do not pay attention to the ecological limits of the commons pasture, nor do they see that their pursuit of self-interest ultimately leads to the demise of the resource on which they depend (Leeson 1979). Hardin argues that the only solution to the commons problem is to use mutual coercion (mutually agreed upon) to enclose the commons and restrict access to it (Hardin 1968; Doyle & Kellow 1995).

In contrast, ecological rationalism represents the natural ecosystem as complex systems in which 'everything is connected to everything else' (Commoner 1971). As a result, ecological rationalists would argue that natural ecosystems, and therefore natural resource and environmental problems, exhibit a number of distinctive characteristics that must be understood and responded to in order to address natural resource and environmental problems. These characteristics include complexity, non-reducibility, variability, uncertainty, collectiveness, spontaneity interconnectedness, interdependence, synergism, threshold effects, irreversibility, interpenetration mutuality and invisibility (Dryzek 1987b; Jones 1990; Walker (1992b). The ability of natural resource and environmental policies and processes to address such characteristics provides the basis for evaluating their ecological rationality.

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[3] Hence the title 'Tragedy of the Commons' is arguably a misnomer as the tragedy as described by Hardin results from conditions of open access rather than from conditions of common property (Ostrom 1990).

On the human side of the human-natural ecosystem interaction, ecological rationalism tends to emphasise the collective nature of natural resource and environmental problems and the role of social institutions in addressing them (Commoner 1971; Bartlett 1986; Dryzek 1987b; Torgerson 1997). Social institutions are recognised, stable and valued patterns of behaviour (Young 1982; Crawford & Ostrom 1995; Dryzek 1996). While they might be expressed formally, for example through contracts, laws and formal procedures, they may also be expressed informally, for example through language, culture and social norms (Young 1982). Social institutions prescribe how individuals, groups and society should relate the natural environment (Doyle & Kellow 1995; Crawford & Ostrom 1995; Dryzek 1996).

An example of an ecologically rational problem framing is provided by Dryzek's (1987b) critical analysis of society's major collective choice mechanisms.[4] In this analysis, Dryzek used five criteria for ecological rationality: negative feedback (to allow appropriate responses to the impacts of social choice mechanisms on ecosystem functioning); coordination (across actors and decisions); robustness (to allow performance across different circumstances); flexibility (to allow adaptation to novel conditions); and resilience (to correct for severe disequilibrium).

Dryzek (1987b) then evaluated the following collective choice mechanisms against his criteria for ecological rationality: the market; administered systems; polyarchy; law; moral persuasion; bargaining; and armed conflict. None of the collective choice mechanisms satisfied all five criteria for ecological rationality. This led Dryzek to conclude that society's major social institutions for collective choice are inherently incapable of maintaining the integrity of natural ecosystems. Accordingly he argues for institutional redesign, or 'the wholesale reconstruction of social choice mechanisms.'

The perspective that ecological rationalism provides on addressing the human side of the human-natural ecosystem interaction has its origins in critical social theory (Foucault

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[4] Collective choice mechanisms are social institutions for collective problem solving.

1980; Deleuze & Guattari 1984; Habermas 1984; Cox 1986; Meppem & Bourke 1999). Critical social theory draws attention to the role of power relationships and inequalities in prevailing social institutions. Social institutions, in turn, prescribe how natural resource and environmental problems are articulated, understood and addressed in society. As a consequence, prevailing power relationships and inequalities can be seen both as a cause of natural resource and environmental problems and a barrier to their resolution (Elliot 1998). Thus the application of critical theory to natural resource and environmental problems often implies a need for fundamental change to prevailing power relationships and social institutions (Forester 1993; Healey 1997; Lewis 1992; Pepper 1993; Hillier 2003; Sandercock 2004).

From the perspective of deep ecology, natural resource and environmental problems stem from the tendency of people to place themselves above nature (Leopold 1966; Ehrlich 1968; Naess 1988). Deep ecology is grounded in the principles of individual self-realisation and biocentric equality or ecocentrism[5] (Devall & Sessions 1985). Thus, deep ecology points to relationships between the individual and natural ecosystems as the cause of, and potential solution to, natural resource and environmental problems. Dysfunctional relationships are anthropocentric and involve human alienation from natural ecosystems and their place in the natural order (Horkheimer 1947). Desirable relationships are those in which the individual identifies with the interests of natural ecosystems and has developed a consciousness of their place in the natural order (Ehrlich 1968; Bateson 1979; Naess 1985; Naess 1988).

Supporters of deep ecology argue that cultivating relationships of this kind between individuals and the natural environment will lead to environmentally responsible human-natural environment relationships (Devall & Sessions 1985; Dryzek 1987b; Fox 1990; Bragg 1996). Deep ecology implies a radical change in the way in which individuals and societies relate to the natural environment (Ehrlich 1968; Naess 1988). It also implies

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[5] The belief that the non-human elements of the natural environment have moral standing and intrinsic value which are not related to the values interests of humankind. This belief implies that 'the fate of other species is not to be arranged to suit the comfort and convenience of species *homo sapiens*' (Hay 1988:22).

dissolution of the distinction between understanding natural ecosystems and understanding human interactions with them. These two understandings become one and the same when people develop their ability to experience an extended sense of self, which encompasses the experiences of the human and non-human elements of natural ecosystems (Bowen 1985; Naess 1988).

Human- natural environment relationship

Ecological schools of thought share the position that humanity has a fundamental obligation to maintain ecological integrity, be that in the interests of humanity or in the interests of the natural environment. Accordingly, some ecological schools, such as ecological reformism and ecological rationalism, adopt an anthropocentric position that the ecological integrity of the natural environment should be maintained in the interests of humanity. Others adopt an ecocentric position that the ecological integrity of the natural environment should be maintained for its own sake, regardless of its utility to humankind. This is the major distinction that Naess (1988) draws between shallow and deep ecological perspectives. There is some variation in the rationale for the human-environment relationships implied by different schools of thought as illustrated by the following examples.

The ecological reformist school tends to see the natural environment as a source of natural resources. This perception is consistent with Hardin's (1968) representation of the earth as a pasture. For the ecological reformists, the imperative to maintain ecological integrity arises from the threat that ecological collapse poses to human survival (Meadows, Meadows, Randers & Behrens 1972; Doyle & Kellow 1995). Hardin's solution to the tragedy of the commons, which involves using coercion to enclose the commons and restrict access to it, implies an anthropocentric human-environment relationship based on hierarchy and control (Dryzek 1997).

Ecological rationalism as a school of thought tends to imply an anthropocentric human-natural environment relationship. This can be attributed to critical social theory, which emphasises the interrelationships that exist among power relationships and inequalities in society and society's relationships with the natural environment. This suggests that environmental problems cannot be resolved without resolving social inequalities. Additionally, Dryzek (1987b) argues for an anthropocentric position on the basis that it allows ecological rationality to be considered on equal footing with other forms of rationality such as economic, social, legal and political rationality. Other theorists argue that an anthropocentric position is also required to ensure political support for ecologically rational institutional reform that would not be possible on the basis of an ecocentric position (Stretton 1976; Young 1982; Doyle & Kellow 1995).

Whereas ecological rationalism tends to emphasise the social aspects of humankind's relationship with the natural environment deep ecology emphasises the relationship between the individual and the ecological community (including its human and non-human elements). Central to this relationship is the possibility for individuals to experience an extended sense of self or 'ecological self' which dissolves the boundaries between the individual and the natural ecological community. Naess illustrates this concept by drawing on his own experience:

> My standard example has to do with a nonhuman being I met
> forty years ago. I looked through an old fashioned microscope at
> the dramatic meeting of two drops of different chemicals. A flea
> jumped from a lemming strolling along the table and landed in the
> middle of the acid chemicals. To save it was impossible. It took
> many minutes for the flea to die. Its movements were dreadfully
> expressive. What I felt was, naturally, a painful compassion and
> empathy. But the empathy was not basic. What was basic was
> the process of identification, that 'I see myself in the flea.' If I was
> alienated from the flea, not seeing anything resembling myself,
> the death struggle would have left me indifferent. (Naess 1988
> quoted in Bragg 1996:95)

This sort of relationship implies that, once an individual develops the capacity to experience an ecological sense of self, they will care for the natural environment as they would care for themselves:

> If your 'self' in the wide sense embraces another being, you need
> no moral exhortation to show care... You care for yourself
> without feeling any moral pressure to do it. (Naess 1988 quoted
> in Bragg 1996:96)

Naess (1985) also argues that the capacity of individuals to experience an ecological sense of self will lead to them responding to the interests of the natural ecosystem as their own interests. This establishes the basis for an ecocentric human-environment relationship which distinguishes deep ecology from the anthropocentric human-environment relationships that are characteristic of most other schools of thought.

Deep ecology represents a romantic school of thought in that it embraces emotional, spiritual and intellectual human-environment relationships and challenges the Enlightenment notion that value neutral scientific knowledge and rational analysis are the most appropriate bases for understanding and managing the natural environment (Pepper 1993; Dryzek 1997). Instead, romantic schools of thought advocate ways of understanding and interacting with the environment that encompass spiritual, emotional, intellectual, aesthetic and moral dimensions (Ehrlich 1968; Fox 1990; Drengson 1997; Torgerson 1997).

Role of Government

Ecologically oriented schools of thought advocate a variety of roles for government in natural resource and environmental issues. At one extreme, ecological reformism tends

to attribute primary responsibility for resolving natural resource and environmental issues to government institutions and organisations. It also favours authoritarian government as the means of discharging this responsibility. At the other extreme, deep ecology tends to attribute responsibility for resolving natural resource and environmental issues to individuals. According to this school of thought, individuals have the capacity to discharge this responsibility through their relationships with both human and non-human elements of the natural ecosystem. In between these two extremes, the dominant tendency is to see the role of government as one of facilitating participatory, discursive and deliberative forms of democracy (Devall & Sessions 1985; Hay 1988).

The ecological reformist school of thought advocates authoritarian forms of government over decentralised participative forms. This position is held on the basis that only authoritarian forms of government are capable of the coercive action required to counterbalance the individual interests that motivate people to degrade ecological functioning (Hardin 1968). This is a more interventionist role than the minimal role implied by neoclassical economics (Young 1982). At the same time, the ecological reformists, like the neoclassical economists, support the prevailing social order and its institutions. Thus, ecological reformists assert that, given appropriate reform, prevailing institutions have the inherent capacity to maintain the integrity of natural ecosystems (Stillman 1974).

So, for the ecological reformists, the government, as the repository of power and knowledge, is vested with the responsibility for maintaining the integrity of natural ecosystems. This is atypical of an ecological perspective (Hay 1988; Dryzek 1997). Typically, ecological orientated schools of thought favour decentralised, democratic, and non-hierarchical social institutions (Lewis 1992; Pepper 1993; Doyle & Kellow 1995; Dryzek 1995a).

Ecological rationalism is typical of ecological schools of thought in favouring decentralised, democratic and non hierarchical social institutions. In addition, this school of thought supports a role for government in facilitating participatory, discursive and

deliberative forms of democracy (Milbrath 1989; Orr 1992; Dryzek 1995b; Kinrade 1995). This support for participatory, discursive and deliberative forms of democracy is grounded in two related propositions. The first proposition is that people are capable of making informed decisions on natural resource and environmental problems and of thinking in terms of social and ecological interests beyond their own self-interest (Dryzek 1995b). The second proposition is that it is through deliberative interaction that people are able to fully express and refine their views on the social desirability of policy goals (O'Riordan 1977; Mercer 1991a; Sandercock 2004).

These two propositions imply that governments have a moral obligation to ensure that policy decisions reflect both individual preferences and the outcomes of public debate (Dryzek 1995b; Kraft 1996). These propositions also imply that governments have a moral obligation to ensure that policy processes are inclusive so that policy decisions do not simply reflect prevailing social inequalities (Habermas 1984, 1987; Forester 1993; Dukes 1996; Meppem & Bourke 1999; Mobbs 2003). Consistent with these propositions, Kraft (1996) stresses that government without inclusive public participation processes runs the risk of ethical lapses and policy failure. Kinrade adds that:

> Government intervention through regulations, financial incentives and publicly funded programs is not sufficient by itself to achieve ESD [Ecologically sustainable development]. Community participation in the formation and implementation of policy will be vital to the attainment of ESD. No policy approach, regardless of how well conceived or how carefully implemented, will achieve ESD in the long run without widespread community support and value shifts. Neither governments nor markets can induce those shifts. At best, they can merely help facilitate them. (Kinrade 1995:105)

Deep ecology shares with other ecologically orientated schools of thought a preference for decentralised, democratic, and non-hierarchical social institutions. However, while

other schools of thought, such as ecological rationalism, perceive a role for government in facilitating these relationships, deep ecology tends to perceive a path that lies outside the dominant social order and its organisations and institutions (Bowen 1985; Pepper 1993; Dryzek 1997). As a consequence, Bowen (1985:221) notes that 'while professional environmentalists work with bureaucracies, deep ecologists are distrustful of hierarchical-bureaucratic organisations, preferring more loosely organized networks.'

Policy prescriptions

There are a number of policy prescriptions common to various ecological schools of thought. Most ecological schools would tend to subscribe to:

- maintaining the ecological integrity above all other goals (Dryzek 1987b);
- identifying opportunities for co-operative approaches to maintaining ecological integrity over competitive approaches (Merchant 1989; Doyle & Kellow 1995; Dryzek 1997);
- decentralising institutions (Cotgrove 1982);
- matching the boundaries of social institutions to ecosystem boundaries so that regions are 'defined by nature not legislature'(Milbrath 1989:211);
- empowering individuals and local communities to effect policy change and resolve particular natural resource and environmental management problems at a local level (Mercer 1991a; Bookchin 1992; Dryzek 1995b; Thomas 1995; Kraft 1996);
- promoting the adoption of appropriate technology, which involves incorporating ecological constraints into technological development (World Commission on Environment and Development 1987);
- maintaining biodiversity (Devall & Sessions 1985);
- the ability to err on the side of caution in the interests of avoiding irreversible impacts on the ecological functioning the natural environment (Commoner 1971; Dryzek 1987b; Ehrlich & Ehrlich 1991); and

- the development of institutions and technologies that will not result in the subjugation of either people or the natural environment (Lewis 1992).

A prescription that would be consistent with the principles of deep ecology that might be added to the list would be to maintain ecological integrity in the interests of the natural environment independently of the interests of humankind (Devall & Sessions 1985). Minimising human impact on the ecological functioning of the natural environment would also be consistent with the principles of deep ecology (Devall & Sessions 1985; Sale 1985; Merchant 1989).

From ecological rationalism could be added the need to incorporate criteria for evaluating the ecological rationality of natural resource and environmental policy options. This suggests that policy proposals should: incorporate negative feedback mechanisms that allow appropriate responses to policy impacts on ecosystem functioning; have mechanisms for coordination across actors and decisions; perform well in a variety of circumstances; be flexible to allow adjustments to changing conditions; and be resilient in destabilising conditions (Dryzek 1987b).

In contrast, the ecological reformist school of thought would see the need for mechanisms of coercion to ensure that the natural environment is managed sustainably. This school of thought generally focuses on coercive mechanisms for restricting individual freedoms such as the coercive attempts of the Indian and Chinese governments to limit the freedom of individuals to reproduce (Stillman 1974; Dryzek 1997).

While the ecological reformist school is often credited with pioneering the modern environmental movement, its authoritarian policy prescriptions have not gained wide acceptance among other ecological schools of thought (Hay 1988; Dryzek 1997). As a result, Hay (1988:24) asserts that this school of thought belongs with 'an earlier, scientist lead, theoretically 'naïve,' phase of the modern environmental movement and has little currency now.'

In practice, natural resource and environmental policies and the positions of peak environmental groups tend to be multidisciplinary with respect to ecological schools of thought. In the context of native vegetation policy this is reflected in the argument of a peak environmental group that a mix of policy tools, including regulatory and participatory, is needed to promote the conservation of native vegetation:

> Regulation is essential in controlling land clearing. ACF are not
> aware of any state, territory or significant region in Australia or
> overseas where land clearing has been successfully controlled in
> the absence of regulatory approaches. Voluntary, "partnership"
> and incentive-based approaches can achieve some success in
> revegetation, but these approaches are not sufficient in
> addressing clearing per se. Commodity market fluctuations can
> also produce shifts and temporary reductions in clearing activity,
> along with increases in activity, and market mechanisms may
> have some utility, but regulation of clearing is a necessary, if not
> always sufficient, element in any approach. (Australian
> Conservation Foundation 2003:10)

Likewise, government policies express the need to conserve native vegetation on the basis of its value to human society as well as on the basis of its intrinsic value. For instance, Australia's National Strategy for the Conservation of Australia's Biological Diversity recognises that:

> • The conservation of biological diversity provides significant
>   cultural, economic, educational, environmental, scientific and
>   social benefits for all Australians......
>
> • We share the earth with many other life forms that have
>   intrinsic value and warrant our respect, whether or not they
>   are of benefit to us. (Department of the Environment 1996)

Thus, government policies and the positions environmental groups take on natural resource and environmental issues, such as the native vegetation issue, tend to reflect an assimilation of principles from various ecological schools of thought.

Summary

In summary, ecological schools of thought share the view that ecological integrity should take primacy as a policy goal. Thus they contend that policies aimed at resolving natural resource and environmental problems must be grounded in an understanding of the functioning of ecological systems and the impact of human activity on that functioning. While ecological reformism emphasises the impact of individual self-interest on the functioning of ecological systems, ecological rationalism emphasises the impact of social institutions and deep ecology emphasises the impact of individual consciousness. With the exception of the authoritarian prescriptions of ecological reformism, ecological schools of thought favour decentralised, democratic, and non hierarchical solutions to natural resource and environmental problems. In practice, government policies and the positions that environmental groups take on natural resource and environmental issues do not reflect a predominant ecological school of thought. Rather they reflect an assimilation of principles from a range of ecological schools of thought.

Social Perspectives

Social theories that inform natural resource and environmental policy include socialism, Marxism, anarchism, ecological modernisation, critical social theory and feminism. Despite their diversity, social schools of thought share the view that natural resource and environmental problems are a symptom of social problems. As a result, social theories contend that in order to address natural resource and environmental problems the social problems that lie at their source must first be addressed.

Thus while ecological schools of thought tend to argue that in order to address natural resource and environmental problems the first priority is to understand and respond to the functioning of natural ecosystems social schools of thought tend to argue that the first priority is to understand and respond to the functioning of human social systems (Ryle 1988; Lewis 1992).

As for ecological schools of thought, social schools of thought differ in the positions that they take on the nature of human-environment relationships, human nature, social relationships, the role of government, and the capacity of the prevailing social order and its institutions to address social problems and maintain the integrity of natural ecosystems. In order to demonstrate the diversity of social perspectives and their commonality, three schools of thought will be reviewed in this section, namely, socialism, anarchism and feminism.

Problem framing

For social schools of thought, the environment is a social issue. Generally, the social problem of most concern to social schools of thought is injustice in human society. Hence for social schools of thought, social justice is the core policy goal. Environmental

degradation, they argue, follows logically from the sources of social injustice in society. Among social schools of thought, there are many conflicting views on these sources of social injustice and environmental degradation. There is also a high degree of contention among social schools of thought as to the form of a socially and ecologically just society and the means of achieving it.

For socialist schools of thought the domination of the working class by the ruling class in capitalist societies is the social problem of central concern (Block 1977). Socialist schools of thought include Marxism (Marx 1859), eco-Marxism (O' Connor 1988), eco-socialism (Pepper 1993), neo-Marxism (Lindblom 1977; Block & Hirschhorn 1979) and democratic socialism (Stretton 1976; Poulantzas 1978; Ryle 1988). Among these Marxism is widely considered the dominant school of thought (Doyle & Kellow 1995). Marxist analysis is grounded in the idea that social and political ideas, institutions and relationships are a reflection of material economic factors or economic modes of production:

> The mode of production in material life (e.g. feudalism,
> capitalism, socialism) determines the general character of the
> social, political and spiritual processes of life. It is not the
> consciousness of men that determines their existence, but, on
> the contrary, their social existence determines their
> consciousness. (Marx 1859 quoted in Pepper 1993:68)

The implication of this idea for natural resource and environmental problems is that if the dominant mode of production in society promotes social oppression, inequality and environmental degradation, then social justice and environmental protection are unlikely to occur without fundamental changes in a society's mode of production.

Hence, Marxism identifies the capitalist mode of production as the root cause of social injustice and environmental degradation. This is because under capitalism the capitalist ruling class has control over the means of production. This control gives it the economic

and political power to exploit the working class and the natural environment in pursuit of capital accumulation. Political and economic power, in turn, reinforces those social and political institutions that further the interests of the capitalist ruling class over the interests of the working class and the natural environment (Pepper 1993).

The solution to social injustice and natural resource and environmental problems, from a Marxist perspective, is for the working class to develop an understanding of the impact of the capitalist mode of production on its freedom and to take collective political action to create a new classless society based on socialist or communist modes of production (Stretton 1976; Cock & Hopwood 1996). This is likely to require revolutionary action as the ruling class will be unwilling to give up its position of economic and political power voluntarily. A critical element in the revolutionary action of the working class would be for it to gain influence over the state which it could then use to facilitate the transition from socialism to communism. In this transitional period, the planned economy possible under socialism would provide a means of redirecting resources from capital accumulation to social justice and ecological goals (Devall & Sessions 1985).

Socialist schools of thought such as Marxism provide one explanation for environmental degradation in capitalist societies. These schools of thought also posit mechanisms for achieving social justice that will not result in environmental degradation, the class struggle and subsequently the transformation from capitalist to socialist or communist modes of production (Considine 1994). In short, socialists would argue that through socialist modes of production humanity would be able to satisfy its material and spiritual needs without degrading the natural environment (Pepper 1993). Like ecological economics, eco variants on socialism differ from their orthodox counterparts in their endeavours to integrate ecological and socialist principles. This integration primarily involves recognising ecological constraints in economic and technical development (Gorz 1980; Ryle 1988).

Among socialist schools of thought there is considerable variation in the positions taken on the degree to which social behaviour and institutions are determined by underlying

structural factors, such as economic modes of production, and therefore the degree to which changing underlying social structures will lead to social change (O'Connor & Fotopoulos 1994). The extent to which revolution is a prerequisite to social change and the validity of defining class solely on the basis of people's roles in production are also contentious issues among socialists.

For anarchist schools of thought, hierarchical power structures that restrict the freedom of the individual are the social problem of most concern. These power structures manifest in the domination of the working class, women, races and the natural environment. Anarchist schools of thought include mutualism (Proudhon 1890), individualism (Stirner 1995), anarcho-communism (Kropotkin 1995), anarcho-syndicalism (Rocker 1988), eco-anarchism (or social ecology) (Bookchin 1980b) and anarcho-capitalism (Friedman 1989).

As for socialist schools of thought, capitalism is rejected in anarchist schools of thought. In addition, anarchist schools of thought share with socialist schools of thought an ideal of society that is classless and stateless (Devall & Sessions 1985). Despite these commonalities, there are some fundamental differences in the positions that anarchist and socialist schools of thought take on the causes of social injustice and the appropriate path to a classless and stateless society.

To illustrate, anarchist schools do not attribute social injustice to the domination of the capitalist ruling class over the working class. Rather, for anarchist schools of thought, the domination of the working class by the capitalist ruling class is only one manifestation of hierarchical power structures, as is domination of society by the state, women by men, one age group by another and the natural environment by society (Dryzek 1997). Thus, for anarchist schools of thought, natural resource and environmental problems are a symptom of hierarchical power structures in human society (Bookchin 1971, 1980b).

With respect to the path to social change, anarchist schools of thought, in contrast to socialist schools, reject any role for a planned economy, all forms of state and government, collective political action, and any participation in conventional politics (Barclay 1982; Friedman 1989; Bakunin 1990). Anarchist schools reject these social institutions on the basis that they are manifestations of hierarchical power relations. The anarchist alternative emphasises the individual as an agent of social change.

The emphasis that anarchist schools of thought place on the individual as an agent of social change is based on the idea that individual autonomy and self-regulation will lead to socially good behaviour without the need for external sources of coercion (Pepper 1993). Thus anarchist schools of thought tend to assume that human nature is fundamentally co-operative and sociable (Kropotkin 1902; Doyle & Kellow 1995). This represents a different basis for advocating individual autonomy than the basis used in neoclassical economics.

Of the anarchist schools of thought, eco-anarchism (or social ecology) is most concerned with integrating ecological and anarchist principles (Hay 1988; Lewis 1992; Pepper 1993). This integration is reflected in eco-anarchist goals which involve individuals living in harmony with both human society and the natural environment:

> If the foregoing attempts to mesh ecological with anarchist principles are ever achieved in practice, social life would yield a sensitive development of human and natural diversity, falling together into a well-balanced, harmonious unity...Freed from an oppressive routine, from paralysing repressions and insecurities, from the burdens of false toil and false needs, from the trammels of authority and irrational compulsion, the individual would finally be in a position, for the first time in history, to fully realize his potentialities as a member of the human community and the natural world... (Bookchin 1980a quoted in Doyle & Kellow 1995:77)

For feminist schools of thought, the social problem of most concern is the domination of women. Feminist schools of thought include black feminism (Guy-Sheftall 1995), Marxist and socialist feminism (Hartmann 1981; Hartsock 1983), radical feminism (Firestone 1970; Lorde 1983; Rich 1983), postmodern feminism (Haraway 1990; Butler 1998), global and third world feminism (Lugones 1990; Mohanty 1991; Sandoval 1991), liberal feminism (Friedan 1983) and eco-feminism (Merchant 1989; Russell 1990). While most schools of thought concur that men are a source of oppression, feminist schools of thought vary widely in the positions they take on the degree to which men are the only source of oppression and the extent to which they emphasise biological, political, cultural or individual factors in their problem framings. This has led to criticisms of feminist theories along the lines of 'the only thing they agree on is that women exist' (Wilber 1997:190).

The diversity of theories underpinning feminist schools of thought suggests that they are unified primarily on the basis of the goals of identifying, explaining and addressing the causes of the domination of women. This general observation on feminist theories seems also to apply to eco-feminism, the feminist school of thought most concerned with natural resource and environmental issues. While there is diversity in eco-feminist theories, Carlassare (1994) distinguishes two key schools of thought within eco-feminism. One is social eco-feminism, which tends towards rational analysis of social and natural resource and environmental problems. The other is cultural eco-feminism, which tends more towards radicalism and romanticism in its analysis.

Warren (1993), on the other hand, suggests that the key premise underpinning all eco-feminist schools of thought is that there are important connections between the domination of women and the domination of nature so that 'A main project of eco-feminism is to make visible these "women-nature connections" and, where harmful to women and nature, to dismantle them.' In short, eco-feminist schools of thought tend to frame natural resource and environmental problems as symptoms of the same forces that

make possible the domination of women (Devall & Sessions 1985; Kheel 1985; Lewis 1992).

Some examples include: male-biased beliefs, values, attitudes and assumptions about ways of knowing and ways of relating which include tendencies towards dualistic separations such as humanity from nature, reason from emotion and mind from body (Gray 1981; Warren 1987); language that reinforces the inferiority of women by naturalising women and feminising nature (e.g. mother nature, women as cows, foxes, chicks) (King 1981); and male biased political institutions (Plumwood 1995). So, from an eco-feminist perspective, natural resource and environmental problems stem from the domination of nature which flows logically from the domination of women. This implies that, to the extent that the domination of women and the domination of nature are connected, addressing the forces that make possible the domination of women will go a long way towards addressing problems with human-natural environment relationships.

In sum, for social schools of thought, natural resource and environmental problems, such as the native vegetation problem, are 'an arena in which fundamental conflicts over power, wealth and control are played out' (Conca & Lipschutz 1993:3). Social framings of natural resource and environmental problems will be of particular relevance when people perceive that natural resource and environmental policies are inequitable in their impacts on particular groups or individuals in society. If such a case can be made then this provides moral grounds for rejecting such policies:

> Australian farmers are the front-line in Natural Resource
> Management in Australia and are best placed to deliver National,
> Regional and Local environmental outcomes both now and into
> the future. Consequently, they must be adequately resourced
> and supported by governments and the wider community at
> large. Farmers should not be unfairly burdened with the
> maintenance of 'green infrastructure' for the benefit of the wider
> community... (National Farmers Federation 2003:5)

Human-natural environment relationship

Like neoclassical economics, ecological rationalism and ecological reformism, socialist schools of thought such as Marxism tend to take an anthropocentric position on human-natural environment relationships. For socialist schools of thought, as for neoclassical economics, this position involves a conception of the natural environment as the ecological basis of economic activity and as a means of production. This position also involves a conception of the human-natural environment relationship in which humanity shapes the environment in the interests of the collective good (Ryle 1988). Grundman (1991) observes that while this is an instrumental relationship, Marxism unlike neoclassical economics does not value the natural environment on the basis of its economic value alone. Pepper adds:

> The conception of nature in Marx, then, is not a mere stock of economic goods (a technocratic view), nor as a source of intrinsic worth or good (a deep ecology view), nor as an endangered ecosystem (tragedy of the commons survivalism). It conceives of nature as a social category: though there was an 'objective' nature, it has now been reshaped and reinterpreted by one aspect of itself; human society. (Pepper 1993:114)

Hence, the Marxist conception of the human-natural environment relationship follows a dialectical process between the material existence of the natural environment and humankind's interpretation of it. This dialectic process implies that while human society shapes the environment, it cannot totally transcend the material basis of the natural environment and must therefore respect natural laws (Parsons 1977).

Anarchist schools of thought, like socialist schools, tend to take an anthropocentric position on the natural environment (Hay 1988; Sylvan & Bennett 1994). At the same time, there are some key differences in the anarchist conception of the human-natural environment relationship relative to the socialist conception. To begin with, as anarchist schools of thought reject all forms of hierarchical power relationships, they are likely to reject a role for humanity that involves shaping the natural environment. Rather, anarchist schools of thought are more likely to support a human-natural environment relationship that involves individuals voluntarily adopting lifestyles that are consistent with minimal impact on the natural environment.

Further, anarchist schools of thought often view relationships in the natural environment as a template for human relationships (Gould 1974; Bookchin 1982). Thus anarchism tends to emphasise cooperative, non-hierarchical relationships in human society and in the natural environment. Sale (1985) for example argues that in the natural world there are no organisations that extend beyond a small group, such as collectives of troops or amalgams of like species. While he notes that there is sometimes evidence of pecking orders, these do not extend beyond individual groups.

Bookchin's (1990) eco-anarchist conception of the human-natural environment relationship is distinguished from other anarchist schools of thought in its rejection of either purely anthropocentric or purely ecocentric human-natural environment relationships. As for Marxism, this position makes use of dialectic logic. Specifically, Bookchin argues that human society is not superior to nature, which implies an egalitarian human-environment relationship. At the same time, he adds that humanity has a special place due to its capacity for self-consciousness and self-reflection. This capacity brings with it a responsibility of stewardship of the non-human elements of the natural environment, which implies an anthropocentric human-environment relationship.

Bookchin (1990) balances the tensions between these views using dialectic logic, which he argues is a way of striving toward ideals. The end result is a proposal for a human-natural environment relationship based on the interplay between eco-centrism and

stewardship. If dialectical logic can be used to synthesise two opposing ideals then this proposal is consistent with the rational basis of eco-anarchism as a school of thought.

Feminist and eco-feminist schools of thought take a variety of positions on human-natural environment relationships, which reflect a variety of theoretical perspectives and political philosophies. These positions range from anthropocentric to ecocentric and incorporate varying degrees of rationalism and romanticism. For example, some liberal feminists support moral consideration and equal rights for men and but not for the non-human elements of the natural environment. On the other hand, some liberal feminists support the idea that moral consideration and rights should extend to the non-human elements of the natural environment (Warren 1993).

Generally, eco-feminists are more likely to take an ecocentric position on the human-natural environment relationship than other feminist schools of thought. This position reflects the opposition of eco-feminism to value hierarchies or dichotomies that imply human interests are more important than the interests of the natural environment or that the interests of humans and the interests of the natural environment are conflicting rather than complementary (Ruether 1975; Gray 1981; Warren 1990). Eco-feminist schools of thought are also distinguished by their position that anthropocentrism and androcentrism[6] are linked. Plumwood (1991) argues that this position enriches the critique of anthropocentrism offered by other schools of thought such as deep ecology and environmental philosophy.

Whereas radical eco-feminism tends to adopt the view that women are closer to nature than men, most eco-feminist schools of thought tend to adopt an alternative position that men's oppression of women has meant that the dominant conceptualisation human-natural environment relationship is not inclusive of feminine ways of relating to the natural environment (Griscom 1981; Roach 1991; Warren 1993). For example, Keller

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[6] Androcentrism depicts the world from the perspective of male interests and values (see for example Bordo 1987; Plumwood 1996)

(1990) argues that modern scientific thought is gender biased towards male conceptions of objectivity, subjectivity and rationality. This, she argues, results in a controlling way of relating to the natural environment which parallels men's controlling way of relating to women. As a result, a major goal of eco-feminism is to identify, dismantle and replace conceptualisations of human-natural environment relationships that devalue feminine ways of knowing and relating (Warren 1993; Plumwood 2001).

Role of government

Socialist schools of thought generally share a critique of the state in capitalist societies that sees the state as representing the interests of the capitalist ruling class (Lindblom 1977; Block 1986; Jessop 1990). Hence, socialist schools of thought tend to take the position that in capitalist societies the state reinforces social inequality. At the same time, socialist schools of thought generally agree that the state, once under the control of the working class, will play a critical role in facilitating the transition from capitalism to socialism (Pepper 1993). Socialist schools of thought differ markedly however in their views on whether centralised government has an ongoing role in socialist societies and the nature of this role.

Orthodox Marxism, for example, sees a role for centralised government in wresting power from the capitalist ruling class and for facilitating the transition from capitalism to socialism. Nevertheless, orthodox Marxism often takes the position that as the transition from capitalism to socialism and communism evolves, there will be an ever decreasing role for the state, which will inevitably fade from existence (Marx & Engels 1968). In consequence, orthodox Marxists do not see an ongoing role for centralised government, the ultimate goal of this school being a classless and stateless society.

In contrast, other socialist schools do see a role for government in co-ordination and planning. This role would be based on the need to have some form of central co-ordination and control to set and action priorities above the local and regional level

and to ensure that the aspirations of different regions and local areas are equally represented (Stretton 1976; Ryle 1988). These schools of thought argue that it is possible to have intermediate forms of decentralisation such as 'co-ordinated decentralisation' or 'flexible centralisation' which can facilitate a power balance across local, regional, state and federal spheres (Lewis 1992).

While anarchist schools of thought vary in the positions they take on what a stateless society should look like, they are unified in their rejection of government by the state over the individual:

> To be GOVERNED is to be watched, inspected, spied upon,
> directed, law-driven, numbered, regulated, enrolled,
> indoctrinated, preached at, controlled, checked, estimated,
> valued, censured, commanded, by creatures who have neither
> the right nor the wisdom nor the virtue to do so. To be
> GOVERNED is to be at every operation, at every transaction
> noted, registered, counted, taxed, stamped, measured,
> numbered, assessed, licensed, authorized, admonished,
> prevented, forbidden, reformed, corrected, punished. It is, under
> pretext of public utility, and in the name of the general interest, to
> be place under contribution, drilled, fleeced, exploited,
> monopolized, extorted from, squeezed, hoaxed, robbed; then, at
> the slightest resistance, the first word of complaint, to be
> repressed, fined, vilified, harassed, hunted down, abused,
> clubbed, disarmed, bound, choked, imprisoned, judged,
> condemned, shot, deported, sacrificed, sold, betrayed; and to
> crown all, mocked, ridiculed, derided, outraged, dishonored.
> That is government; that is its justice; that is its morality.
> (Proudhon 1923:293-294).

For anarchist schools of thought, government by the state over the individual restricts the individual's capacity to meet their psychological needs for personal autonomy and a

sense of community (Sarason 1982; Fox 1985). As a result, for anarchist schools of thought, government by the state is oppressive by definition (Pepper 1993). It follows that anarchist schools of thought see no constructive role for government in resolving either social or natural resource and environmental problems. Rather, anarchist schools of thought, like deep ecologists, tend to advocate paths to social and environmental change that lie outside the dominant social order and its social institutions.

In terms of the role of government in resolving social and natural resource and environmental problems, feminist schools of thought span the political spectrum. Thus liberal feminists and eco-feminists take the position that it is possible to reform capitalist liberal democracies to better account for environmental and feminist goals. Marxist and socialist feminists and eco-feminists on the other hand view gender bias as a form of class oppression and take the position that a socialist social order would have a greater capacity to address the oppression of women and the environment than would capitalist social order. As a result, Marxist and socialist feminists and eco-feminists tend to see a role for government in facilitating the transition from capitalism to socialism and in co-ordination and planning. Likewise, some feminists and eco-feminists take an anarchistic perspective and see no constructive role for government in resolving social and environmental problems.

This diversity in perspectives reflects the fact that feminist schools of thought are not underpinned by a particular political philosophy that implies a particular role for government. Rather, feminist schools of thought are underpinned by a critique of oppressive relationships. While for cultural feminists this critique is focussed at the level of human consciousness, for social feminists it is focused on the range of social, economic and political institutions, including alternative models of government. An illustration of a social feminist critique is given by Plumwood's (1995) analysis of alternative models of democracy in which she proposes an eco-feminist alternative that is eco-centric and views humankind as citizens of human society and of the natural ecosystem. In short, feminist schools of thought advocate a range of roles for government which are aimed at addressing the sources of oppression that feminist

critique has identified in prevailing social, political and economic institutions (Merchant 1980; Shiva 1989; King 1990; Plumwood 1995).

Policy prescriptions

Social schools of thought tend to place first priority on ensuring social justice in human society. As already discussed, different social schools of thought emphasise different sources of social injustice and this is reflected in their policy prescriptions. The policy prescriptions of different social schools of thought are not often identifiable in natural resource and environmental management policies beyond broad statements relating to social justice. One of the major reasons for this is that, with the exception of liberal feminism, they propose alternatives to the dominant liberal political philosophy that prevails in western democracies such as Australia. As a result, these schools of thought are invoked when stakeholders perceive that the operation of the dominant philosophy results in social injustice. When this is the case, alternative schools of thought provide a basis for explaining why such injustices arise and propose ways of addressing them.

For socialist schools of thought the central policy prescription is to ensure that the perspectives of the working class are incorporated into the policy process. Most socialist schools of thought take the position that this cannot be achieved through capitalist modes of production. They propose a socialist alternative which would involve:

- developing productive forces in the interests of criteria other than economic imperatives; criteria such as freedom, social justice and the opportunity for self-actualisation among workers, even at the expense of some loss in economic profit (Schumacher 1980);
- reappropriating collective control over nature through collective ownership of the means of production (Pepper 1993);
- recognising and respecting ecological processes and natural laws;

- developing self-reliant communities based on renewable resource use and appropriate technologies (in terms of both its adaptiveness to nature and the needs of workers) (O'Riordan 1989); and

- treating people equally at the outset, rather than allowing inequalities to develop and then trying to compensate for them, 'hence the maxim from each according to ability: to each according to need.' (Pepper 1993:29)

For anarchist schools of thought the central policy prescription is to eliminate central policies by promoting individual autonomy. As for socialist schools of thought, most anarchist schools of thought take the position that this cannot be achieved in the context of capitalist societies or liberal democratic forms of governance. They propose an anarchist alternative which would involve:

- political, social and economic decentralisation;

- abolishing hierarchical, top-down government as well as representative forms of democracy;

- self-organising communities and non-hierarchical forms of direct democracy (see for example Bookchin's (1992) model of libertarian municipalism);

- achieving of harmony with nature through harmony among people (Devall & Sessions 1985);

- an emphasis on co-operation over competition, egalitarianism over hierarchical power relationships, voluntarism over coercion, ruralism over urbanism, altruism over self-interest, smallness of scale over largeness of scale (Cook 1990);

- voluntarily formed regional or national federations to deal with issues that extend beyond the local (Bookchin 1986); and

- the creation of a social environment which increases trust, friendship, equality, autonomy, and empathy and decreases competition, materialism, over-consumption, energy waste, hierarchy, and exploitation (Fox 1992).

For feminist schools of thought the central policy prescription is to ensure that women's perspectives are incorporated into the policy process. This would involve considering the environmental context of women and the ways in which this context might differ from

that of men. It would also involve identifying and removing barriers to women's capacity to participate fully in the policy process.

For instance, in their submission to the Australian Ecologically Sustainable Working Groups Brown and Switzer (1991) note that women make a distinctive contribution to maintaining environmental, economic and social sustainability and this reflects differences in the private and public roles they play relative to men. In the public arena women are the majority of the workforce in the health, education welfare and service industries. In the private arena women tend to take primary responsibility for unpaid household management including care-giving and education of children and the purchase of food and consumer goods.

According to Brown and Switzer (1991), as a result of these gender differences in context:

- women are half as likely to have post-secondary qualifications as men (recent statistics suggest that there is no longer such a disparity in the access that women and men have to post-secondary qualifications; as at 2005 54.2, percent of males and 48.9 percent of females in Australian had post secondary qualifications (Australian Bureau of Statistics 2005b));
- women are worse off economically than men, with women representing the majority of people in poverty (recent statistics suggest that this is still the case if income is used as a measure of economic well being (Australian Bureau of Statistics 2005a));
- women suffer disproportionately from ill health relative to men (as low income and low education are highly correlated with ill health);
- female industries and women whose primary responsibility is unpaid household management are underrepresented in decision-making processes in the public arena (they point to the Australian Ecologically Sustainable Working Groups as a case in point);
- women have different responsibilities and face different environmental risks to men;

- women have different concerns about natural resource and environmental issues than men; and

- women are generally less empowered to act on their concerns than men.

Brown and Switzer (1991) propose five policy principles aimed at incorporating the concerns of women in human, social and economic development:

- protection of social equity (which is critical to the capacity of people to adopt lifestyles that are ecologically sustainable);

- safeguarding national and personal security (including threats from environmental risks and risks from disruption and uncertainty);

- precautionary resource management (e.g. through placing the responsibility for avoiding environmental risks on economic development);

- full valuing of resources (including unpaid work, natural and social resources); and

- environmental education which includes women's concerns (including the impact of industries in which women make up the majority of the workforce and practical training in conflict management in natural resource and environmental management disputes).

The influence of a feminist perspective on natural resource and environmental policy is evident in the National Strategy for Ecologically Sustainable Development, the social goals of which include:

- To inform decision-makers, program managers and the community of women's contributions to ecologically sustainable development and to provide for women's access to relevant decision-making processes and information

- To assess the gender implications of ecologically
  sustainable development related initiative in all sectors of
  the economy (Commonwealth of Australia 1992)

Summary

In summary, social schools of thought share the view that natural resource and environmental problems are a symptom of social problems. As a result social theories contend that natural resource and environmental problems cannot be resolved without first ensuring social justice. While social schools of thought generally share the view that social injustice lies at the heart of natural resource and environmental problems, different social schools of thought point to different sources of, and therefore solutions to, social injustice.

For socialist schools of thought, the capitalist mode of production is the source of social injustice and this leads to the domination of the working class by the ruling class. For socialist schools of thought the solution to natural resource and environmental problems lies in replacing the capitalist mode of production with a socialist alternative, one that will be more adaptive to ecological functioning. For anarchist schools of thought hierarchical power structures are the source of social injustice, so that resolving natural resource and environmental problems involves liberating individuals from hierarchical power structures, including the government of individuals by the state. Feminist schools of thought, on the other hand, contend that natural resource and environmental problems flow logically from male domination of women. For feminist schools of thought it is critical to ensure that women's ways of knowing and relating to the natural environment are incorporated and valued in the formulation of natural resource and environmental policy.

The policy prescriptions of different social schools of thought are not often identifiable in natural resource and environmental policies as they provide critiques of the dominant liberal political philosophy in western democracies such as Australia. As a result, social schools of thought are likely to be reflected in debates over policy goals when stakeholders perceive that existing or proposed policies are socially inequitable. When this is the case, alternative schools of thought provide grounds for explaining why such injustices arise and propose ways of addressing them.

Conclusions

In this chapter the economic, ecological and social theoretical perspectives have been reviewed. These are three of the major perspectives that are invoked in debates over what policy goals should be and how they should be achieved. Each of these perspectives starts from a different position on the nature of natural resource and environmental problems, appropriate human-natural environment relationships, the role of government and appropriate means of achieving goals. As a result, the application of these theoretical perspectives to the same natural resource and environmental problem can result in different conclusions about the policy goals that should be aimed for and appropriate ways of achieving them. This helps to explain why stakeholder conflict over policy goals and the means of achieving them is an enduring and pervasive feature of natural resource and environmental policy.

The findings of this review also help to explain why broadly defined goals such as social equality, efficiency, integration, community participation, ecological integrity and social welfare might be interpreted differently by the range of stakeholders engaged in policy processes. This means that, even when there is consensus on the broad goals as stated in natural resource and environmental policies, differences in interpretation may emerge as conflicts when it comes to refining and implementing policies, as the way in which people interpret goals will influence their views on what is acceptable both in terms of

the means of achieving goals and the potential impacts on different segments of the community. A comparison of the policy prescriptions of the different schools of thought also indicates that, even when different stakeholders agree on policy prescriptions, it cannot be assumed that they agree for the same reasons.

All this suggests that in the formulation and implementation of natural resource and environmental policy it cannot be assumed that there will be wide consensus on the policy goals that should be aimed for, nor the means of achieving them. This suggests that the process of balancing and integrating economic, environmental and social goals will be inherently idiosyncratic and unpredictable, depending upon the stakeholders involved and the mix of theoretical perspectives invoked. This, in turn creates a high degree of uncertainty that needs to be accounted for if the process is to be strategically managed.

Chapter 3

Theoretical Perspectives on Strategic Management

> Planning, budgeting and managing people are all very well, but a
> manager is judged by the results achieved. Making things
> happen, reaching the goals set for the organisation: this is what
> managers are paid for. (Corbett 1992:166)

Introduction

Strategic management is about how to 'make things happen' to ensure that organisations achieve the goals that are set for them given available resources. In other words, strategic management is about how to translate goals into co-ordinated action. It is predicated on the idea that it is possible to develop an understanding of the dynamics that critically influence the capacity of an organisation to realise the goals set for it. This understanding is then used as a basis for developing strategies that will present the greatest potential for organisations to realise the goals set for them while making the most of available resources.

The resulting strategies will have ramifications for decision-making and activities throughout an organisation. With respect to a government organisation, for example, such strategies will set the parameters for decisions about: how resources are allocated among developing regulatory, educational and market based policy tools; who are the critical stakeholders to consider; the way in which decision-making will be shared among state, regional and local agencies; and the location of offices. Once policy goals are set and strategies have been selected, these ramifications will limit the capacity of an

organisation to adjust should there be changes in the nature of the dynamics that critically influence its capacity to achieve policy goals.

As a result, if such dynamics are stable then there will be considerable scope for achieving integration and efficiency[7] in the policy process in pursuit of policy goals. However, if such dynamics are unstable then achieving integration in the policy process is likely to limit its capacity to adapt to changing dynamics. This may involve some losses in efficiency. As foreshadowed in Chapter 1, strategic management provides a framework for analysing and balancing these tensions.

In this chapter, three of the major schools of thought on strategic management will be reviewed, namely rational strategy, incremental strategy and emergent strategy. These schools provide fundamentally different perspectives on balancing the tensions between integration and adaptability in pursuit of policy goals. The structure of the chapter is as follows. For each school of thought, the way in which the strategic problem is framed will be outlined. This will be followed by a description of strategy formulation according to the school. Next the assumptions that each school makes about stability, predictability and control will be discussed. In the process some conclusions are drawn about the relative merits of the different models of strategy involved and the conditions under which their assumptions are likely to hold.

Rational Strategy

Rational strategy, also known as the design school, has its origins in neo-classical economics and the rational comprehensive model of decision-making (Simon 1955; Mintzberg 1990; Tarter & Hoy 1998). Hence, rational strategy is an idealised approach that involves eliciting rational, objective and comprehensive knowledge of an

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[7] That is technical and allocative efficiency with respect to the inputs available to the organisation.

organisation and its environment which is then used to identify an optimal or 'one best way' for achieving clearly defined policy or organisational goals (Taylor 1947; Weber 1947; Fayol 1949). Rational strategy is the traditional school of thought on strategic management and as such has had a dominant impact on the way that strategic management has been conceived of and practised in private organisations and public policy (Andrews 1987; Mintzberg 1990; Corbett 1992; Stacey 1995; Beinhocker 1997; Van der Heijden & Eden 1998; Lynch 2000; Orchard, Ross & Young 2003).

Problem framing

From a rational perspective, strategic management is an optimising problem (Ansoff 1984; Checkland 1985; Tarter & Hoy 1998). So, the task of rational strategy is to identify an optimal means of achieving clearly defined policy goals. This task is achieved through rational and comprehensive analysis. This suggests that, from a rational perspective, the failure to achieve policy goals is attributed to a lack of rational and comprehensive analysis, which leads to the identification and implementation of sub-optimal strategies (Hendry 1995). As a result, a major focus of this school of thought has been to develop and apply systematic processes to improve the rationality and comprehensiveness of strategic decision-making (McGuire 1989; Mintzberg 1994a).

Formulation of Strategy

Since the 1960's the principal process for formulating rational strategy has been strategic planning (Mintzberg 1994a; Lynch 2000). In the classical approach to strategic planning[8] strategy formulation is broken down into a logical sequence of decision-making steps (McGuire 1989; Bridgman & Davis 1998). These steps generally include:

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[8] For example as described in Ansoff (1965).

1) formulating policy goals (including the setting of measurable targets);

2) making forecasts of future performance and identifying gaps between forecasted performance and desired performance in terms of the strategic objectives (gap analysis);

3) analysing the strengths and weaknesses of the organisation in terms of its capacity to capitalise on opportunities and minimise the potential impact of threats presented by the external environment (SWOT analysis);

4) generating alternative strategies for matching the internal capability of the organisation to the opportunities presented by the environment;

5) identifying the consequences of alternative strategies;

6) comparing alternative strategies in light of policy goals and targets;

7) selecting an optimal strategy; and

8) implementing, monitoring and controlling the selected strategy (Hax & Majluf 1984; Hay 1986; Bowman & Asch 1987; Argenti 1989; Mercer 1991b; Corbett 1992; Bridgman & Davis 1998).

In the strategic management literature there is some variation in the content and order of these steps and the degree to which there are feedback loops between them. At the same time, on the strength of the rational comprehensive decision-making model, these steps imply a one-way, linear chain of causality with each step reflecting the intent of the previous steps and constraining decision parameters in subsequent steps. Hence, policy goals are formulated independently and in advance of the search for an optimal strategy. The search for an optimal strategy is then conducted in light of the policy goals but independently and in advance of strategy implementation. Strategy implementation is taken into consideration in the final stage of the process. The position of strategy implementation in this process is consistent with a fundamental premise of this school of thought that action should be preceded by conscious analysis (Mintzberg 1990; Franklin 2004).

The rationality of strategy

Because it is based on the rational comprehensive decision-making model, the classical approach to strategic planning assumes that absolute knowledge of an objective reality can be obtained through conscious, rational and comprehensive analysis. This implies that it is possible to identify and take into account all the potential consequences of the strategic alternatives in identifying an optimal strategy. This is not possible in reality due to practical constraints such as the time and resources available for making decisions and the cognitive demands that it places on the decision-maker (Mintzberg 1983; Feldman & Kanter 1965; Hoy & Miskel 1991; Bridgman & Davis 1998). As with neo-classical economics, the classical approach to strategic planning also implies that the consequences of strategic alternatives are comparable and can be traded off against each other. In practice, this means that strategic planning tends to focus on consequences that are quantifiable and amenable to analytical tools such as cost benefit analysis (Quinn 1980; Mintzberg 1994a; Dryzek 1997; Orchard, Ross & Young 2003).

The classic approach to strategic planning is also predicated on the assumption that policy goals can be identified, agreed upon and clearly articulated a priori. Such goals remain fixed for the duration of the analytical process. This assumption is often not supported in practice, either in the private or public sectors (Hoy & Miskel 1991; Mintzberg 1994a; Stacey 1996; Tarter & Hoy 1998). This is particularly problematic for government agencies that are expected to balance multiple, contested and often conflicting policy goals, such as the economic, social and environmental goals discussed earlier in Chapter 2.

It is widely acknowledged that the idealised model of rational comprehensive decision-making was intended as a prescriptive model of decision-making rather than a model of how decisions are made in practice (Lindblom 1959; Dror 1971; Corbett 1992). Therefore, critiques of this model have tended to focus on its value as a foundation for theories of strategic management that decision-makers should be guided by, even if they are not achievable in practice (Taylor 1947; Simon 1955; Lindblom 1959; Hirschman &

Lindblom 1969; Simon 1993; Rosenhead & Mingers 2001b). On this point, the idealised model has been criticised for inadequately accounting for some key realities of strategic decision-making, such as uncertainty and subjectivity, which affect the logic of strategic decision-making in theory and practice. As a result, Simon (1955:100) argues, that if the ideal is adopted as a basis for guiding strategic decision-making 'the hard facts of the actual world can, at the present stage, enter the theory only in a relatively unsystematic and unrigorous way.'

Simon's (1955) criticism of the rational comprehensive model of decision-making led him to propose 'bounded rationality' as a more realistic foundation for rational decision-making. This model accounts for the existence of uncertainty in strategic decision-making which, Simon argues, means that strategic decision-making will invariably be based on limited information. This model of rationality also accounts for the likelihood that decision-makers will pay selective attention to the limited information available to them, depending for example on their personal goals, their experience and their cognitive capacity. This model of rationality also suggests that it will be rational to search for additional information so long as the expected value of additional information is greater than its expected cost. Therefore by reason of this model, decision-making is rational if it is consistent with the goals sought after, the information available and the expected value of additional information relative to its expected cost.

The model of bounded rationality does not assume that what is rational for an individual decision-maker is necessarily rational at the organisational level. In particular, Simon (1991) argues that the alignment between what is rational at the organisational level and what is rational for individual employees will depend on four key mechanisms: authority, rewards, identification and co-ordination. According to Simon, these mechanisms will affect not only the degree to which individual employees accept the goals of the organisation, but also the degree to which employees will use their skills and knowledge to the best of their ability in the interest of achieving the goals of the organisation. Simon notes that the latter requires employees to take the initiative to move beyond complying with organisational rules and procedures.

The model of bounded rationality transforms strategic management from an optimising problem to a satisficing problem (Simon 1955; Simon 1993). Satisficing is an iterative process whereby available information is used to identify acceptable rather than optimal outcomes. Once acceptable outcomes have been identified they are used as a basis for evaluating alternative strategies and for selecting a satisfactory strategy for realising policy goals, as opposed to an optimal one. Given the iterative nature of this process both policy goals and the strategies for achieving them may evolve over time in light of experience.

Therefore the model of bounded rationality introduces some elements of double-loop learning to strategy formulation. Specifically, it entails reviewing and adapting policy goals as well as the means of achieving them in light of experience. In contrast, strategy formulation based on the rational comprehensive model implies more of a single-loop learning process which entails evaluating strategic alternatives according to predetermined policy goals and targets. Hence, strategy formulation based on bounded rationality asks whether the right things are being done, while strategy formulation based on the rational comprehensive model asks only whether things are being done right (Flood & Romm 1996; Tarter & Hoy 1998; Cooksey 2001; Downs, Durant & Carr 2003). Where the former tends to promote efforts to adapt policy goals in light of experience, the latter tends to promote efforts to close the performance gap between the outcomes of current policies and the realisation of predetermined policy goals.

Control, stability and predictability

The classic approach to strategic planning provides a conceptual framework for identifying an optimal strategy but not for implementing it. This distinction between identifying a strategy and implementing it is predicated on some assumptions about control with respect to both the internal functioning of organisations and the external

environment. With respect to the internal functioning of organisations, it is assumed that organisations can be reorganised in line with strategic directives, and that this reorganising will have the intended effects (Andrews 1987; Ginsberg 1988; Zajac & Shortell 1989; Stacey 1995). As a result, it is often argued that rational strategy is dependent on the co-ordination of organisational activities through central control (Koonz & O' Donnell 1964; Majone & Wildavsky 1978; Hayes 1985; Stoner, Collins & Yetton 1985; McGuire 1989; Mintzberg 1990; Mintzberg 1994a; Stacey 1996). Hence Tannenbaum argues:

> Organization implies control. A social organization is an ordered arrangement of individual human interactions. Control processes help circumscribe idiosyncratic behaviors and keep them conformant with the rational plan of the organization. Organizations require a certain amount of conformity as well as the integration of diverse activities. It is the function of control to bring about the conformance to organizational requirements and achievement of the ultimate goals of the organization. The co-ordination and order created out of the diverse interests and potentially diffuse behaviors of members is largely a function of control. (Tannenbaum 1968:3)

This dependence on central control means that the classic approach to strategic planning is generally conceived as a hierarchical process driven by top level managers (Zajac & Kraatz 1993; Mintzberg 1994a; Stacey 1995). The task of top level managers is 'to define the ends of group existence, to design an enterprise distinctively adapted to these ends, and to see that design becomes a living reality' (Hayes 1985 quoted in Mintzberg 1994a:176).

Conceiving strategic management in this way implies that top level managers are either vested with the required strategic knowledge or that they can access, absorb and assimilate this knowledge from other sources. Moreover, it implies that the decisions of top level managers are the only decisions that influence the direction, position and

viability of an organisation (Quinn 1981; McGuire 1989). Such a conception does not allow for the possibility that, unbeknown to top level managers, people in a range of roles in an organisation might make decisions that have the potential to influence the direction, position and viability of an organisation (Mintzberg & McHugh 1985; Stacey 1996; Downs, Durant & Carr 2003).

With respect to the external environment, in the classic approach to strategic planning it is assumed that comprehensive and rational analysis of past environmental behaviour will allow forecasts to be made about future environmental behaviour. This suggests a relatively stable and predictable environment whose behaviour will not change qualitatively for the duration of the strategic planning horizon (Andrews 1971; Mintzberg 1994a; Stacey 1996). Hence, Mintzberg (1994:110) dryly asserts that 'according to the premises of strategic planning the world is supposed to hold still while a plan is being developed and then stay on the predicted course while that plan is being implemented.'

Research suggests the assumption of a stable environment is unlikely to hold in reality. Specifically, Beinhocker's (1997) research suggests that while the assumptions of a stable environment may hold for particular industries and particular periods of time, such as some agricultural and manufacturing industries in the early twentieth century, this assumption is problematic for high technology and service dominated industries. Similarly, Godden's (1999) research suggests that the assumption of a stable environment is problematic for Australian agricultural industries due to their export orientation. This assumption is also problematic for public agencies as they tend to operate in environments where broad socio-political and socio-economic forces can lead to qualitative changes in government and community expectations about the goals that public agencies should pursue and the appropriate means of pursuing them (Hendrick & Nachmias 1992; Nelson 1999; Byrne 2001).

The aforementioned assumptions about control, stability and predictability imply a tight or mechanistic organisational design which is typified by hierarchical lines of authority and communication; standardisation of tasks to ensure that activities in an organisation

are conducted in a consistent and predictable way; and a reliance on formalised mechanisms of control such as clearly specified operating procedures, job description and rules and regulations (Kast & Rosenzweig 1974; Mullins 1993; Narayanan & Nath 1993). This sort of design promotes specialisation and is therefore conducive to a high degree of efficiency when the behaviour of the environment is stable and predictable. However, it is conducive to a low degree of adaptability should the behaviour of the environment be less stable and predictable than presumed.

It follows that in a relatively stable environment, where the behaviour of the internal organisation is amenable to managerial control and behaviour of the external environment is predictable, the rational model of strategic planning offers a systematic way for achieving integration and realising predetermined policy goals. However, deviations from these conditions may necessitate some retreat from integration in the interest of adaptability. Recognition of this tension has led some to warn that relying solely on this model can also provide a systematic way of either failing to realise policy goals or realising policy goals that are no longer relevant (Lindblom 1959; Stacey 1995; Berlin 1996; Downs, Durant & Carr 2003).

Summary

In sum, rational strategy is grounded in the ideal model of rational and comprehensive decision-making. As a result, approaches to strategic management based on rational strategy tend to conceive of strategic management as a deliberate, systematic and linear process. Key features of strategy formulation in this process include clearly defining and articulating policy goals, rational and comprehensive analysis of alternative strategies for achieving such goals, and the selection of an optimal strategy from among the alternatives. This aim in this process is to identify an optimal way of achieving predetermined policy goals.

A key criticism of rational strategy is that its model of rationality departs so far from reality that it is neither a good guide to decision-making nor a good theoretical foundation for strategic management. This has led to the development of more realistic models of rationality such as Simon's (1955) model of bounded rationality. This alternative model transforms the problem of strategic management from one of identifying an optimal solution to one of identifying a satisfactory solution. This alternative model also entails reviewing and adapting policy goals and the means of achieving them in light of experience. This has the effect of transforming strategy formulation from a process which engages single-loop learning to a process which engages double-loop learning. While these transformations decrease the extent to which strategic management can be conceived of as a well-ordered, well-defined and linear process, they introduce greater potential for learning and adapting in light of experience.

Rational strategy is also predicated on two key assumptions about control, stability and predictability. First, rational strategy is predicated on the assumption that the internal functioning of organisations is relatively stable, predictable and amenable to central control so that the activities of organisations can be coordinated in line with strategic priorities. Second, rational strategy is predicated on the assumption that the behaviour of the environment is relatively stable and predictable. In a relatively stable environment rationally formulated plans will still be relevant when it comes to the implementation stage. These assumptions imply an organisational design conducive to high integration; such a design is less conducive to adaptability.

Incremental Strategy

> For complex problems, tied to an unhelpful aspiration that simply
> admonishes "Be complete!" an analyst unknowingly or guiltily
> muddles badly. Or, pursuing a guiding ideal of strategic analysis,
> he knowingly and openly muddles with some skill. Hence, his

taking as an ideal the development of better strategic analysis
will be far more helpful than his turning away from strategic
analysis in an impossible pursuit of approximations to synopsis.
(Lindblom 1979:518)

Proponents of incremental strategy such as Lindblom (1958; 1959, 1979) argue that when there is uncertainty and subjectivity associated with strategic decision-making, accepting these as realities and developing systematic mechanisms to deal with them will lead to better (more practical, politically acceptable and efficient) strategies than will failed attempts to be comprehensive and objective, as per the rational model of strategy. According to Lindblom, uncertainty and subjectivity in strategic decision-making emerge when there is social conflict over policy goals or the means of achieving them and when there is limited information available on the potential consequences of strategic alternatives. Limited information, in turn, arises when something is intrinsically unknowable or when the resources required to elicit and analyse information are greater than what is available.

By reason of this argument, Lindblom developed a model of incremental strategy, also known as disjointed incrementalism, to inform strategic decision-making in public policy. This model comprises a set of guidelines which are aimed at systematically reducing the chances of serious adverse consequences as a result of uncertain information and social conflict. These guidelines emphasise the importance of experience, learning through trial and error and political interaction in strategic management. They also favour incremental changes to current strategy over major shifts in direction. Incremental strategy is widely regarded as a realistic description of strategic decision-making processes in public policy (Altman 1994; Doyle & Kellow 1995; Bridgman & Davis 1998). However, there is considerable debate over the extent to which the approach is desirable to aim for (Dror 1964; Schultze 1968; Metcalfe & Richards 1987; Doyle & Kellow 1995).

Problem framing

The focus in incremental strategy is on addressing two related problems. The first is the analytical problem that emerges once it is accepted that it is only ever possible to base strategic analysis on limited information and therefore a partial understanding. If being as comprehensive as possible is rejected as a criterion for selecting information to be used in strategic analysis, then this suggests a need for an alternative criterion for selecting information. Lindblom asserts that one such criterion should be to reduce exposure to the risk of serious adverse consequences, arguing that non-incremental policy proposals are 'typically not only politically irrelevant but also unpredictable in their consequences' (Lindblom 1959:85).

Lindblom's criticism of the political relevance of non-incremental policy proposals foreshadows his view that the second problem that needs to be addressed in strategic management is the political one that arises when there is social conflict over policy goals and the means of achieving them. When this social conflict is grounded in value conflicts, such as those discussed in Chapter 2, Lindblom argues that resolution is unlikely to be found through objective analysis. Thus, he observes that a simple fact that is often overlooked is that 'understanding a social problem is not always necessary for its amelioration' (Lindblom 1979:524-525). Rather, he points to a need for political processes in strategic management which provide an opportunity for decision-makers to interact and mutually adjust their positions in the interest of identifying points of policy on which they agree over time.

Formulating Strategy

The incremental model of strategy formulation comprises seven elements. In contrast to strategic planning, these elements do not form a sequence of steps but function as a set of interrelated guidelines. As was the case with the guidelines for adaptive management

presented in Chapter 1, these elements were not intended to be universally applicable. This recognises that some elements will be more relevant to particular circumstances than others. The seven elements of incremental strategy formulation are to:

1. limit analysis to a few strategic alternatives, largely informed by past experience;

2. limit analysis to strategic alternatives that are only incrementally different from current strategy;

3. integrate analysis of policy goals and the means of achieving them;

4. focus analysis on avoiding adverse consequences over pursuing positive goals;

5. conduct analysis through successive learning cycles whereby strategy is applied monitored and evaluated and revised;

6. limit analysis to only a few of the potentially important consequences of the alternative strategies considered; and

7. distribute decision-making among many (partisan) participants in strategy formulation (Lindblom 1959, 1979).

Like adaptive management, outlined in Chapter 1, the formation of incremental strategy is an iterative and systematic learning process. This implies that any strategy to emerge from the process will be only provisional. This enables strategy to change over time in light of experience. At the same time, this capacity to change will be limited in any given learning cycle because analysis is limited to alternatives to those that differ only incrementally from previous strategies.

One significant departure of the incremental model of strategy formulation from the conventional model of rational strategy is that it does not consider the setting of policy goals separately from the means of achieving them. Nor do policy goals remain fixed for the duration of the strategy formulation process. Another significant departure of the incremental model from rational strategy is that, by distributing decision-making among many participants, it explicitly incorporates a mechanism for political interaction in strategy formulation.

Rationality of Strategy

> What kind of aspiration, norm, or ideal gives direction and other
> specific guidance to a body builder - his hope to have the
> strength of a gorilla or his intention to exceed Arnold
> Schwarzeneger? For a soprano, the impossible aspiration to hit
> a note six octaves above the highest note ever sung, or the
> resolve to reach A above high-C? For a person who dislikes
> telephone directories, to memorize all the telephone numbers he
> might ever use or to memorize a still difficult smaller set of
> frequently called numbers? An aspiration to synopsis does not
> help an analyst choose manageable tasks, while an aspiration to
> develop improved strategies does. (Lindblom 1979:518)

In short, Lindblom is arguing that what is rational depends on what is do-able. It is by reason of this logic that policy goals and the means of achieving them are analysed simultaneously in incremental strategy. It is also by reason of this logic that strategic goals are excluded from consideration if they are not considered do-able.

Moreover, consideration of what is do-able according to the incremental model of rationality is not limited to what is objectively or technically viable. In contrast to the rational comprehensive model, 'social rationality' is the overriding consideration in incremental strategy. For this reason Lindblom (1959) proposes that the test of a good policy proposal is that decision-makers agree on it. This does not imply that there is necessarily agreement on policy goals, as a particular policy proposal may be a means to a variety of ends. In other words decision-makers may well agree on policy proposals for different reasons. This was illustrated in the review of different schools of thought on natural resource and environmental policy goals presented in Chapter 2 (for example the advocacy of both economic and anarchist schools of thought for individual autonomy).

Lindblom acknowledges that, on the surface, social agreement might seem a poor test of good policy when compared with the test for the rational comprehensive model (which is to test a policy against the goals set for it). Nevertheless, he asserts that, in reality, the validity of both models depends on social agreement. In the case of the rational comprehensive model, it is assumed that there is social agreement on policy goals. In the case of the incremental model, social agreement is sought 'wherever it can be found' (Lindblom 1959:84). Theoretically, then, both models limit policy consideration on the basis of social agreement. For the rational comprehensive model this implies that a lack of social agreement will limit consideration to only a subset of possible policy goals. For the incremental model it implies that a lack of social agreement need not limit consideration to a subset of possible policy goals, to the extent that policy proposals for which agreement exists can be seen as a means to a variety of ends; in other words, to the extent that decision-makers pursuing different policy goals agree on the social acceptability of means.

Hence, according to the incremental model, it is rational to exclude policy proposals from strategic analysis if decision-makers agree that they are socially unacceptable, even though they may have high technical merit when measured against policy goals. There is some evidence of this in natural resource and environmental policy, as illustrated in Pannell's (2001) review of government policies on dryland salinity in Australia. Specifically Pannell observed that dryland salinity policies have pursued strategy options that have distributed government investment broadly among farmers over options that had the potential to be more technically effective but involved targeting particular localities or investing directly in engineering works rather than farmers. The implication is that technically superior strategy options have been excluded from consideration on the grounds that they were social unacceptable. Pannell's conclusion that there was a clear need for a change in policy approach suggests that he did not support the way in which social acceptability had influenced the policy decisions he had observed.

This example raises questions as to what policy goals are realistic to aim for in relation to dryland salinity and in consequence it highlights the interrelatedness of policy goals and

the means of achieving them. It suggests that even though it may be technically viable, it may not be realistic to aim to prevent or remedy dryland salinity if the available means of doing so are socially unacceptable. In such cases it may be more realistic to aim to assist local communities to adjust to changes in landscape functioning than to aim to prevent or remedy changes in the landscape itself. In other words, it may be more realistic to adopt policy goals that are palliative in nature rather than curative (Kristjanson & Hobbs 2001).

Another aspect of rationality in incremental strategy relates to the problem that strategic analysis can only ever be based on limited and uncertain information. The solution that Lindblom proposes is to take an incremental and remedial approach to strategy with a view to reducing the chances of serious adverse consequences (Lindblom 1959; Hirschman & Lindblom 1969). This approach is evident from the guidelines presented above for formulating strategy. There are three assumptions underpinning this approach. The first is that small changes in current policy will result in small exposures to risk. The second is that the consequences of small changes to current policy are more predictable than the consequences of large changes. The third is that it will be possible to learn from the consequences of strategic decisions made previously and, if deemed necessary, retreat from the course set by them. Thus, errors 'not avoided can be mopped up or attended to as they appear, because analysis and policy making are serial or successive' (Hirschman & Lindblom 1969:359).

Given these assumptions, an incremental and remedial approach to strategy can be justified on the basis of social rationality. Specifically, it can be argued that the likelihood of securing social agreement on small, low risk changes in policy will be significantly greater than the likelihood of securing social agreement on large, high risk changes in policy. Small changes, Lindblom argues, 'do not rock the boat, do not stir up the antagonisms and paralysing schisms as do proposals for more drastic change' (Lindblom 1979:520). By reason of this argument Lindblom suggests that, if small changes in policy are made frequently, incremental strategy is potentially the fastest way to achieve large shifts in policy direction.

The rationality of incremental strategy has been criticised on a number of grounds. First, it has been criticised for favouring the status quo (and its associated social and environmental inequalities) when radical departures from the status quo may be required to remedy social problems (Dror 1971; Bridgman & Davis 1998). Thus, incremental strategy encourages single-loop when double-loop learning may be called for. In the realm of natural resource and environmental management, for example, it has been argued that a holistic and integrated approach is needed to address environmental problems, which requires altering the entire logic of current policies rather than simply changing them at the margins (Dryzek 1987b; Doyle & Kellow 1995). Recall from Chapter 2 that various social and ecological schools of thought argue that radical change in the current social order will be required to adequately address natural resource and environmental problems.

Second, the adoption of social rationality as the overriding test for good policy has been widely criticised on the basis that many social and environmental problems are the result of socially rational policies (Dror 1971; Dryzek 1987b; Mercer 1991a). With respect to natural resource and environmental management this suggests that what is socially acceptable does not necessarily correspond with what is required to remedy an environmental problem (especially over the longer term). This means that even when there is sufficient political support to incorporate ecological values into policy goals, there may be insufficient support to ensure that policies are implemented effectively when measured against the environmental policy goals that were set for them. This sort of tension was highlighted in the context of dryland salinity earlier in this section.

Third, the assumptions underpinning the idea that consideration should be limited to small changes from current policy have been criticised on the basis that there are times when small changes in policy are likely to result in serious, unpredictable and irreversible consequences. In natural resource and environmental management this is of particular concern with what has become known as creeping environmental problems (CEPs)[9]:

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[9] In economics this issue is known as 'the tyranny of small decisions' (Kahn 1966; Odum 1982).

A major feature that CEPs share is that a change in a creeping environmental problem does not make it much worse today than it was yesterday; nor is the rate or degree of change tomorrow likely to be much different from that of today. So societies (individuals as well as government bureaucrats) do not, for the most part, recognize changes severe enough to cause them to treat their environments any differently than they had on previous days. Yet incremental changes in environmental conditions accumulate over time with the eventual result that, after some perceived if not objectively defined threshold of change has been crossed, those unimportant imperceptible increments of change "suddenly" appear as major degradation. If no action is then taken, as is often the case, those incremental changes will likely continue to mount until a full-blown crisis emerges. (Glantz 1998)

Creeping environmental problems include things like salinity, global warming, deforestation, desertification, acid rain and ozone depletion. The danger with taking an incremental approach to these sorts of problems is that when cumulative impacts reach a threshold, small changes in policy may lead to irreversible and catastrophic ecological and social consequences. Moreover, such problems may not engender social concern until an irreversible threshold has been exceeded. Under such conditions limiting consideration to small changes from current policy and maintaining social rationality as the overriding test for good policy would seem to be problematic.

These critiques of the rationality of incremental strategy highlight a dilemma for policy makers. On the one hand, if they adopt social rationality as their overriding decision-making criterion, this may well reduce stakeholder resistance to their policy proposals and enhance their political success. On the other hand, if socially rational policy leads to thresholds of environmental degradation being reached, they may well suffer political backlash from being held accountable on scientific, economic or ecological grounds.

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Control, stability and predictability

Whereas strategic decision-making is assumed to be centralised in rational strategy, in incremental strategy decision-making is decentralised. This is mainly by virtue of the principle of social rationality and, as a consequence, the distribution of strategic decision-making among many partisan participants. As a result, policy goals and the means of achieving them evolve over time through a continuous political process in which decision-makers interact and mutually adjust their positions. Lindblom describes this process as partisan mutual adjustment and suggests that in many circumstances it will 'achieve a coordination superior to an attempt at central coordination, which is often so complex as to lie beyond any coordinator's competence' (Lindblom 1979:523).

Therefore in incremental strategy it is not assumed that any individual or subgroup of managers is vested with the knowledge and power to determine how policy goals and the strategies for achieving them will evolve over time. Rather, the process of partisan mutual adjustment implies that it will only ever be possible for any individual or subgroup of managers to partially influence the direction that policy takes. Moreover, it suggests that, regardless of the characteristics of the environment external to the strategic decision-making process, it will only ever be possible to predict the direction that policy will take to the extent that it is possible to predict how the various partisan decision-makers involved will mutually adjust to each other. Lindblom (1979) observes that, as a result, the direction that policy takes might be better described as something that happens rather than something that is intended or decided upon. In short, incremental strategy accounts for the possibility of not only decentralised decision-making in strategic management but also for the possibility that uncertainty and unpredictability are likely to emerge from sources within the strategy process itself.

The mechanisms aimed at avoiding serious adverse consequences in incremental strategy (such as conducting strategic analysis through successive learning cycles and limiting consideration to small departures from current policy) rely on the following assumptions about control, stability and predictability. To begin with, it is assumed that current social behaviour and the behaviour of the natural environment are relatively stable within bounds. If this assumption holds, then small changes in policy that do not change social and ecological behaviour beyond the bounds of their stability are unlikely to produce irreversible or threshold effects (as described above for creeping environmental problems). Moreover, within such bounds it is reasonable to expect that current behaviour can be used as a basis for predicting, and therefore influencing, future behaviour. If these assumptions hold then the adoption of an incremental approach to strategy is unlikely to lead to serious adverse social and ecological consequences.

At the same time, the extent to which incremental strategy will be adaptive to changing conditions in the natural environment will be mediated by the overriding influence of social rationality on policy. Specifically, if social rationality and ecological rationality do not correspond, then incremental strategy will be adaptive to social change but not to ecological change. Some of the consequences of this have already been noted and include the adoption of policy goals that do not adequately represent ecological values and the adoption of strategies that are socially acceptable over strategies that have the potential to be more effective if evaluated according to ecological criteria. Further, if there are large changes in the behaviour of the natural environment or its behaviour is unstable then incremental strategy may result in policies that are at best inadequate and at worst catastrophic in terms of their ecological impacts.

In comparison with rational strategy, the emphasis in incremental strategy is on adaptability over integration. However, the degree to which incremental strategy will promote adaptability or integration will depend on the balance of these in current policy and the degree to which decision-makers engaged in partisan mutual adjustment are supportive of changes in this balance. If current policy is highly integrated then incremental strategy will likely promote integration in future policy. Conversely, if

current policy is highly adaptive then incremental strategy will likely promote adaptability in future policy. The degree to which incremental strategy will promote adaptability or integration will also depend on the degree to which the mutual adjustments of decision-makers involved are conducive to changes in the existing balance. This will also depend on the degree to which decision-makers involved are representative of a wide variety of perspectives and roles. Thus the degree to which incremental strategy will promote adaptability or integration will depend on a range of contingencies.

These contingencies mean that it is difficult to draw implications for organisational design from incremental strategy. On the one hand, the emphasis of incremental strategy on adaptability implies a more organic organisational design. Such designs typically involve: a network structure of authority and communication; fluid definitions of tasks and job descriptions to ensure adaptability to changing requirements; and a reliance on informal mechanisms of control such as broadly defined procedures and unwritten rules (Kast & Rosenzweig 1974; Mullins 1993; Narayanan & Nath 1993). On the other hand, if an organisation is highly mechanistic and hierarchical to start with, strategy options involving a more organic organisational design may well be socially unacceptable among decision-makers and difficult to implement.

Summary

In summary, incremental strategy is a pragmatic approach to strategic management that explicitly addresses uncertainty and subjectivity. There are seven elements to incremental strategy. These elements mutually reinforce the notion of strategic management as an infinite sequence of single-loop learning cycles, whereby consideration in any given learning cycle is limited to small changes from strategy decided in the previous cycle. The elements of incremental strategy also mutually reinforce the notion of strategic management as a social process which is inherently and

appropriately subjective. Two core aims in incremental strategy are to avoid serious adverse consequences and diffuse social conflict in the pursuit of policy goals.

In contrast to rational strategy, policy goals and the means of achieving them are not analysed sequentially in incremental strategy. Rather, they are analysed simultaneously by reason of the argument that what is rational to aim for in policy depends on what is do-able. Moreover, policy goals and the means of achieving them are fluid in incremental strategy, evolving over time in light of experience. Incremental strategy also departs from rational strategy in its emphasis on social rationality over objective rationality. This is reflected in the idea in incremental strategy that good policy is policy that decision-makers agree on.

A comparison of incremental strategy with rational strategy also reveals that where the former relies on decentralised decision-making the latter relies on centralised decision-making. This suggests that for incremental strategy, policy goals and the means of achieving them will evolve over time as a result of the interactions and mutual adjustments among decision-makers. Further, it suggests that there is an obscure relationship between any given decision-maker's intention and the direction that policy takes. The net result is that, in incremental strategy, uncertainty and unpredictability emerge from both the external environment and the strategy process itself.

There are three core criticisms of incremental strategy that relate to the logic of limiting consideration to small changes from current strategy. First, it has been argued that limiting consideration to small changes from current strategy will favour the status quo and its associated social and environmental inequalities. Second, it has been argued that resolving social and environmental problems may well require a fundamental change in the logic of current policies. Third, there is evidence to suggest that small changes are not always associated with a correspondingly small risk of serious adverse consequences. In natural resource and environmental policy this is of particular concern in relation to creeping environmental problems such as salinity and global warming where small

changes result in cumulative impacts and threshold effects that can have irreversible and catastrophic consequences.

The major remaining criticism of incremental strategy relates to the overriding influence of social rationality over other grounds for rationality such as ecological or scientific considerations. In relation to natural resource and environmental policy this suggests that the extent to which policy adequately responds to environmental problems will depend on the extent to which they are recognised as social problems. This is likely to favour the adoption of strategies that are socially acceptable over strategies that have the potential to be more effective if evaluated according to environmental criteria. While there is evidence to suggest that this may well be an accurate description of the political reality of natural resource and environmental policy processes, many consider this to be undesirable.

Finally, relative to rational strategy, the emphasis in incremental strategy is on adaptability over integration. Nevertheless, it would seem that the extent to which incremental strategy will promote adaptability over integration in any given learning cycle will depend on the extent to which current strategies are adaptive or integrative, the characteristics and perspectives of decision-makers involved and the results of their mutual adjustments. In other words, the extent to which incremental strategy will promote adaptability over integration will be highly contingent on the characteristics of existing policy processes and participants.

Emergent Strategy

Emergent schools of thought on strategy have arisen in recognition that co-ordinated organisational behaviour can result from sources other than central intention and control. In natural resource and environmental policy co-ordinated behaviour can result, for example, from chance events and dynamics in the natural environment, from interactions

between the policy process and the natural environment or, as discussed earlier for incremental strategy, from interactions among decision-makers within the policy process itself. Co-ordinated behaviour resulting from sources other than central intention and control is known as emergent behaviour or self-organising behaviour (Mintzberg & Waters 1985; Stacey 1996).

Emergent or self-organising behaviour mediates between strategy as intended and strategy as realised. By this logic Mintzberg and Waters define emergent strategies as 'patterns or consistencies realized despite, or in the absence of, intentions' (Mintzberg & Waters 1985:257). Thus, Mintzberg and Waters equate emergent strategy with emergent behaviour. However, Downs, Durant and Carr (2003) extend this definition to include interpretation of emergent behaviour, which would seem consistent with the way emergent strategy is generally described in the literature.

The dynamics of emergent behaviour is a core interest of systems theorists. Therefore, it is not surprising that emergent strategy draws heavily on systems theories to explain the dynamics of emergent behaviour and its implications for strategy. A significant dynamic of emergent behaviour is that, while it arises from the interactions of individual behaviours within a system, it is not possible to predict future emergent behaviours from current individual behaviours (Checkland 1981; Senge 1990; Lissack 1999). Reasons for this include the potential for individual components to behave independently of each other and the potential for nonlinear interactions among components in complex systems.[10] All this means that given knowledge of current individual behaviours and interactions it may be possible to anticipate that emergent behaviours are likely to occur in a policy system; however, it will not be possible to predict exactly what behaviours will emerge and when. Hence from the perspective of emergent schools of thought, strategic management is about managing the unknowable (Stacey 1992a).

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[10] These issues are elaborated on in Chapter 4 where the dynamic properties of complex systems are described and discussed in detail.

Emergent schools of thought conceive of strategic management as an infinite series of nonlinear learning cycles in which organisational and environmental behaviour are constantly monitored, analysed and responded to as they unfold (Stacey 1995; Lynch 2000). This conception emphasises the importance of maintaining flexibility in strategic management, which provides scope for learning and adapting in light of experience and changing circumstances. Studies suggest that entrepreneurial and small not-for-profit organisations tend to favour emergent strategy (Fletcher & Harris 2002; Downs, Durant & Carr 2003).

Problem framing

Emergent strategy, like incremental strategy, accepts uncertainty as a reality of strategic management and proposes mechanisms to deal with it. However, the aim in emergent strategy is not to reduce uncertainty but to adapt to it and take account of the opportunities and constraints it presents so as to 'better go with the flow' (Lissack & Letiche 2002:75). Moreover, proponents of emergent strategy argue that it may well be desirable to seek to enhance uncertainty and the prospect of emergent behaviours by reason that they are conducive to complex learning, creativity and innovation (Stacey 1992a; Brown & Eisenhardt 1998; Marion 1999).

Adapting to uncertainty and emergent behaviours implies a need to monitor organisational and environmental behaviours, learn about the dynamics through which emergent behaviours occur, identify patterns or order in these dynamics and respond to them as they evolve. Emergent schools of thought propose a number of mechanisms for meeting these needs and they include constant monitoring of the dynamics of organisational and environmental behaviour, engaging double-loop learning, being open to multiple forms of knowledge including analytical, intuitive, symbolic and cultural knowledge, promoting flexibility in organisational processes and accepting outcomes that diverge from intentions as learning experiences rather than failures (Stacey 1992b;

Barnett & Burgelman 1996; Barry & Elmes 1997; Downs, Durant & Carr 2003). In combination these mechanisms encourage constant questioning of the way things are being done and openness to perceiving and doing things in new ways, in other words, double-loop learning.

Formulating Strategy

Emergent or self-organising behaviour is fundamental to the formulation of emergent strategy. Such behaviour arises from interactions among individual behaviours despite, or in the absence of, central intention and control. The process of partisan mutual adjustment, described above in relation to incremental strategy, is an obvious example of a process from which emergent behaviour can arise. Mintzberg and Waters describe the resulting strategy as consensus strategy and observe that the direction that is converged on in this form of strategy 'is not driven by any intentions of a central management, nor even by prior intentions widely shared among the other actors. It just evolves through the results of a host of individual actions...it derives more from collective action than from collective intention' (Mintzberg & Waters 1985:267).

In their paper Mintzberg and Waters also describe an instance of emergent strategy that is imposed by the external environment. This sort of strategy results when environmental forces constrain the strategic options open to an organisation to such an extent that it is forced into a particular way of responding. To illustrate they provide the example of a Canadian minister who decreed that Air Canada would only be permitted to buy and fly a particular type of aircraft. Air Canada had little choice but to comply with this directive. Thus the minister represented an external force that constrained the strategic options open to Air Canada. In the absence of this directive Air Canada may have chosen to pursue a strategy that involved buying and flying different aircraft. While the intention of the minister was deliberate in this case, the potential also exists for self-organising processes in the external environment to impose strategy on an organisational system. An often-

cited example is the way in which aspects of the global economy and international governance converge to leave the populations of lesser developed countries with little option but to participate in activities that are socially and environmentally detrimental over the long term in order to survive in the short term (Prins 1990; Elliot 1998).

Conditions conducive to emergent strategy can also be factored into the design of deliberate strategy. For instance, central managers may set a general direction for strategy and allow staff considerable discretion in interpreting it. Mintzberg and Waters (1985) describe this as an umbrella strategy. Similarly, central managers may focus at an organisational design level, for example, by setting up processes that determine who has the authority to participate in strategy formulation rather than contributing to the content of strategy itself. Mintzberg and Waters (1985) describe this as process strategy. Both these sorts of strategy are deliberately designed to promote emergent behaviour within bounds.

Emergent strategy can also result despite central intention and control. This can occur when people, either consciously or subconsciously, devise ways to get around central directives. For instance, emergent strategy can result from the creative accounting procedures that people use to get around budgetary controls set by central managers. Argyris (1985) cites such an instance involving a divisional manager who disagreed with a central directive that limited his division's operating budget for full-time engineers. In order to attain the number of full-time engineers that he believed was necessary to meet the responsibilities of his division, the manager employed temporary engineers whose salary would not appear on his operating budget. Hence, the divisional manager found a way to appear to comply with the central directive that limited his operating budget. However, in reality, the manager devised a way to attain his full contingent of engineers contrary to the intentions of the central directive.

The ways that people devise to get around the limits delineated by central strategy can catch on and become part of the 'shadow organisation' (Stacey 1996). The shadow organisation is co-created by people in an organisation as they are simultaneously

constraining and being constrained by their interactions with each other. Thus, the shadow organisation is delineated by the unofficial understandings and networks that evolve from informal conversations among people about how the organisation works and how to get things done. Such conversations can take place in a range of venues inside and outside the work place such as hallways, tea rooms, restaurants and sporting events. In contrast, the legitimate organisation is delineated by centrally intended strategy and operates through mechanisms such as the formal organisational chart, formal operational rules and formal procedures. Studies suggest that, in reality, strategy as realised in any organisational process is unlikely to be either wholly emergent or wholly centrally intended. Rather strategy as realised is likely to result from the interplay between the two (Mintzberg & Waters 1985; Senge 1990; Stacey 1996).

Rationality of Strategy

> We are more likely to appreciate chance if we stop trying to
> control what happens, and one way to do that is to cultivate
> non-intention. To do this totally is to realize how fully the world is
> already happening inside us and around us, as if by magic
> (Downs, Durant & Carr 2003:23).

Emergent schools of thought take the position that much of what happens in a complex world is driven by dynamics over which we have limited knowledge and control. Moreover, it is accepted that the outcomes of such dynamics are intrinsically unpredictable and therefore uncertain. At the same time, the potential for emergent behaviour suggests that it may be possible to discern patterns in the behaviour resulting from such dynamics and respond to them in ways that take account of the constraints and opportunities they present. Further, as Lindblom points out in relation to partisan mutual adjustment, it is possible that such dynamics may play out to produce better outcomes than would efforts at central direction and control. For these reasons emergent schools of

thought conceive strategic management to be an infinite series of learning cycles in which behaviours of the internal and external environment are continuously monitored, interpreted and responded to. This conception emphasises flexibility and adaptability over integration, central direction and control (Mintzberg & Waters 1985; Brown & Eisenhardt 1998).

In addition, emergent schools of thought, like incremental schools of thought, assume that knowledge is partial and subjective so that strategic problems cannot be addressed solely through objective analysis. Further, the emphasis that emergent schools of thought place on learning, flexibility and adaptability is reflected in their openness to multiple ways of knowing and new ways of seeing things (Stacey 1992a; Downs, Durant & Carr 2003). This means that the validity of multiple forms of knowledge (such as intuitive, emotional and symbolic) is accepted in both the process through which emergent strategy forms and the way in which it is interpreted and responded to. It also implies that knowledge is transient, needing to be updated continuously in line with a changing reality (Mintzberg & Waters 1985; Waldrop 1992).

At the same time, given the distributed nature of knowledge in emergent strategy and its intrinsic unpredictability, it is not implied that knowledge informing any particular action will translate into predictable policy outcomes. Rather, since emergent behaviour is neither perfectly predictable nor unpredictable, it is implied that different forms of knowledge provide different perspectives on the patterns of behaviour that might exist in emergent strategy. These perspectives can then be synthesised and used as a basis for responding to emergent behaviour in ways that are consistent with what is known about its dynamics and the opportunities that they present (Mintzberg 1994a).

The rationality of emergent strategy has been criticised for the degree to which strategy is driven by reactions to an ever changing reality over a central purpose. As a result, some would argue that emergent strategy provides little guidance as to how to move towards policy goals when such goals are a given. Thus Idenburg asserts:

> This view leaves the door wide open for all kinds of irrational
> mechanisms, wishful thinking, ignorance and conformism. The
> development is then motivated by external events which
> overshadow long term trends and structured changes. There are
> no techniques, tools or programs at the manager's disposal.
> Vision becomes hallucination, the issue of business definition
> becomes: 'What business are we in this year?' (Idenburg
> 1993:136)

This criticism suggests that there is a limit to which it is possible to be flexible and adaptive without losing sight of the goals that policies were put in place to achieve in the first place.

Control, stability and predictability

In emergent strategy stability is a matter or more or less rather than either/or (Cooksey 2001). Moreover, it is expected that, while it may be possible to observe relatively stable patterns in organisational and environmental behaviour, such patterns are always subject to change. Thus, emergent strategy is similar to incremental strategy in its acceptance that uncertainty is a reality that arises from the external environment and from within the policy processes itself. In response, both models advocate a need for flexibility and adaptability. However, a comparison of the two models suggests some fundamental differences in the way in which uncertainty is addressed and to what end.

Specifically, incremental strategy attempts to reduce uncertainty through the application of two criteria, social rationality and by favouring small changes to current strategy over major shifts in direction. These criteria provide some guidance as to what behaviour is important to be responsive to in formulating, implementing and monitoring strategy, and to what end. As discussed earlier, they also imply a degree of stability and predictability

in the behaviour of the environment. This provides a rationale for formulating intentions about future behaviour on the basis of past experience.

Emergent strategy, in contrast, does not attempt to reduce uncertainty on the basis that this may be neither possible nor desirable. In relation to the former, emergent strategy points to an evolving reality characterised by nonlinear relationships between cause and effect, random events in the behaviour of the internal and external environment, and self-organising processes that are intrinsically unpredictable and not amenable to central control. Given these conditions Stacey observes that 'hindsight provides little information about the future' (Stacey 1995:493). In relation to the latter, as already noted, it has been argued that uncertainty is desirable because it provides opportunities for complex learning, creativity and innovation.

Hence, in contrast to incremental strategy, emergent strategy emphasises flexibility and adaptability without bounds and so does not offer criteria for selecting in advance some paths to policy goals over others. On the one hand, this could be seen as an advantage, in the context of natural resource and environmental policy, because it does not preclude a priori major changes in the logic and direction of policy should they be required on ecological grounds. On the other hand, this could be seen as a disadvantage because it provides little foundation for identifying a few paths to policy goals a priori that might be used as a foundation for building up shared understandings and garnering political support among key stakeholders. The Scientific Method comes to mind here as an example of where being able to demonstrate the path to an outcome a priori can be critical to establishing confidence that the outcome is feasible and of value (Prelli 1989; Riggs 1992; Ehrlich & Ehrlich 1996).

Finally, emergent strategy implies an organic organisational design. This sort of design promotes decentralised decision-making and a high degree of individual discretion when knowledge about strategically-relevant organisational behaviour is distributed among people beyond central managers. This is consistent with Mintzberg and Water's observation that:

> ...emergent strategy also enables a management that cannot be close enough to a situation, or to know enough about the varied activities of its organisation, to surrender control to those who have the information current and detailed enough to shape realistic strategies. Whereas the more deliberate strategies tend to emphasize central direction and hierarchy, the more emergent ones open the way for collective action and convergent behaviour. (Mintzberg & Waters 1985:271)

Thus, an organic organisational design favours individual learning, creativity and innovation over conformity. This is conducive to a high degree of flexibility and adaptability when the behaviour of the environment is unstable and unpredictable. However, it may be conducive to a low degree of integration despite the behaviour of the environment being highly stable and predictable.

Summary

The focus in emergent strategy is on understanding and responding to patterns in organisational and environmental behaviour that result from sources other than central intention and control. These patterns in behaviour are associated with high uncertainty and a low amenability to prediction and control. In emergent strategy this is not necessarily considered a bad thing, as the potential exists for such patterns of behaviour to lead to better outcomes than would efforts at central direction and control. Thus, the emphasis that emergent strategy places on adapting to, and accounting for, uncertainty rather than on reducing it distinguishes it from the rational and incremental models of strategy.

Emergent schools of thought conceive strategic management to be an infinite series of learning cycles in which behaviours of the internal and external environment are continuously monitored, interpreted and responded to. In accepting that knowledge is partial and subjective emergent schools of thought are also open to aspects of knowledge beyond the bounds of objective rationality. As a result emergent schools accept a role for multiple forms of knowledge (such as intuitive, emotional and symbolic) in the process through which emergent strategy forms and the way in which it is interpreted and responded to. Emergent schools of though also accept that knowledge may be transient which implies a need for it to be continually updated; the more uncertain the environment the greater this need. An organic organisational design that allows room for decentralised decision-making and provides individuals with the flexibility to change their response in line with evolving knowledge and environmental conditions is most conducive to emergent strategy.

Because emergent strategy is about responding to an evolving and unpredictable reality it is not presumed that past behaviour can be used as a basis for predicting and responding to future behaviour. If these conditions hold, formulating intentions about future behaviour on the basis of past experience becomes problematic. Therefore, emergent strategy provides little a priori guidance as to the particular paths that might be followed in pursuit of policy goals. This has led to some criticism of emergent strategy for not adequately addressing the reality that there is a limit to the extent to which it is possible or desirable for strategy to be driven by reactions to changing organisational and environmental behaviour at the expense of being driven by the pursuit of policy goals.

A comparison of the three schools of thought on strategic management reviewed in this chapter is presented in Table 3.1.

Table 3.1   Comparision of Rational, Incremental and Emergent Strategy

	Rational	Incremental	Emergent
PROBLEM FRAMING	identify an optimal means of achieving clearly defined policy goals	reduce the chances of serious adverse consequences as a result of uncertain information and social conflict in pursuit of potentially evolving policy goals	respond to uncertainty and emergent behaviour so as to take account of the opportunities and constraints they present in pursuit of potentially evolving policy goals
STRATEGY FORMULATION	logical sequence of decision-making steps strategy formulated independently and in advance of implementation strategic decision-making is the realm of top level managers	iterative learning cycles where analysis in any given cycle is limited to alternatives that differ only incrementally from current policy simultaneous analysis of policy goals and the means of achieving them strategic decision-making is distributed among many partisan participants	iterative learning cycles in which behaviours of the internal and external environment are continuously monitored, interpreted and responded to strategic decision-making is decentralised strategy can emerge despite, or in the absence of, intention
CONTROL, STABILITY AND PREDICTABILITY	organisational and environmental behaviour are relatively stable and predictable organisational behaviour is amenable to central control	organisational and environmental behaviour are relatively stable and predictable if only small changes are made to existing policy	stability in organisational and environmental behaviour is relative and transient organisational and environmental behaviour are relatively unpredictable and uncontrollable however it may be possible to discern patterns so as to either influence them or 'better go with the flow'
ORGANISATIONAL DESIGN	tight or mechanistic	ambiguous	organic
ADAPTABILITY VERSUS INTEGRATION	emphasis on integration over adaptability	emphasis is on adaptability within bounds adaptability to natural environment mediated by the overriding influence of social rationality in strategic decision-making	emphasis is on adaptability without bounds

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Conclusions

There is a growing consensus that none of the models of strategy described in this chapter are universally applicable or mutually exclusive so that, in reality, strategic management will reflect varying degrees of each (Mintzberg & Waters 1985; Zajac & Shortell 1989; Mintzberg 1990; Stacey 1995; Tarter & Hoy 1998; Van der Heijden & Eden 1998; Rosenhead & Mingers 2001a). Further, the literature is replete with successful instances of all three models.

From the perspective of natural resource and environmental policy the review presented in this chapter suggests that the relative merits of rational, incremental and emergent strategy will be contingent upon the dynamics of the natural and social environments that the policy aims to influence. The relative merits of alternative models of strategy will also be contingent upon the dynamics of the policy process itself and the interplay between these dynamics and the natural and social environments. These dynamics will determine the extent to which it is possible to attain consensus on policy goals in advance of strategic analysis and alignment between what is socially rational and what is ecologically or scientifically rational. This will in turn determine whether it is possible to formulate policy goals in advance of analysis and what policy goals are realistic to aim for. Finally, the aforementioned dynamics will have implications for the extent to which policy processes can be integrative or adaptive in pursuit of policy goals.

Thus, if rational strategy is adopted, then strategic management becomes a well-ordered, well-defined and linear process. This has the advantage of creating a sense of certainty, as goals can be clearly articulated and prioritised a priori and there is an optimal way to achieve them. These are ideal conditions for maximising the benefits of integration in pursuit of policy goals. The danger with rational strategy, however, is that it can create an illusion of control when there is instability and unpredictability in the dynamics of the

policy process and/or the external environment (Mintzberg 1994b; Das & Teng 1999). Under such circumstances rational strategy will offer limited scope for learning and adapting in light of experience.

In contrast, if incremental strategy is adopted, then strategic management becomes a less ordered, fuzzier and iterative process. This has the disadvantage of creating a sense of uncertainty, as goals are fluid and there are potentially many satisfactory paths to achieving goals. However, if there is some instability and unpredictability in the dynamics of the policy process or the external environment then incremental strategy has the advantage that there is greater scope for learning and adapting in light of experience. In addition, incremental strategy offers criteria for selecting among alternative paths in a given learning cycle. The danger with incremental strategy is that, if there is a mismatch between what is socially rational and what is ecologically rational, or if there is a nonlinear relationship between the scale of policy change and the risk of adverse consequences, then the emphasis on adapting through single-loop learning in incremental strategy may be insufficient to avoid serious adverse environmental and social consequences.

If emergent strategy is adopted then it is accepted that there will be many paths to achieving policy goals and that these paths will emerge over time. Moreover, emergent strategy does not offer criteria for selecting among alternative paths in a given learning cycle. This has the disadvantage of creating a strong sense of uncertainty because it provides little scope for management to identify particular paths to follow a priori. However, if a high degree of instability is intrinsic to the dynamics of the policy process or the external environment it can be argued that assuming otherwise is not conducive to adapting to the reality of the situation. A major criticism that has been levelled at emergent strategy is that it does not adequately deal with the reality that there is a limit to which it is possible to be flexible and adaptive without losing sight of the goals that policies were put in place to achieve in the first place.

All this suggests a need for strategic management to be grounded in an understanding of the dynamics that underpin organisational and environmental behaviour. The preceding discussion suggests that, while the alternative models of strategy reviewed provide different perspectives on such dynamics, they do not provide adequate guidance as to what dynamics are important to monitor and respond to in any given situation. This points to a need for a higher order framework to synthesise these alternative perspectives on strategy. Such a framework would provide guidance as to when the assumptions of the alternative models of strategy hold and what dynamics are likely to be strategically relevant to a given situation. In the next chapter it is proposed that Complexity Theory can meet this need.

Chapter 4

Complexity Theory

..the ability to assume complexity is a great strength. You could
call it the ability to deal with reality (Saul 1997)

Introduction

Complexity theory (also known as complex systems science; complexity science;
dynamical systems theory; nonlinear systems theory and complex, adapting and nonlinear
systems (Waldrop 1994; Bella 1997; Holland 1998; Cooksey 2001)) is grounded in the
systems sciences of general systems theory, information theory and cybernetics
(Goldstein 1999). It provides a way of thinking about complex problems that do not
conform to any single disciplinary theory. As a result it has been described as a theory
that has evolved in the space between the disciplines (Horn 2002).

A core theme in Complexity Theory is the need to firmly ground strategic management in
an understanding of the dynamics that underpin the behaviour of organisational systems.
As noted earlier, an important limitation of the theories of strategy reviewed in Chapter 3
is that while they provide different perspectives on such dynamics they provide limited
guidance as to what dynamics are important to understand and respond to in a given
situation. Moreover, two of the three theories reviewed make assumptions about the
dynamics of organisational systems and their environment a priori, assumptions that do
not always hold in reality.

Complexity theory provides a higher order framework for integrating these alternative
theories on strategy. Specifically Complexity Theory provides a framework for
identifying the dynamics that are important to monitor and respond to in a given

situation. In the process it can help to identify when the assumptions associated with particular theories on strategy are likely to hold.

While an understanding a particular system requires an understanding of the context of that system, the findings of research into complex systems suggest that complex systems share some fundamental dynamic properties that have implications for strategic management. In this Chapter these properties will be described and their implications for strategic management discussed.

Dynamic Properties of Complex Systems

Interactions

Complex systems are made up of diverse components interacting with each other. Interactions of individuals with their environment and with each other are the fundamental source of dynamics in complex social systems (Arndt & Bigelow 2000; Goldspink & Kay 2003). As illustrated by the notions of the shadow organisation and partisan mutual adjustment in Chapter 3, it is through such interactions individuals influence the behaviour of other individuals while at the same time modifying their own behaviour in anticipation of the behaviour of others (Ajzen 1991; Littlejohn 1996). It is also through such interactions that new collective understandings and actions evolve (Becker & McCall 1990; Senge 1990).

An example of the sorts of impacts that people's interactions can have on system dynamics is given by Smith's (2004) analysis of sources of change in Australian sports organisations. Smith describes an organisation whose work force was made up of paid employees, volunteers and the occasional work experience student. Smith notes that, in this organisation, there was considerable diversity in the ways that volunteers interpreted and responded to organisational policy and instructions from paid employees. This diversity meant that some volunteers followed instruction 'with bureaucratic efficiency'

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while others did 'what they think is best.' When volunteers did what they thought was best they made seemingly minor changes to operational activities that could snowball to produce significant changes in the behaviour of the organisation as a whole.

A case in point observed by Smith (2004) involved a paid employee delegating management of the store to a volunteer, who allowed a work experience student to accept and discharge mail orders, despite the organisation's policy of only selling direct from the club office. By the time the paid manager became aware of the operational change that had been made a large demand for mail orders had evolved, promising increased sales and much needed revenue to the club. The net result of this sequence of interactions was doubling of sales and a significant change in the way that the organisation distributed its products.

The diversity that Smith (2004) observed in the responses of volunteers to organisational policy and instructions from paid employees highlights a characteristic of complex systems that distinguishes them from complicated systems. This characteristic is the potential for their individual components to behave independently of each other (Goldspink 1999). In complicated systems, the behaviour of one component is dictated by the behaviour of other components. This means that in complicated systems a given behaviour in one component will lead to a fixed response in the behaviour of other components.

Hence, if the sports organisation were simply a complicated system, volunteers charged with the same task would respond to the same instruction in the same way. Moreover, any given volunteer charged with the same task on separate occasions would respond to the same instruction in the same way on each occasion. In a complex system however, a given behaviour in one component can lead to a variety of responses in one or more other components (Kauffman 1993). This potential for individual components to behave independently of each other is a source of nonlinear interactions in complex systems.

Nonlinearity

Nonlinear interactions occur when the causes and effects of behaviour are disproportional, or when the combined effects of two or more causes are not the same as summing the effects of each cause individually. It is generally accepted that nonlinear interactions are the norm rather than the exception in complex systems (Simon 1956; Checkland 1981; Flood & Carson 1988; Capra 1996). When interactions are nonlinear, a small change in the behaviour of one or more components of a system (at the micro level) can have a big impact on the behaviour of a system as a whole (at the macro level). Conversely, when interactions are nonlinear, a large change in the behaviour of one or more components can have a small, or no impact, on the behaviour of the system as a whole.

Thus, in the example of the sports organisation cited earlier, Smith (2004) notes that while many of the seemingly minor operational changes made by volunteers in the sports organisation were inconsequential, others, such as the response of volunteer and a work experience student to a mail order request, led to consequential changes to the behaviour of the organisation as a whole. Conversely, Lewin, Parker & Regine (Lewin, Parker & Regine 1998) observe that managers and their staff can put a lot of energy into initiating major changes that by and large lead to inconsequential changes to the behaviour of an organisation as a whole. The net result is that the behaviour of complex systems can be both highly sensitive and highly insensitive to changes within and external to the system (Richardson, Mathieson & Cillers 2000).

Behavioural States and Attractors

While linear interactions lead to smooth, continuous and predictable change, nonlinear interactions lead to 'discontinuous, often abrupt and sporadic' change (Kiel & Elliot 1992). As a result, complex systems can exhibit a range of behavioural states and can

shift abruptly from one state to another over time. While there is some variation in the way that behavioural states resulting from nonlinear interactions are classified, it is generally accepted that nonlinearity results in at least three fundamental behavioural states (Goldstein 1994; Stacey 1996; Lewin & Regine 2000; Goldspink & Kay 2003).

The first behavioural state is the stable state (also known as dynamic/stable equilibrium). When a system is in a stable behavioural state there is a long term pattern in the behaviour of the system, known as an attractor (Gleick 1987). Types of attractors include: fixed point (steady state), where the system behaviour tends to converge towards a fixed point; cyclic (oscillating), where system behaviour tends to converge towards a repetitive pattern; and strange, where system behaviour tends to converge towards a varied pattern within bounds without ever following exactly the same path or reaching a stable state (Checkland 1981; Gleick 1987; Arndt & Bigelow 2000; Cooksey 2001). The butterfly pattern of the Lorenz attractor (Lorenz 1963a) is a famous example of the pattern characteristic of a strange attractor.

A system in a stable behavioural state tends to converge on a single attractor, so that even though it may shift temporarily from its attractor in response to a perturbation, it will tend to return to it over time. Thus stable systems are relatively insensitive to change. At the same time it is possible to perturb a stable system to a critical point (also known as a bifurcation point or a point of self-organised criticality) beyond which the system is unable to adjust back to its original attractor, at this point the system will tend to shift to a new equilibrium (May 1976).

A second behavioural state is the quasi-stable state (also known as far from equilibrium or the edge of chaos). When a system is in a quasi-stable state the behaviour of the system is in a threshold zone between stability and instability. Quasi-stable behaviour involves multiple attractors and stable behaviour within bounds. A quasi-stable system is less resistant to change than a stable system and so will tend to reach a critical point and shift among attractors with greater frequency.

A third behavioural state is the unstable state (also known as a chaotic state). When a system is in an unstable state it converges towards a strange attractor. Thus the behaviour of an unstable system converging on a strange attractor is continually changing within bounds. This fractal pattern of behaviour, while not predictable, is intelligible and can be described by nonlinear mathematical equations (Gleick 1987; Casti 1997; Sole & Goodwin 2000). An unstable system is highly sensitive to change and small perturbations can lead such a system to shift among attractors rapidly and frequently. In contrast to systems characterised by stable and quasi-stable behavioural states, systems characterised by an unstable state will not return to an attractor once it has shifted from it (Goldspink 1999).

From an organisational management perspective, an advantage of a stable behavioural state is the capacity it gives the system to dampen out the effects of perturbations so as to minimise their impact on the behaviour of the system as a whole. The disadvantage of a stable state is, that, because of its resistance to perturbations, it can be slow to adapt to environmental change and resistant to the efforts of managers to bring about change (Waldrop 1994; Stacey 1996; Lewin, Parker & Regine 1998). In other words, the flip side of stability is inflexibility.

Further, while a system in a stable behavioural state is generally resistant to perturbations, a series of subtle, seemingly inconsequential perturbations can push the system to a point of criticality, after which the state of the system will change suddenly and unpredictably. This means that while major behavioural changes do not happen frequently in stable systems, when they do happen they will potentially be large and catastrophic (Casti 1994; Holling & Meffe 1996). This potential was highlighted in Chapter 3 in relation to creeping environmental problems such as salinity, global warming, deforestation, desertification, acid rain and ozone depletion. On a smaller scale Hoare and du Toit (1999) illustrate this potential with their finding that elephants and human populations will co-exist until a threshold human population density is reached, after which elephant population will collapse all together.

Because of the frequency with which a system in an unstable state is likely to shift from one strange attractor to another, the behaviour of an unstable system will tend to change too rapidly and unpredictably for people to identify patterns in behaviour and respond to them. As a consequence, from an organisational management perspective an unstable behavioural state is generally considered unsustainable (Waldrop 1994; Stacey 1996). In contrast, a quasi-stable state is often considered to be the most desirable of behavioural states because this state provides a balance between stability and flexibility:

> chaotic order per se is actually too violent, too changing to describe much that goes on among living beings. Complexity theorists ... argue that life tunes Chaos's intensity down a bit to a transition band between Chaos and predictable stability called the Edge of Chaos. Dynamics in this band are still Chaotic but they also possess characteristics of order. Full-blown Chaotic Systems flit a bit too readily from novelty to novelty; living systems need to consolidate gains. Predictable, stable systems, by contrast, possess none of the panache needed to create new order or even to respond adaptively to creative environments. Complex Systems lie between these poles, at the Edge of Chaos, and they have both panache and stability sufficient to serve life. (Marion 1999:14)

Similarly, from an natural resource and environmental management perspective, Holling and colleagues (Holling 1973; Holling, Schindler, Walker & Roughgarden 1995; Holling & Meffe 1996) assert that, at large scales and over long time periods, resilient natural ecosystems operate at conditions far from equilibrium. They add that attempts to stabilise natural ecosystems by reducing variability in system behaviour generally reduce ecosystem resilience in the longer term. Thus, attempts to stabilise river flows have led to an increase in the vulnerability of native fish populations to invasive fish populations; attempts to suppress fire in fire prone ecosystems have led to an increase in the vulnerability of vegetation communities to infrequent high intensity fires; and the

replacement of diverse native vegetation communities with monocultures has led to an increase in the vulnerability of agricultural production systems to natural and social perturbations such as 'drought, flooding, insect of pathogen outbreaks, and market vagaries' (Holling & Meffe 1996:331).

Feedback Loops

Feedback loops are the mechanisms through which a system will either maintain its current state or shift from one state to another (Forrester 1987). Feedback loops are information flows that arise from the recursivity of nonlinear interactions among components in a system over time (Hanson 1995). As noted earlier, in social systems individual people will seek to influence others' behaviour, while their own behaviour will, in turn, be influenced by the behaviour of others. This recursive cycle of influencing and being influenced continues indefinitely. In addition, people can influence each other directly or indirectly through mechanisms such as social norms.

Feedback loops can act to close the gap between a desired state and an existing state in the system (Checkland 1981; Cilliers 2000; Cooksey 2001). When a feedback loop acts to reinforce existing behaviour (and thus discourage change) it is a negative or stabilising feedback loop. Conversely, a feedback loop that acts to discourage existing behaviour (and thus encourage change) is a positive or destabilising feedback loop. Positive feedback loops have an amplifying effect on changes in system behaviour. As a consequence, positive feedback loops promote instability, making further change more likely. Negative feedback loops, on the other hand, have a dampening effect on changes in system behaviour. As a consequence, negative feedback loops promote stability, making further change less likely.

So, the behaviour of complex systems reflects a dynamic interplay between positive and negative feedback loops over time. When positive feedback loops dominate, the

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behaviour of the system moves towards instability and conversely when negative feedback loops dominate the system moves towards stability. As a result, Forrester (1987) describes a shift in the behavioural state of a system as a shift in loop dominance.

Senge (1990) illustrates the interplay between positive and negative feedback loops in an organisational context using the experiences of U.S. firms with 'quality circles' (see Figure 4.1). The loop on the left hand side of the figure represents a positive (or amplifying) feedback loop, whereby initially the quality circle activity leads to more open communication and collaborative relations between workers and managers which improves problem solving in the firm. This, in turn, increases the motivation of workers and managers to participate in the quality circles and subsequently an increase in quality circle activity. The loop on the left hand side of the figure then, promotes change in the status quo.

The loop on the right hand side of the figure represents a negative (or dampening) feedback loop. This loop illustrates how, after a period of time, increasing quality circle activity begins to threaten the power bases of union leaders and managers. From the union leaders' perspective, the improvement in worker – management relations that the quality circles promote threatens their role as a mediator between workers and management. In response union leaders seek to restore more adversarial worker-management relations by undermining the workers' motivation to participate in the quality circles. They do this by targeting any underlying fears that workers might have that, given an opportunity, managers will manipulate and take advantage of them: 'Be careful; if you keep coming up with cost saving improvements on the production line, your job will be the next to go' (Senge, 1990: 99).

From the managers' perspective, the increasing quality circle activity and the associated increase in communication and collaborative problem solving between workers and managers triggers a fear among managers that over time they will have to relinquish too much power to the workers. The managers respond to this fear by reducing their participation in the quality circles to a token level and, while professing to acknowledge

the ideas of workers, fail to incorporate these ideas into management practices. Over time, the combined efforts of the managers and the union leaders lead to a decline in the openness of communication among workers and managers in the firm and, as a consequence, a decline in the degree to which workers and managers collaborate to improve problem solving. This in turn leads to a decline in the motivation of workers and managers to engage in quality circle activity. The loop on the right hand side of the figure, then, promotes a decline in quality circle activity and thus a return to the previous status quo.
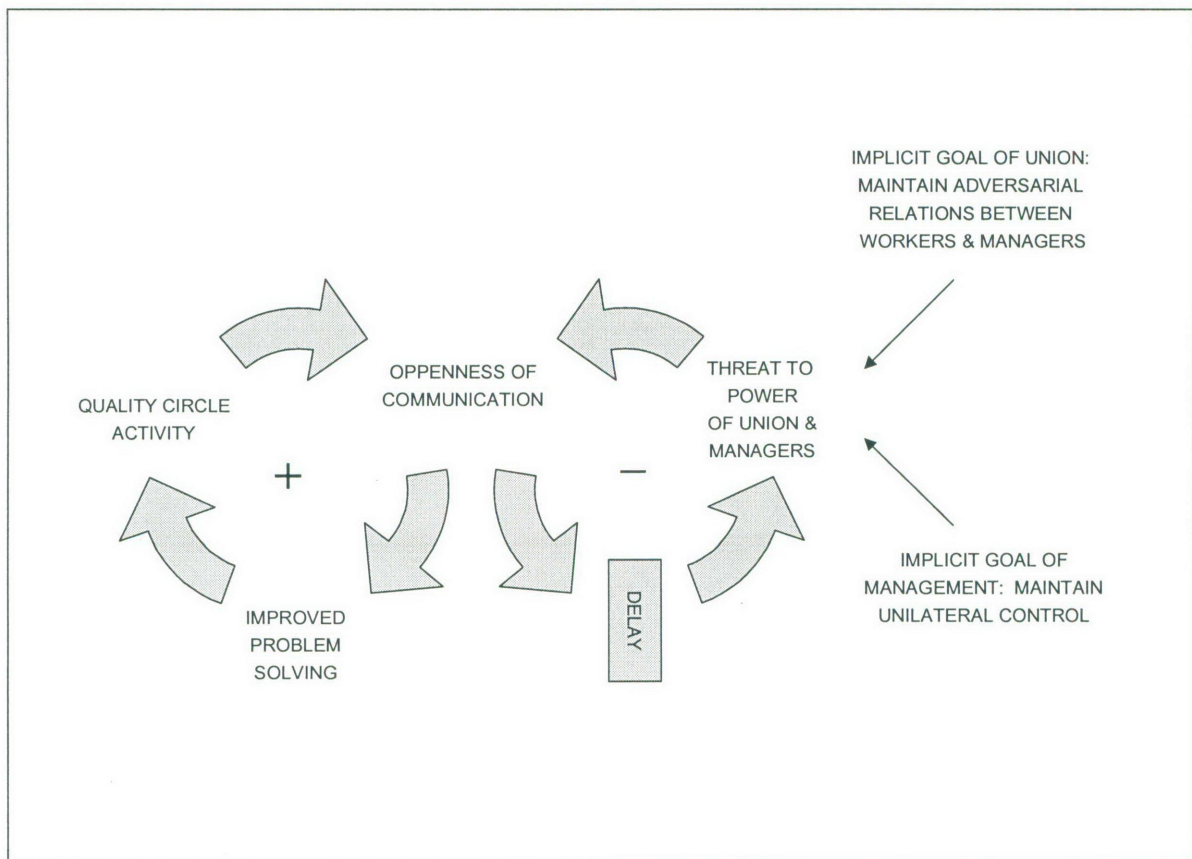
Figure 4.1   Feedback loops influencing quality circle activity in US firms, adapted from (Senge 1990:99-100)

This example shows how loop dominance can shift from positive to negative over time, so that an initial period of change can be followed by a return to the previous status quo. The example highlights the importance of understanding the interplay of feedback loops relevant to the behaviour that an intervention, such as a quality circle program, is aimed at. Otherwise, while attempts to improve a situation may result in short term improvements, such improvements may well erode to the point where things are either back where they started or worse.

The natural resource management literature, like the organisational management literature, is rich with examples of well intentioned efforts to ameliorate problem behaviours that have made things worse in the longer term, because they failed to adequately address the feedback loops that reinforce the problem behaviour. For instance, programs aimed at reducing environmental degradation through economic development in lesser developed countries are often criticised for disempowering indigenous communities and leading to further environmental degradation and poverty (Shiva 1989; Chatterjee & Finger 1994; Elliot 1998).

To illustrate, Corry (1993) cites programs based on the principle of 'trade not aid' that promote the harvesting of native vegetation with a view to both protecting native vegetation and providing an economic resource for local indigenous people. Corry argues that such programs tend to undermine the autonomy of indigenous people, making them more vulnerable to a market place that is driven by consumer demand in Western countries, with little concern for the needs of local indigenous communities or the preservation of the local native vegetation. As a result, Corry notes that, in the longer term, such programs have failed to either protect native vegetation or economically empower local indigenous people.

In an attempt to draw attention to the need to address the feedback loops that reinforce natural resource and environmental problems, the World Commission on Environment and Development asserts that sustainable development requires:

A political system that secures effective citizen participation... an
economic system that is able to generate surpluses and technical
knowledge on a self-reliant and sustained basis, a social system
that provides for solutions for the tensions arising from
disharmonious development, and a production system that
respects the obligation to preserve the ecological base for
development, a technological system that can search
continuously for new solutions, an international system that
fosters sustainable patterns of trade and finance and an
administrative system that is flexible and has the capacity for
self-correction (World Commission on Environment and
Development 1987 quoted in Elliot 1998:183)

Self-organising processes

Self-organising processes are processes that lead to co-ordinated behaviour in the absence
of central direction or control. Moreover, the nature of the behaviour resulting from
self-organising processes cannot be predicted from knowledge of the individual
components and the individual interactions among them. The process of partisan mutual
adjustment described in Chapter 3 and the positive and negative feedback loops described
above for quality circle intervention provide examples of self-organising processes. The
process of biological evolution is also an often cited example of a self-organising process
(Gould 1989; Morel & Ramanujam 1999). Specifically, biological evolution leads to a
pattern in the genetic make up of populations in response to changes within populations,
such as genetic variation, and changes in the external environment (Goldspink 1999).

The impact of self-organising processes on system behaviour is likely to differ at
different hierarchical levels in a system, so that a pattern of behaviour may be evident at
one level in a system but not at another level (Goldspink & Kay 2003). Thus it is not
possible to discern the formation of a flock of birds from the flight pattern of one or two

individual birds in the flock. Similarly, genetic patterns resulting from biological evolution may not be discernible from the genetics of individuals or even from the genetics of a localised population. Rather, such patterns are likely to be apparent when viewed at larger scales that incorporate a range of habitats and selection pressures.

To illustrate, scientific research suggests that the genetic diversity of plant populations tends to be greater in habitat zones that have sporadically experienced unstable environmental conditions such as erosion, fire and climatic change, than is the genetic diversity of plant populations in habitat zones that have experienced stable, high rainfall conditions (DiMichele & Aronson 1992; Inlenfeldt 1994). As a consequence, over time plant populations subject to unstable environments tend to experience a high rate of genetic change while plant populations subject to stable environments tend to experience a low rate of genetic change.

There is also evidence to suggest that the relationship between stability in environmental conditions and genetic change is nonlinear, as plant populations subject to continual (as opposed to sporadic) instability tend to be relatively low in genetic diversity and show a relatively slow rate of genetic change (Hoffmann & Parsons 1997). In other words there is a threshold point of environmental instability whereby the nature of the relationship between environmental stability and genetic diversity changes. Thus this example, like the quality circle example above, also shows how self-organising processes can promote instability or change in system behaviour as well as stability or a continuance of current behaviour.

Openness

Complex systems continually exchange energy with their external environment. This openness to the environment provides complex systems with the capacity to counteract the increasing disorder that, on the basis of the second law of thermodynamics, would

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otherwise lead to their destruction (von Bertalanffy 1950). Complex systems are able to counteract the tendency towards increasing disorder because they import more energy from the environment than they export (Prigogine & Stengers 1984). In the process:

> Open systems move in the direction of differentiation and elaboration. Diffuse global patterns are replaced by more specialized functions....Social organizations move toward the multiplication and elaboration of roles with greater specialization of function.' (Katz & Kahn 1969:99)

It is the capacity of complex systems to self-organise that enables this evolution towards differentiation and elaboration over time. This evolution creates a tension between adaptability to environmental changes and behavioural stability because as differentiation and elaboration progress so does the need for regulatory mechanisms to integrate and co-ordinate the behaviour of specialist roles (Prigogine & Stengers 1984; Bak 1997; Cilliers 2000; Cooksey 2001; Gunderson et al. 2002). In social systems this can be promoted through organisational design mechanisms described in Chapter 3 such as hierarchical lines of authority and communication, standardisation of tasks and formal rules. It can also be promoted through the cultivation of shared norms and values.

As Katz and Kahn (1978) note, in constraining the freedom of individual components to behave independently such regulatory mechanisms enhance stability and efficiency but reduce the degree to which system behaviour can change in response to environmental changes. In contrast, increasing the freedom of individual components to behave independently will enhance the degree to which system behaviour can change in response to environmental changes. However, this will also increase the potential for instability in system behaviour. This tension between adaptability and stability is mirrored in the equipotentiality of a system, the potential to reach the same behavioural outcome via different initial conditions and paths (Katz & Kahn 1969). While highly adaptive

systems tend to have a high degree of equipotentiality, highly stable systems tend to have a low degree of equipotentiality.

All this suggests that at any given time in an organisational system there will be a dynamic tension between its adaptability to environmental changes and its behavioural stability. It also suggests that the impacts of management strategies aimed at enhancing the degree to which organisational behaviour is integrated or adaptive will be contingent upon the interplay among these strategies, the behavioural states of the system and the external environment, the interactions between the system and the external environment and the self-organising processes involved. In other words, the impacts of such management strategies will be composite in nature:

> ..the organizations's response is not to an environment but into an environment. Therefore behavior is explained neither by events taking place exclusively inside the system (e.g. motivation, decision-making), nor by events taking place exclusively outside the system in the environment (e.g. reinforcement contingencies, natural selection). Rather, behavior is everywhere a composite relation. The environment's affordances and the system's potentialities together account for the unity of the behavioral act. (Weick & Sandelands 1990:339)

An implication that follows from recognising the composite nature of system-environment behaviour is that it is not possible to understand the behaviour of a complex system independently from the environment in which it is embedded (Emery & Trist 1969; Katz & Kahn 1969; Cilliers 2000; Cooksey 2001; Keating, Kauffman & Dryer 2001). This, along with the distributed and partial nature of knowledge in complex systems, suggests that there can be no definitive boundary between the system and its environment. Rather, delineation of such boundaries will depend on the purposes of the observer and, as a consequence, the behavioural domain of interest (Casti 1986; Scott 1987; Flood & Carson 1988; Weick & Sandelands 1990; Song & M'Gonigle 2001).

Further, delineation of the system-environment boundary is likely to evolve over time as the behaviour of the system unfolds and the observers' understanding of system behaviour grows. Song and M'Gonigle (2001) illustrate this point with reference to the increasing recognition among conservation biologists that conservation biology must operate within the constraints imposed by the broader political and economic system. Therefore they argue that there is a need for conservation biologists to integrate their understanding of the biophysical functioning of natural ecosystems with a systemic understanding of the economic and political structures within which conservation biology must function- thus 'situating the scientific endeavour within economic and political imperatives' (Song & M'Gonigle 2001:981). In short, Song and M'Gonigle assert the system of concern to conservation biologists has expanded over time in line with their increasing understanding that the behaviour of natural ecosystems is a composite relation of social and biophysical interactions.

Emergent behaviour

As outlined in relation to emergent strategy in Chapter 3, emergent behaviour is co-ordinated behaviour that arises from the self-organising processes among components in a system. Emergent behaviours have also been described as emergence, emergent order, complexity order, emergent phenomena, emergent properties, emergent structures and emergent patterns, emergent patterns and emergent strategies (Mintzberg & Waters 1985; Goldstein 1999; Morel & Ramanujam 1999; Cilliers 2000; Goldspink & Kay 2003). Goldstein (1999) asserts that four conditions are required for emergent behaviour, namely nonlinearity, self-organising processes, a behavioural state other than stable equilibrium and attractors.

Emergent behaviour leads to the evolution of multiple levels of order in complex systems with higher levels of order emerging from self-organising behaviour at lower levels of

order. Casti (1994) describes these levels of order as a hierarchy of complexification. Since by definition emergent behaviour is qualitatively different to the behaviours from which it emerges, the different levels of order in complex systems are driven by different rules. Thus the rules driving the behaviour of individual cells are qualitatively different to the rules driving the behaviour of the organ of which they are a part. Similarly, the rules that drive the firing of individual neurons are qualitatively different to the rules that drive the behaviour of a neural network and the rules that drive the behaviour of the brain as a whole (Bar-Yam 1997).

Despite the differences that exist in the rules that drive behaviour at different levels of order in complex systems there may also be patterns of behaviour that are repeated across different levels. Such patterns are known as fractal patterns. Fractal patterns are similar regardless of the scale from which they are observed. Such patterns were discovered in weather patterns by Lorenz (1963a, 1963b) who found that variations in the weather were similar regardless of the scale at which they were observed:

> He discovered that when a line went from high to low without a
> bump, a double bump would come next, and he said, "That's the
> kind of rule that a forecaster could use." But the repetitions were
> never quite exact. There was pattern, with disturbances. An
> orderly disorder. (Gleick 1987:15)

Fractal patterns have also been described as having the characteristics of self-similarity and scale invariance (Mandelbrot 1977; Hastings & Sugihara 1993). Mandelbrot (1967) has been a pioneer in this field of research since his discovery of fractal patterns in the coastline of Britain. Specifically, he found patterns in the coastline that were similar regardless of the spatial scale from which they were observed. Fractal patterns have since been identified in a range of domains including the structure of blood vessels, vegetation, cities, snow flakes, earthquakes and fluid dynamics (Mandelbrot 1977; Ruelle

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1980; Gleick 1987; Batty & Longley 1994). Fractal patterns have also been observed in the foraging behaviour of ants (Fourcassié, Coughlin & Trainello 1992).

In the domain of human behaviour Horn's (2002) research into the impacts of tourism on two local communities in New Zealand suggests that there may be fractal patterns in behaviour across individual, community and national scales. Specifically, Horn found similarities in the way that stress was responded to at different scales. The implication drawn was that the potential exists to use knowledge about stress management at one scale to inform stress management at other scales.

Fractal patterns illustrate the potential for multi-directional relationships among different levels of order in complex systems (Ahl & Allen 1996). Hence, behaviour at a given level of order can be seen as a composite relation of inter- and intra level interactions. As a result, any given level of order can be conceptualised as an open sub-system of other sub-systems and of the system as a whole. This means that the boundaries between levels of order in a complex system will be dynamic, changing over time in response to changing interactions among components and between components and the external environment.

A characteristic of emergent behaviour that has not been explicated in the discussion thus far is its persistence. For example, the shadow organisation is an emergent feature of an organisation that arises from the mutual adjustments of members of staff as they respond to the external environment as well as to the formal organisational strategies, rules and procedures (Stacey 1996). Through these mutual adjustments members of staff develop social norms about how things should be done in the organisation. These social norms will evolve across various individuals and groups of individuals at different organisational levels. If individual members contravene these norms they are likely to be censured, which provides a negative feedback mechanism for reinforcing established norms. Through such mechanisms social norms become attractors around which staff behaviour organises (Svyantek & DeShon 1993). As a consequence, once social norms are established the multiple feedback loops involved will reinforce their continuing

existence despite the turning over of individual members of staff (Holland 1998). This is not to say that social norms cannot be changed, but rather that change will be resisted if it is not consistent with the underlying dynamics that maintain them.

Implications of Complex Dynamics for Strategic Management

Stability

The dynamic properties of complex systems suggest that behavioural stability is not a dichotomous variable in complex systems so that such a system can be described as either stable or unstable. Rather, they suggest that, in complex systems, stability and instability co-exist in a dynamic tension. This means that the behaviour of an organisation may be sensitive to some changes more than others at particular points in time. Moreover the behaviour of different sub-systems in an organisation may be characterised by different levels of order, behavioural states and attractors.

For example, research suggests that there are two types of cultural sub-systems in organisations, configurational information sub-systems and adaptive informational sub-systems (Eldredge 1986; Namenwirth & Weber 1987; Svyantek & DeShon 1993). The most fundamental is the configurational information sub-system. This sub-system is primarily concerned with what it means to be a member of the organisation, how social and economic justice are pursued in the organisation and what is judged as socially good behaviour. It has been hypothesised that this cultural sub-system delineates the cultural identity of an organisation (Svyantek & DeShon 1993).

As a consequence, the configurational information sub-system is a mechanism that enables the cultural identity of the organisation to persist over time despite the turnover of organisational members. While short term changes in the behavioural pattern of this

sub-system may result from environmental or organisational changes, it will tend to return to its original behavioural pattern in the longer term. In other words, the behavioural pattern of the configurational information sub-system is highly stable and therefore highly resistant to change.

In contrast, the adaptive informational sub-system is less stable but more responsive to change. This sub-system is primarily concerned with converting resources into goods and services in the interests of ensuring the survival of the organisation in a changing environment. Behaviours of particular relevance to this sub-system will be related to the development of new technologies, products and services. While the behaviour of this sub-system is likely to be more responsive to organisational or environmental change than the configurational information sub-system, behavioural changes in this system that require changes in the configurational sub-system are unlikely to endure.

Svyantek and DeShon (1993) use this model to explain why Japanese car manufacturers have been able to maintain a competitive advantage over American car manufacturers. In particular they posit that the configurational information sub-systems of Japanese organisations are more conducive to the production of quality cars than are those of American organisations. The stability of these sub-systems has meant that American organisations have been unable to replicate the emphasis that Japanese organisations place on quality in production.

Knowledge of the dynamic properties of complex systems would suggest that, while the potential exists, in principal, for the sub-systems involved to shift to a new behavioural equilibrium, American organisations have yet to find a dimension of change that will perturb these sub-systems to a critical point. This is not surprising given that, by definition, such a change would fundamentally change the cultural identities of the organisations involved. An alternative strategy would be to seek out ways of improving the fit between quality improving technologies and existing cultural identities (Moch & Bartunek 1990; Svyantek & DeShon 1993).

Predictability and control

The dynamic properties of complex systems described above also suggest that while the short term behaviour of an organisational system may appear random, there may be patterns in the longer term, such as those identified by Lorenz (1963a) in relation to variations in the weather and Senge (1990) in relation to quality circle activity, that make the behaviour of the system predictable in terms of general tendencies rather than specific events. This sort of predictability is shown by personality profiles, which fare poorly as predictors of how an individual might respond to individual events but fare well as predictors of a general pattern of behaviour that an individual is likely to express over time (Briggs & Peat 1989). Knowledge of such patterns can provide clues as to the likely range of a particular aspect of system behaviour over time, the stability of such behaviour and the dimensions of change that it is likely to be resistant or sensitive to.

Bella's (1997) study of the tobacco industry illustrates the value of such knowledge for understanding organisational behaviour in a specific context. In the study Bella identifies a self-reinforcing pattern of behaviour, or R-attractor, which explains the ability of the tobacco industry to persist over time despite mounting evidence of the harmful health effects of tobacco. This R-attractor is presented in Figure 4.2. A significant emergent outcome of this attractor is the systematic distortion of information, which enables the tobacco industry to adapt to mounting evidence linking smoking to harmful health effects. Inspection of the individual boxes in the Figure shows how harmful effects can emerge from the interactions of individual behaviours that would seem quite reasonable from the perspectives of the people involved.

In general, Bella (1997:985) observes such R-attractors will reinforce some sorts of behaviours over others. Specifically, it will reinforce behaviours that promote the existing pattern of order such as those which:

- secure funding;

- support systemic activities;
- avoid and resolve budget crises;
- meet schedules, quotas, or deadlines;
- satisfy those in higher position;
- deflect criticism; and
- prevent restrictions or constraints.

Conversely, R-attractors will repress behaviours that promote instability in the existing pattern of order such as those which:
- threaten funding;
- undermine support for systemic activities;
- promote budget crises;
- disrupt schedules, quotas, or deadlines;
- upset those in higher position;
- expose shortcomings, failure, and risks; and
- promote restrictions or constraints.

Bella asserts that the tendency for R-attractors to reinforce stabilising behaviours over destabilising behaviours is a reflection of the adaptive nature of complex organisational systems. As a result, for such tendencies to arise:

> Conspiracies, schemes, and intentional designs by individuals are not required, though they may occur. What is required of individuals is that they become preoccupied with the behaviours and activities reinforced by organizational systems, rushing to meet schedules, seeking funding, defending budgets, and having little time to stand back and question what emerges from all this activity. (Bella, 1997:985)

In the context of the tobacco industry Bella (1997) suggests that the preoccupation of people with behaviours and activities reinforced by the organisational system has supported the production of tobacco products that deliver addictive levels of nicotine to consumers over levels that are not addictive. It has also supported behaviours that allow the industry to avoid bearing the costs of the externalities associated with nicotine addiction over those that involve accepting such costs. These harmful emergent outcomes are a product of the history of threats or disturbances that the industry has faced over time and the way in which it has responded to them.
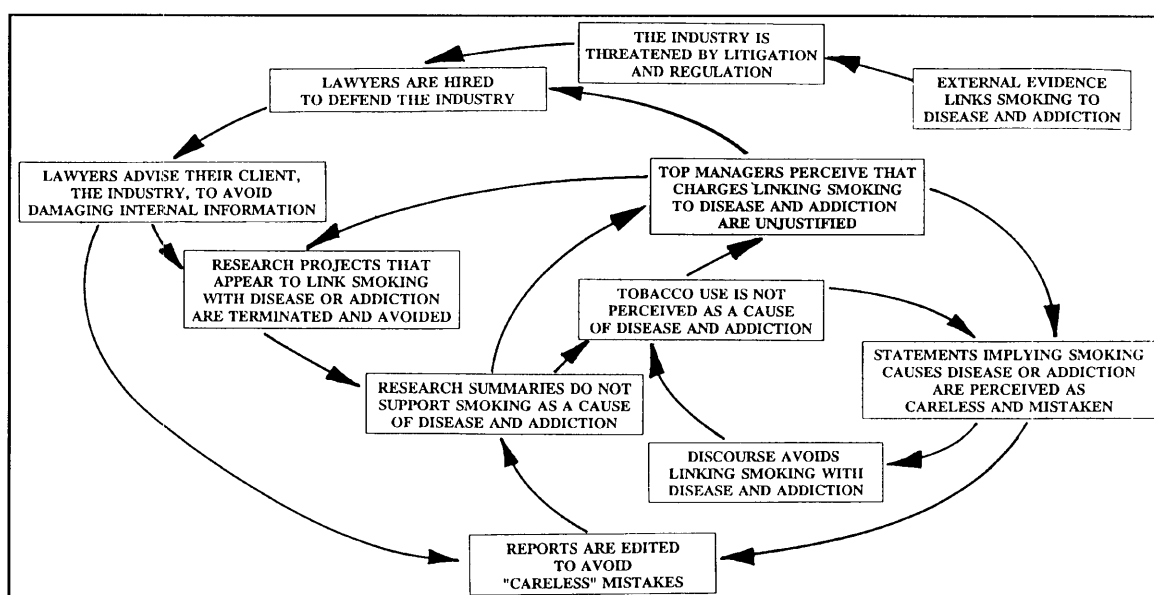
Figure 4.2 R-attractor resulting in the systemic distortion of information in the tobacco industry (Bella, 1997:990)

In the face of these harmful emergent outcomes, the R-attractor depicted in Figure 4.2 suggests, counter intuitively, that attempts to increase external evidence linking smoking to harmful health effects are likely to reinforce rather than destabilise the systemic distortion of information within the tobacco industry, which in turn supports the

continued existence of the industry. This counter intuitive outcome is a reflection of the fact that the R-attractor depicted in the Figure is a complex adaptive response to its past exposure to the threat posed by external evidence linking smoking to harmful health effects in the first place.

Whether emergent outcomes are harmful or otherwise, Bella (1997) points to the sorts of destabilising behaviours listed above as potential sources of leverage. In other words, changes to system behaviour resulting from individuals engaging in such behaviours have the potential to amplify throughout the system to the point where it shifts away from its existing attractor, or pattern of order. This potential was illustrated above by Smith's (1994) study of sports organisations where the disturbance caused by a seemingly small digression from the established pattern of order was amplified to produce significant and enduring changes in the way the organisation did business. It was also illustrated by Senge's (1990) quality circle example, where union leaders recognised and took advantage of the leverage provided by workers' distrust of management to counter the positive feedback loop initiated by the introduction of quality circles and trigger a return to the previous pattern of order.

The dynamic properties of complex systems mean that, even armed with knowledge about the dynamics of a particular system, it will not be possible to anticipate with any certainty how a system will respond to a given management intervention. Certainly the potential for nonlinearity, self-organising processes and emergent properties in complex systems suggests the parameters of their behaviour are always subject to change. At the same time, these dynamics also suggest that there are likely to be patterns in system behaviour that reflect how they have adapted to internal and external sources of change over time. While the characteristics of such patterns cannot be anticipated in advance, once they have been recognised they provide clues as to behavioural tendencies, the likely stability of behavioural tendencies and the dimensions of change that they may be critically sensitive to.

All this suggests that adopting a traditional perspective on management control, where it is assumed that organisational behaviour is stable, predictable and amenable to control, would be unwise in relation to complex organisational systems. A perspective more consistent with the dynamic properties of complex systems would be to accept that there are forces in complex systems that are not amenable to management control, either in principle or in practice. In other words it would be wiser to assume complexity. This suggests that the focus of strategic management should be on improving understanding of these forces rather than on controlling them. Such an understanding might then provide clues as to how to take advantage of the opportunities they present:

> '...realizing that you are part of it, realizing that the flow is ever-changing and always leading to new complexities, then every so often you can stick your oar into the river and punt yourself from one eddy to another.' (Waldrop 1992:330-331)

Summary and Conclusions

In this chapter the properties of complex systems and their implications for management have been discussed. These properties include nonlinearity, self-organising processes, openness and emergent behaviour. These properties suggest that the parameters of complex systems are neither dichotomous nor static. Rather, they suggest that at any point in time the behaviour of a complex system is underpinned by a dynamic tension between order and disorder, stability and instability, rigidity and flexibility, integration and adaptability. Further they suggest this tension is likely to change over time and to differ for parts of the system and in relation to different behaviours. Thus Cooksey notes that:

Complexity theory reminds us of the need to be constantly aware of, and responsive to, the dynamic nature of complex systems which means that critical parameters may change over time as a result of both the internal dynamics of the system and external forces, rather than assuming that 'they are random, don't exist, or are simply something to be held constant.' (Cooksey 2001:78)

This, in turn, suggests that an important part of strategic management will be to continually monitor the dynamics of system in search of clues to the behavioural tendencies of the system and any potential synergies or tensions between such tendencies and management or policy goals. Moreover, the dynamics of complex systems implies a need for an adaptive approach to strategic management that involves observing how the system works in practice as well as the responses of the system to any interventions. System responses and learning experiences can then inform further intervention.

The composite nature of organisational behaviour and the distributed nature of knowledge in complex systems also highlight the need for strategic analysis to consider and synthesise multiple perspectives on a given organisational system. Such perspectives will be critical to identifying and responding to patterns of behaviour within organisational sub-systems, among organisational sub-systems, and between organisational sub-systems and the external environment.

Chapter 5

Research Design

Complexity is not only a feature of the systems we study, it is
also a matter of the way in which we organize our thinking about
those systems. (Tsoukas & Hatch 2001:979)

Introduction

In the previous chapter the dynamic properties of complex systems were described and
some general implications for strategic management were discussed. Specifically, it was
asserted that interactions among people are a fundamental source of dynamics in social
systems and that knowledge about these dynamics is distributed. These assertions
suggested that eliciting multiple perspectives on the dynamics at play in a given social
system would be a fundamental to identifying which dynamics are critical to the pursuit
of management or policy goals and developing strategies to deal with them.

In this chapter the approach that was used to elicit and analyse multiple perspectives on
the dynamics at play in the native vegetation policy system will be justified and
described. As underlined by the opening quote, this approach was guided by Complexity
Theory.

The structure of the chapter is as follows. To begin with the ontological and
epistemological foundations of the research design are discussed. This is followed by a
discussion of the methodological perspective taken in the study and the issues it raised for

the research design. The chapter is completed by a presentation of the data collections procedures and the interpretive analyses that were used in the study.

The Nature of Knowledge in the Policy System

The research design in the study was grounded in the proposition that, not only are participants in the policy system a fundamental source of system dynamics but that they are also a fundamental source of knowledge about such dynamics. Participants' knowledge of system dynamics is particularly valuable for informing management because of the capacity of people generally to be sensitive to, and make sense of, the dynamic properties described in the previous chapter (such as nonlinearity, feedback loops and emergent order) (Stacey 2001; Tsoukas & Hatch 2001). Moreover, the capacity of people to make sense of such dynamic properties include the ability to deal with the paradoxes they imply, such as the potential for a decision at one point in time to generate both stability and instability in the system. This is known as bisociation, 'the ability to mentally and emotionally traverse both paths of a bifurcating line of thought' (Tsoukas & Hatch 2001:987).

Hence Forrester's observation that, while other sources of knowledge about social systems may exist, it is people's understandings of these systems that provide the richest knowledge of the dynamics at play:

> The information we possess about a social system can be
> divided into that stored in people's heads, that in descriptive
> written form, and that which has been measured and for which
> numerical data exist. The mental store of knowledge is
> overwhelmingly more comprehensive in revealing system
> structure, the information available at decision-making points,

and the nonlinear nature of decision-making criteria. (Forrester
1987:107)

The interest in this research on the social reality emerging from participants'
understandings of the policy system suggested that, the possibility of the policy system
existing independently of participants' understandings of it was not a significant
consideration in the research design. In other words, the consideration driving the
research design was not to uncover an objective truth that existed independently of
participants' perceptions. Rather, the consideration driving the research design was
whether participants' understandings of the policy system, as elicited through the
research process, could provide meaningful insights into the system of problems of
concern to participants and the interactions among them.

This placed the study within a constructivist epistemology (Bragg 1996; Crotty 1998;
Stake 2000). Such a position accepts the validity of differences in people's
understandings of reality without favouring some people's understanding over others
(Goolishian & Winderman 1988; Schwandt 1996; Raine 2001). At the same time,
adopting such a position did not preclude the possibility that the participants'
understandings of the policy system might also be influenced by sources other than our
interactions with the policy system, such as subconscious or ideological beliefs (Allen et
al. 1998; Crotty 1998). Similarly, adopting such a position did not preclude the
possibility that my interpretation of participants' understandings of the policy system
might also be influence by factors other than my interaction with participants.

Methodological Perspective

The interpretive perspective

An interpretive methodological perspective underpinned the research design in the study. An interpretive methodological perspective is appropriate when the research purpose is to understand and describe meaningful social action in specific contexts (Neuman 1997). This was consistent with the purpose of this study and the proposition that participants in the policy system would be a rich source of knowledge about its dynamics. An interpretive methodological perspective suggests that the researcher is a subjective participant in the research process rather than an objective observer. This perspective also suggests a naturalistic research design whereby meaningful action is studied in the social context in which it is embedded.

Miles and Huberman (1994:6-7) describe some of the common features of a naturalistic research design as: (1) involving prolonged contact with a field or life situation; (2) perceiving the role of the researcher as one of gaining a holistic, systemic and integrated overview of the context under study; (3) eliciting data on the perspectives of local actors through an empathetic process of attentiveness; (4) maintaining the integrity of the data collected while seeking to identify particular themes and expressions; (5) explaining how people in particular situations make sense of and manage their particular situations; (6) identifying compelling interpretations of the data collected; (7) use of the researcher as the main 'measurement device;' and (8) an analytical focus on words, which 'can be organized to permit the researcher to contrast, compare analyse and bestow patterns upon them.'

Adopting an interpretive methodological perspective raised four key issues for the research design. These issues related to the value of a case study approach, the degree to which the conceptual framework bounds the scope of the study in advance of data

collection, the interrelationship between data collection and analysis and what constitutes rigorous research.

Case study

A case study approach was well suited to the purposes of this study as it gives emphasis to understanding the complexities of a bounded case (Yin 1989; Stake 2000). This matched the overarching conceptual framework adopted in the study which was to conceptualise participants engaged in formulating and implementing native vegetation policy as part of a complex social system. Thus it was anticipated that the case study approach would be sensitive to the social interactions that give rise to the dynamic properties described in Chapter 4, such as nonlinearity, feedback loops and emergent behaviour.

I had both intrinsic and instrumental interests in developing an understanding of the dynamic properties at play in the native vegetation policy system (Stake 2000). Intrinsically, I was interested in developing an understanding of the case per se rather than understanding the case as an example of a complex system. Instrumentally, I was interested in exploring how an understanding of the case might provide useful information for managing the native vegetation policy system in pursuit of policy goals. Instrumentally, I was also interested in using the case to explore the value of the methodological approach developed in the study.

Bounding the scope of the study

While the research design was informed by a general understanding of the dynamics of complex social systems as described in Chapter 4, it was recognised that knowledge about the dynamics at play in the native vegetation policy system would reside in the

understandings of participants in that system. This suggested that the conceptual framework should be as broad as possible at the outset of the study. The opportunity would then exist to refine the conceptual framework as I learnt more about the system through my engagement with participants. Thus at the outset of the study the conceptual framework was guided by my general interest in native vegetation policy and the role of values in the policy process, a set of broad research questions and some ideas about where to start talking to people. Refining the conceptual framework then became a journey of learning with each cycle of learning informing the design of the next phase of the study.

Interrelationship between data collection and analysis

The approach to refining the conceptual framework described above necessarily meant that data collection and analysis were interrelated, in the sense that they were repeated throughout the research process. As depicted in Figure 5.1, each successive repetition involved reflecting on what had been learnt so far and using the insights gained to further refine the conceptual framework. It was anticipated that with each repetition my understanding of the dynamics of the system would progress. However, in practice, the progression through repetitions was messier than was possible to show in Figure 5.1, which tends to depict sequential progress. The messiness of this process is better captured by Neuman's description of the cyclical research path of interpretive research:

> Rather than moving through a straight line, a cyclical research path makes successive passes through steps, sometimes moving backward and sideways before moving on. It is more of a spiral, moving slowly upward but not directly. With each cycle of repetition, a researcher collects new data and gains new insights. (Neuman 1997:331)
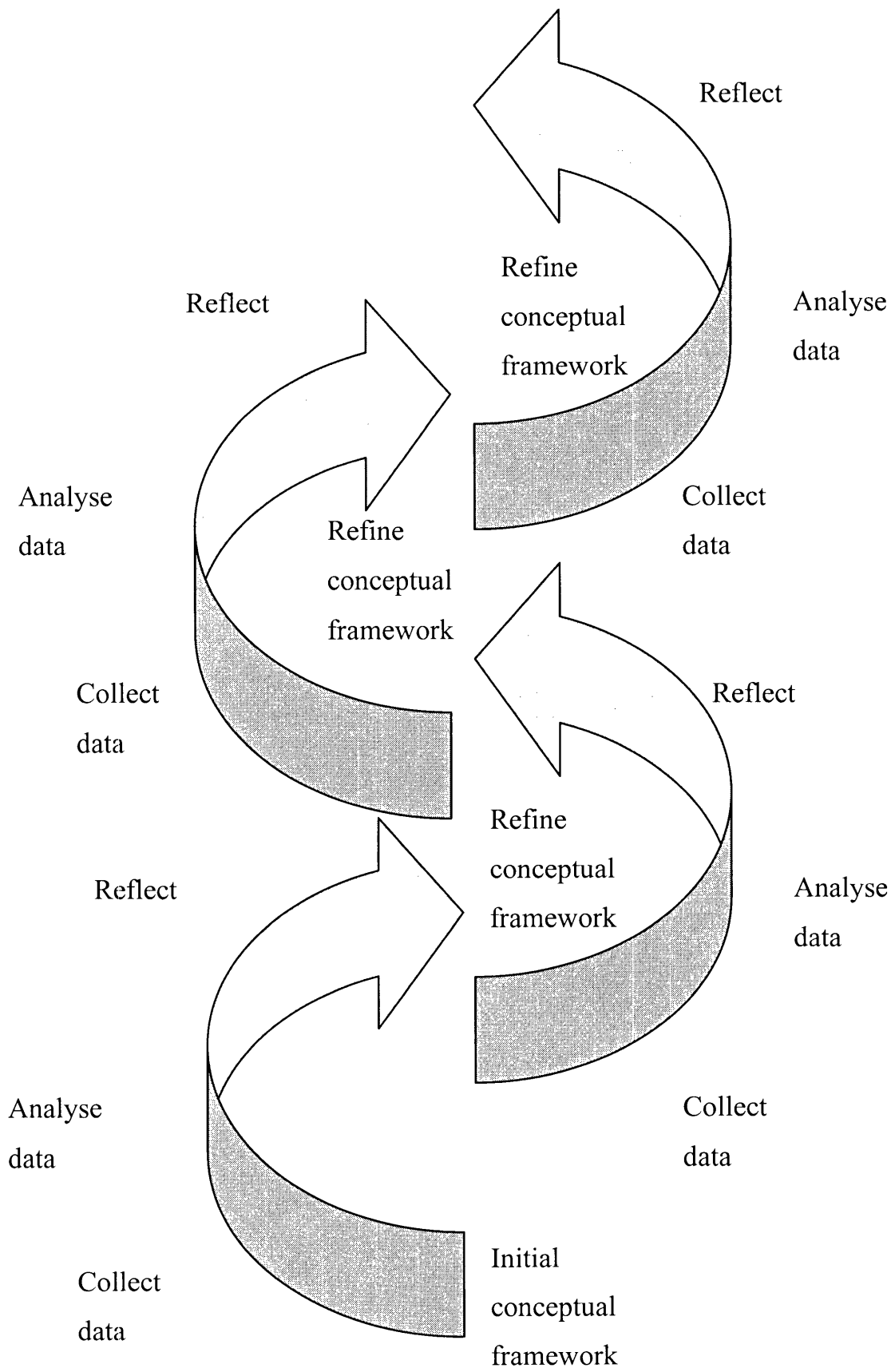
Reflect

Refine
conceptual
framework

Analyse
data

Reflect

Collect
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Analyse
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conceptual
framework

Analyse
data

Reflect

Refine
conceptual
framework

Collect
data

Analyse
data

Initial
conceptual
framework

Collect
data

Figure 5.1   Research process   142

With regard to this study, the first data collection cycle involved unstructured scoping interviews with a view to eliciting data from people involved in formulating and implementing native vegetation policy on the role of values in the policy process. Analysis and reflection on these data produced the insight that perhaps the research question was framed too narrowly. As a result, the research question was broadened to consider how people manage the range of problems that impact on policy process to realise policy goals. This broadening of the research question highlighted the relevance of two areas of literature. The first area was the literature on strategic management given its focus on how to achieve organisational goals in complex and uncertain environments. The second area was the literature on natural resource policy and management given its focus on how to pursue natural resource and environmental management goals.

A review of these areas of literature yielded three critical insights. First, from the literature on strategic management was the insight that managing organisational behaviour in pursuit of organisational goals in complex and uncertain environments involves a balancing of integration and adaptability. Second, from the literature on natural resource and environmental management was the insight that there were different theoretical perspectives on the priorities that should be placed on different goals in natural resource and environmental policy, and the means of pursuing them. This meant that success according to one theoretical perspective could be judged as failure according to another perspective. The third insight emerged from reflection on these two areas of literature. This was the insight that, in contrast to the literature on organisational management, adaptive management and integrated management had evolved as two distinct paradigms in the literature on natural resource and environmental management.

These insights were brought to bear on interpreting the next round of unstructured interviews. In these interviews participants in the policy process were asked about the various problems that they were required to address given their role in the policy process. Analysis and reflection on the data collected in this round of interviews revealed that the complexities observed in the literature were reflected in participants' experiences. This highlighted the potential value of an overarching conceptual framework that would allow

the synthesis of insights from different theoretical and participant perspectives. A search of the literature on management and decision-making led to Complexity Theory being chosen as an overarching framework that was consistent with the interpretive methodological perspective of the study.

The cyclical nature of the research path was also reflected in the evolution of the research methods used in the study. Thus, the methods used to elicit, interpret and represent participants' understandings of the policy system evolved through a highly iterative process. With each round of interviews I observed and reflected on how participants were describing the policy system. This provided insights that informed the interview design. It also raised questions about how the methods could be adjusted so as to better elicit, interpret and represent participants' understandings of the policy system.

To illustrate, the idea of interpreting and representing the data using causal maps only emerged after reflection on, and analysis of, the data collected in the fifth round of interviews. Specifically, it was anticipated that the physical representations that participants created in this round of interviews would act as a platform from which they could elaborate rather than as an actual representation of their understanding of the policy system. However, it was only through these interviews that the scope, depth and nature of the data elicited became apparent. Reflection on these characteristics led to the search for a way of interpreting the data that would adequately represent the richness of the dynamics that the participants had described. Thus, causal mapping was chosen as a tool for interpreting and representing the understandings of participants only after participants had expressed these understandings in the interviews.

As a consequence of this reflection on the data collected in the interviews, and the choice to use causal mapping to interpret and represent these data, it also became apparent that the taped recordings provided a more complete source of data on the dynamics of the policy system that participants had described than did the notes that I had taken either during or post-interview. As a consequence, the sample from which interviews were

selected to be presented in the thesis was limited to those interviews that were recorded on tape. This sample comprised 47 of the 59 interviews conducted in the fifth round.

What constitutes rigorous research?

> How do we know when we have specific social inquiries that are
> faithful enough to some human construction that we may feel
> safe in acting on them, or, more important, that members of the
> community in which the research is conducted may act on them?
> (Lincoln & Guba 2000:180)

The question that Lincoln and Guba raise explicates the emphasis that interpretive researchers give to ensuring, as far as possible, that the social phenomenon under study has been accessed and faithfully represented (Lincoln & Guba 1985; Scheurich 1996; Penman 2000). In the case of this study the fundamental concern was to access and faithfully represent participants' understandings of the dynamics at play in a particular policy system. A review of the methodological literature suggested that considerable controversy exists as to what criteria should be used to judge whether a research process has accessed and faithfully represented the social phenomenon under study (Schwandt 1996; Gubrium & Holstein 2000). However, there did appear to be a convergence of opinion in the literature as to the sorts of measures that can be taken in the research process to ensure that, as far as possible, the relevant social phenomenon has been accessed and faithfully represented. This convergence of opinion pointed to a need for reflexivity in interpretive research design (Deising 1991; Alvesson & Sloldberg 2000).

Choice and application of methods

Reflexivity in the choice of methods calls attention to the potential for the researcher to introduce sources of bias into a study by selecting methods that constrain the capacity of

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participants to express their own understandings in their own ways. This can occur, for example, when the conceptual framework and the methods chosen to support it are too narrow to be meaningful to participants. This issue became apparent early in the study when I approached the study with an interest in the role of values in the policy process. However, discussions with participants suggested that framing the research problem in terms of values would represent too great an abstraction from the reality of participants in the policy process. It was in reflecting on these discussions that I gained the insight that a broader and more systemic conceptual framework would be appropriate.

The researcher can also introduce bias into a study by selecting methods that are not well suited to the conceptual framework for the study. The cyclical research process described earlier and represented in Figure 5.1 was the main mechanism that was used to reduce this source of bias. Hence, with each data collection cycle I reflected on how people were responding to the data collection approach, the sort of information that was being elicited and the how these aligned with the conceptual framework. Following reflection action was taken to refine the conceptual framework and methods as deemed appropriate.

The researcher can also introduce bias into a study when a chosen method of elicitation is better suited to some participants' personality types than others. One mechanism that was used to reduce this sort of bias in the study was my willingness to adapt the design of the interview to the communication style of the participant. This was particularly relevant in relation to in-depth interviews that were undertaken in the later stages of the study. For these interviews a facilitated process was developed to assist participants to externalise their understandings of the dynamics at play in the policy system and the interrelationships involved. While some participants took advantage of the range of physical tools that were made available to assist this process, others preferred to express their understandings in other ways, such as on whiteboards, on paper or simply through narration. Throughout the research process I made a conscious effort to be open to participants expressing themselves in ways that were different to those either preferred or anticipated by the researcher. In some cases this meant repeat visits where the participant felt that they needed more time to either express themselves or reflect on things. In other

cases it meant conducting interviews at venues that suited participants rather than me, such as noisy coffee shops or under trees in the park.

The above example underlines the importance of the researcher being mindful of how their interactions with participants might be influencing the nature of the data elicited (Langer 1989). Such influence might be grounded, for instance, in the researcher's past experiences, in their emotional state at the time or in their cognitive make up. In the case of this study, I was aware that on some days I connected better with people than on others, similarly there were some people I connected with better than others and some stories they found easier to relate to. In order to manage these particular instances I made a conscious effort to evaluate how I was feeling in the moment and to adjust the way I was responding accordingly. In addition, I took field notes which included observations on such dynamics when I was aware of them. I reflected on these experiences post-interview, considered their impacts and developed strategies to manage similar circumstances in future.

Another source of researcher bias can emerge from the researcher's choice of who to invite to participate in a study. In the case of this study one of the ways that was used to minimise this potential source of bias was to seek a diversity of perspectives on the research process. The dimensions of this diversity were the roles of participants and their organisational affiliation. In addition, a snowball sampling method was used. This involved using secondary data, such as government web sites or information booklets to identify a few participants to approach initially. Each participant was then asked to suggest other people engaged in the process that would be important to talk to, or who could provide a different point of view (Cooper & Emory 1995).

Two propositions from Casti (1986) support the pursuit of diverse perspectives on the policy system. First, that the complexity of a system is observer dependent. Second, the complexity of a system is directly proportional to the number of inequivalent descriptions of the system that can be generated. This suggests that the greater the number of inequivalent descriptions that are obtained of a system, the richer the understanding of the

system will be, and the less influential the perspective of any single observer. The implication drawn for the purposes of this research was that the greater the diversity of perspectives on the system the smaller would be the bias imparted by the researcher.

Interpretation

Reflexivity in interpretation calls attention to the role of the researcher in drawing interest to some interpretations of the phenomenon under study over others (Greene 2000; Gubrium & Holstein 2000). While an interpretive perspective recognises the legitimacy of the researcher's role in this regard, rigour requires that the researcher has a reasoned argument for drawing interest to some interpretations over others and that this reasoned argument is made explicit (Neuman 1997; Lincoln & Guba 2000). This means that it should be possible to distinguish the researcher's contribution to understanding from that of participants. It also means that the researcher's representations of the understandings of participants should resonate with participants.

In this study, the reasoning for drawing attention to particular interpretations of the data was guided by the theoretical lens of Complexity Theory and the management orientation of the research purpose. Specifically, the data were interpreted with a view to informing knowledge about the dynamics at play in the policy system and their implications for management. This was reflected in the choice to construct causal maps from the data as they provided a means for representing the richness of relationships that participants had described in the interviews and the calls to action that they either directly stated or implied. A conscious effort was also made to document and reflect upon this reasoning in constructing and interpreting the causal maps. This made it possible to be explicit about the reasoning when reporting the results of the interpretive analyses.

In the conduct of the interpretive analyses, care was taken to ensure that the inferences drawn from the data accurately reflected the evidence present in the data. This involved checking for, and reflecting on, corroborative and contradictory evidence within and

across individual accounts. This was supported by efforts to retain the integrity of the words and phrases that participants used in constructing and presenting the causal maps. If changes were made to the participants' wording, the rationale for these changes was reported. In addition, at all times an effort was made in the text to distinguish observations made by participants from those made by the researcher. It was hoped that these efforts, in conjunction with those already described, would retain the integrity of participants' contributions to the study and thus make it possible to distinguish participants' contributions to understanding from those of the researcher.

To check whether the causal maps as representations of participants' understandings actually resonated with participants, a sample of participants were contacted and asked if they would be willing to meet with the researcher and provide some feedback on whether, and the extent to which, the causal maps reflected what they had conveyed the interviews. The approach taken to these meetings is reported in the research methods section to follow.

The mechanisms for reflexivity in interpretation described in this section were buttressed by the cyclical nature of the overall research process, which provided an opportunity for reflection, learning and adjustment throughout the research process.

Research Methods

Overview and timeline

This study was conducted over five years and survived a major shift in direction, an eight month suspension of candidature and two trans-Tasman relocations. The timeline presented in Figure 5.2 provides a general overview of how the study progressed in the context of these perturbations. As can be seen from the time line the study commenced in March 2001. It was during the first year following scoping interviews with people involved in native vegetation policy that I became dissatisfied with the original

conceptual framework for the study. As a result, the major part of this year was devoted to the pursuit of an alternative. This pursuit led to the adoption of Complexity Theory as the overarching framework for the study. This provided the basis for the remaining progress of the study which involved five major cycles of interviews, analysis and reflection. The final cycle ended with the submission of the thesis in April 2006.

Bounding the case study

Selecting the State context

The policy realm of interest in this study was natural resource management policy in general and native vegetation policy in particular. In Australia, natural resource management is largely the responsibility of state governments (Holland, Morton & Galligan 1996). By and large, state level policy sets broad policy directions and baseline criteria which are aimed at guiding action at regional and local levels of government. Each state is responsible for developing its own natural resource management policies, so that there is considerable variation in the approaches to natural resource management policy formulation across the states and territories (Johnson & Rix 1993; Denys Slee and Associates 1998; Dore, Binning & Hayes 2000; Environment Australia 2001). This suggested that the first step in bounding the policy domain would be to identify a State or Territory in which to locate the case study.

After reviewing available literature on native vegetation management and policy in Australian States and Territories, Victoria was selected as the State in which to locate the case study. The main criterion for selecting Victoria was that it had a long history with policies and regulations aimed at retaining native vegetation on privately owned, leasehold and state owned land, relative to other States and Territories (with the exception of South Australia). This long history suggested that the Victoria would provide a relatively stable context in which to locate the case study as enough time had passed since the introduction of the vegetation clearing controls to allow time for a
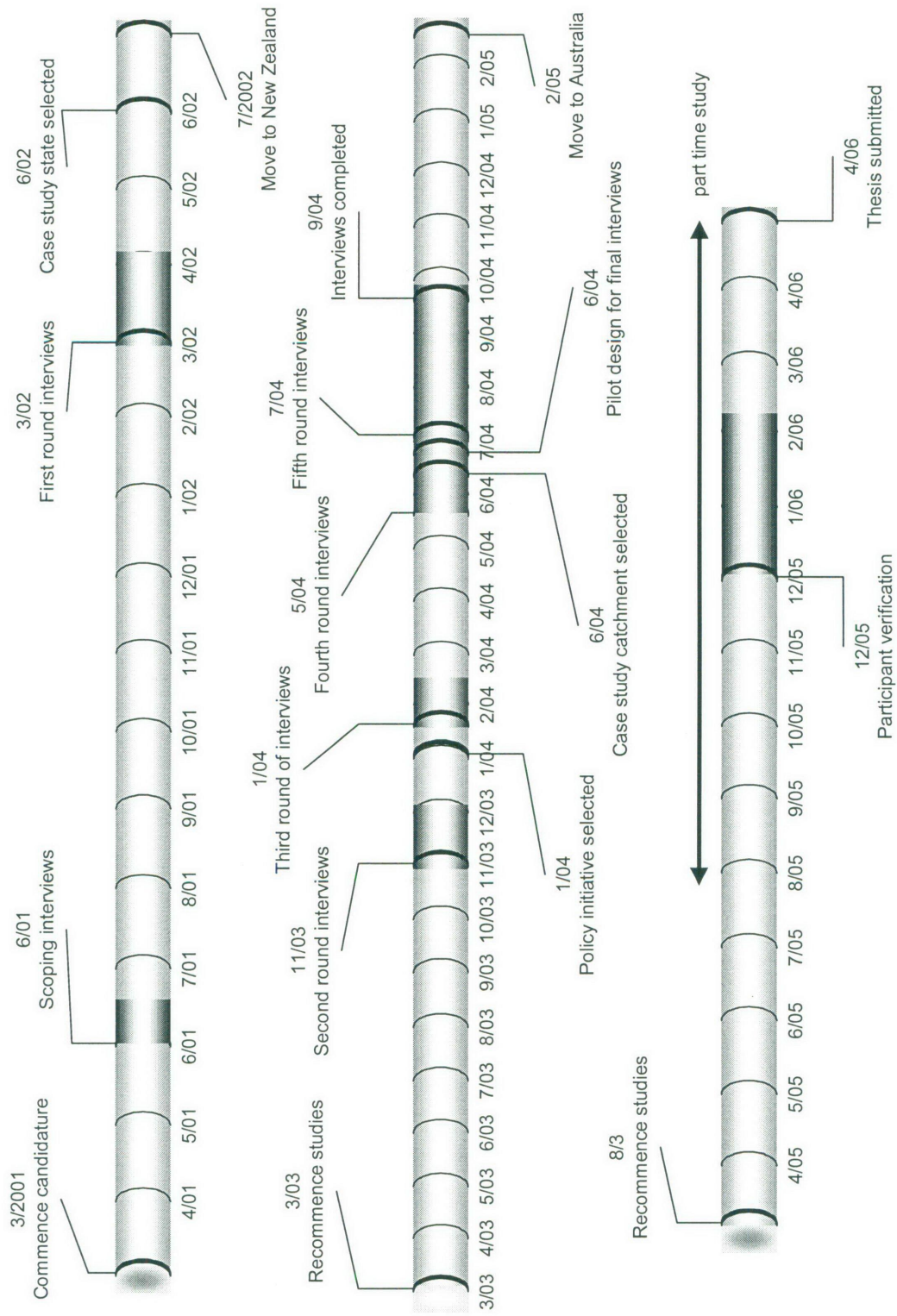
Figure 5.2 Timeline for the study

3/2001
Commence candidature

6/01
Scoping interviews

3/02
First round interviews

6/02
Case study state selected

7/2002
Move to New Zealand

3/03
Recommence studies

11/03
Second round interviews

1/04
Third round of interviews

5/04
Fourth round interviews

7/04
Fifth round interviews

9/04
Interviews completed

2/05
Move to Australia

1/04
Policy initiative selected

6/04
Case study catchment selected

6/04
Pilot design for final interviews

8/3
Recommence studies

12/05
Participant verification

part time study

4/06
Thesis submitted

system of supporting institutional structures, policies, programs and instruments to be developed and put in place. This would provide a rich context in which to locate the case study.

In Victoria the Department of Sustainability and Environment (DSE) has statutory responsibility for developing and administering state level native vegetation management policy. The overarching policy document in this regard is *Victoria's Native Vegetation Management Framework – A Framework for Action* (Department of Natural Resources an Environment 2002). This document establishes guiding principles for managing native vegetation in the state according to the central policy objective which is 'a reversal, across the entire landscape, of the long-term decline in the extent and quality of native vegetation, leading to a Net Gain.' Participants commonly described this as the 'Net Gain objective.'

Selecting the regional context

Complexity theory suggests that, when bounding a study, it is critical to account for multiple hierarchical levels in analysing a policy system. At the same time, it was recognised that, in practice, there will be a trade-off between the number of levels that can be covered in an analysis and the depth of analysis that can be pursued in each level in the hierarchy. This suggested a need to identify some boundaries around a level in the system that would be the central focus of analysis and provide a foundation for explorations into other levels of the policy system. In the case of Victoria, the level selected for entry into the system was the regional catchment management level. This level was selected because it is at this level that there is a convergence between broader policy guidelines and the real world biophysical, social and institutional environment in which they are to be applied.

There are ten Catchment Management Authorities (CMAs) in Victoria. Within the policy framework provided by the State government, and in conjunction with other government agencies, CMAs are responsible for formulating and implementing regional catchment strategies and their components (Ewing 2003). One of these components is the regional native vegetation management plan. The regional native vegetation plans set regional priorities for achieving the State's Net Gain objective (Department of Natural Resources an Environment 2002). These priorities are then used to guide State and Federal government investment in on-ground works in the catchment (Department of Natural Resources an Environment 2002).

For the purposes of this study it was recognised that with the time and resources available it would not be possible to conduct an in-depth analysis in relation to all ten catchment management regions. This necessitated choosing a subset to analyse. After considering the trade-offs involved between depth and breadth of analysis a decision was made to seek coverage of two catchment regions in the case study. The option of two catchment regions was selected over the option of focussing on a single region simply to enhance the diversity of perspectives on the system.

Three criteria were used to guide the selection of the regions in which to locate the study. Two of these criteria emerged as key features that distinguished the regions based on the findings of the second, third and fourth rounds of interviews that were conducted with participants in the policy process across the State. These criteria were that there was a degree of diversity in native vegetation issues covered by the catchments and that they included one catchment that had been selected as a priority region in the National Action Plan for Salinity (NAP) and a catchment that had not been selected as a priority region under this program.

The second criterion was chosen because a number of people who participated in the study related that NAP was a major source of funding, so that catchments that had been able to attract such funding tended to have higher capacity to address natural resource issues than catchments that had not been able to attract such funding. Participants also

related that, because of the conditions attached to NAP grants, they had an observable impact on the relative priorities placed on different natural resource management issues in the catchments. Finally, participants' observations suggested that NAP grants had implications for the relationships and understandings that developed between regional agency staff and staff in State and Federal agencies.

The third criterion was a practical consideration. This was the consideration that the catchments be in proximity with each other given limited time and resources available for the study.

Ethical considerations

The study was approved by the Human Research Ethics Committee of the University of New England (Approval No04/111).

A major ethical consideration in the study was anonymity as it became apparent that there was a relatively small and closely connected network of people engaged in policy processes relating to native vegetation in Victoria. This meant that, in all likelihood, the identity of the participant would be evident from combining knowledge of their role with knowledge of their location in the State (particularly to other people in the native vegetation policy network and those in the broader natural resource management network). As the roles of participants were evident from the content of participants' discussions, the case study catchments were not named in the thesis. Similarly, information that would identify individual participants was not reported in the thesis.

In addition, an information sheet was sent to participants prior to the interview that had information on the study, the nature of the interview, and the confidential, anonymous and voluntary nature of their participation (see Appendix 1). I also took care to reassure people of the voluntary nature of their participation in the interview and to let them know

that if they were to decide to withdraw their participation at any stage, even after the interview, it would not be a problem as any data collected could be returned to them or destroyed. Before commencing the interviews participants were asked to provide informed consent for their participation and where applicable for the interview to be recorded on tape.

Unstructured Interviews

Shortly after commencing the study, I conducted some informal scoping interviews with contacts that the researcher had made in a previous study on native vegetation policy in NSW and Queensland. In these interviews I talked about ideas for the study and sought responses from participants.

Five major rounds of interviews were then conducted for the study. The first round of interviews was conducted with people engaged in the native vegetation policy process in Sydney, NSW. These informal and unstructured interviews were aimed at informing the identification of a case study state and refining the conceptual framework for the study. Participants in these interviews were largely contacts that I had made in a previous study on native vegetation policy or people that these contacts had recommended that I talk to. They included staff of government agencies and academics with an interest in native vegetation management.

After identifying a State in which to locate the study, the second round of interviews was conducted in Victoria. Eighteen interviews were conducted in this round. A snowball sampling strategy was used to identify participants for this round of interviews. This strategy involved using secondary data (for example government web sites) and recommendations from contacts made in the previous study to identify a few people to approach initially. Participants were then asked to suggest other people engaged in the policy process that they thought would be important to talk to, or who could provide a

different point of view. The organisational affiliations of the people who participated in this round of interviews is summarised in Table 5.1 below.

Table 5.1   Organisational affiliations of second round participants

Participant affiliation
Catchment Management Authorities (CMAs)
Country Fire Authority of Victoria (CFA)
Deakin University
Department of Primary Industries (DPI)
Department of Sustainability and Environment (DSE)
Environment Victoria (EV)
Municipal Association of Victoria (MAV)
Parks Victoria (Parks Vic)
Royal Melbourne Institute of Technology (RMIT)
Victorian Environmental Assessment Council (VEAC)
Victorian National Parks Association (VNPA)

The information elicited in the second round of interviews informed the researcher's understanding of the organisations involved in native vegetation policy in Victoria and the general issues they were dealing with. These interviews also informed the selection of the case study initiative. After reflecting on the findings of this round of interviews *Victoria's Native Vegetation Management Framework – A Framework for Action* (Department of Natural Resources an Environment 2002) was selected as the policy initiative for the case study. From this point forward this policy will be referred to as the NVMF.

Having identified an initiative around which to focus the study, the third and fourth rounds of interviews were conducted with a view to identifying a regional context in which to locate the study. Thirteen participants were interviewed in the third round and these were mainly based in Melbourne. The sampling strategy for this phase of interviews was focused on talking to participants from organisations with core

responsibilities for formulating and implementing the policy initiative. These organisations were DSE, DPI the CMAs and Local Government. The information collected in this round helped to identify the fourteen regionally based people in these organisations that were interviewed in the fourth round of interviews. The unstructured interviews in the third and fourth rounds provided information on the issues in the individual catchments and the characteristics that participants felt distinguished the different catchment regions.

In-depth interviews-data collection methods

<u>Design</u>

The aim in the in-depth interviews was to elicit detailed information on the participants' understandings of the dynamics at play in the policy process. Two considerations therefore were considered critical to the interview design. The first was to ensure that the design was sufficiently open to ensure that participants would have the flexibility to express their understandings of the policy process in a way that they were comfortable with. As noted in the earlier section on the choice of methods and their application, I addressed this consideration through my efforts to be open to participants expressing themselves in their own ways.

The second was to engage people in a discussion of sufficient depth to allow the richness of their understandings about the policy process to be elicited. The approach that was taken to address this consideration was to ask people to identify a particular experience to talk about in detail. In order to encourage participants to elaborate on the details of their experiences a series of prompts were used. These prompts and the overall approach taken in the interviews are reported in the interview guide (see Appendix 2). In addition physical tools such as Post-It notes, felt connectors and a felt mat were made available to assist people to create a physical summary or display of their discussion.

The process of creating a physical summary of the discussion was started early in the interview when people identified an issue and began talking about the key aspects that needed to be considered. At this point participants were asked if they could summarise the points that they had made on Post-It notes. Participants were then asked to elaborate on the points that they had written on the Post-It notes. As participants elaborated on points I continued to ask the participant if there was some way that they could represent their points and their relationships with other points using additional Post-It notes and connectors. Through this process the participant gradually built up a physical representation of their understandings (see Figure 5.3 for photographs of maps that participants created in the pilot).

The interview design was piloted with six people involved in natural resource management policy in New Zealand. This process highlighted the importance of providing people with Post-It notes and connectors ranging in colours and size. It also helped the researcher develop some phrases for encouraging people to add to their physical representations. Further, the pilot process highlighted the value of asking participants if there was anything that struck them as particularly important when they thought about the various aspects they had described. This provided an opportunity for participants to:

- identify especially important points and connections in their maps;
- articulate new insights that the interview process had engendered; and
- articulate relationships and understandings that had not yet been made explicit in the discussion.

The interviews were recorded on audio-tape where conditions were conducive to such recording and the participant gave their consent to have the interview recorded on tape. If conditions were not conducive to recording on tape, or the participant did not wish to have the interview recorded on tape, I took notes. In two cases participants did not wish notes to be taken during the interviews. In these cases I made notes post-interview. Where the participant used Post-It notes, with the permission of the participant, a photo

was taken of how the participant had arranged the Post-It notes on the felt map. The Post-It notes were then placed in an envelope labelled with the interview number. This enabled me to repeatedly review the photos, Post-It notes and tape-recordings in conducting the interpretive analysis. Thus an advantage of this research design was that it provided an opportunity for me to elicit a visual summary of the interview in the participant's own words, which could be revisited and reflected upon as the analysis progressed. The interviews took about an hour, on average.

Sampling

As articulated in the section earlier in relation to rigour and the choice and application of methods, the sampling strategy for the in-depth interviews was driven by a desire to obtain diverse perspectives on the system. Thus coverage was sought of the range of organisations involved in formulating and implementing the NVMF. Moreover coverage was sought of a range of organisational roles. After identifying a few initial people to interview based on their role and the organisation they represented, the snowball strategy described earlier was used to identify other participants to approach. In total 59 in depth interviews were conducted. The affiliations of the participants interviewed are summarised in Table 5.2.

It became apparent as the interpretive analysis progressed that it would not be possible to report an in-depth interpretive analysis for all of the 47 interviews that were recorded on tape in the study. Of the total sample, a sub-sample of ten was selected to report in depth. The criterion used to select the sub-sample was the organisational role of the participant. Specifically, the aim was to provide coverage of the roles that emerged from participants' discussions as the core organisational roles in formulating and implementing the Native Vegetation Management Framework (NVMF) in Victoria.
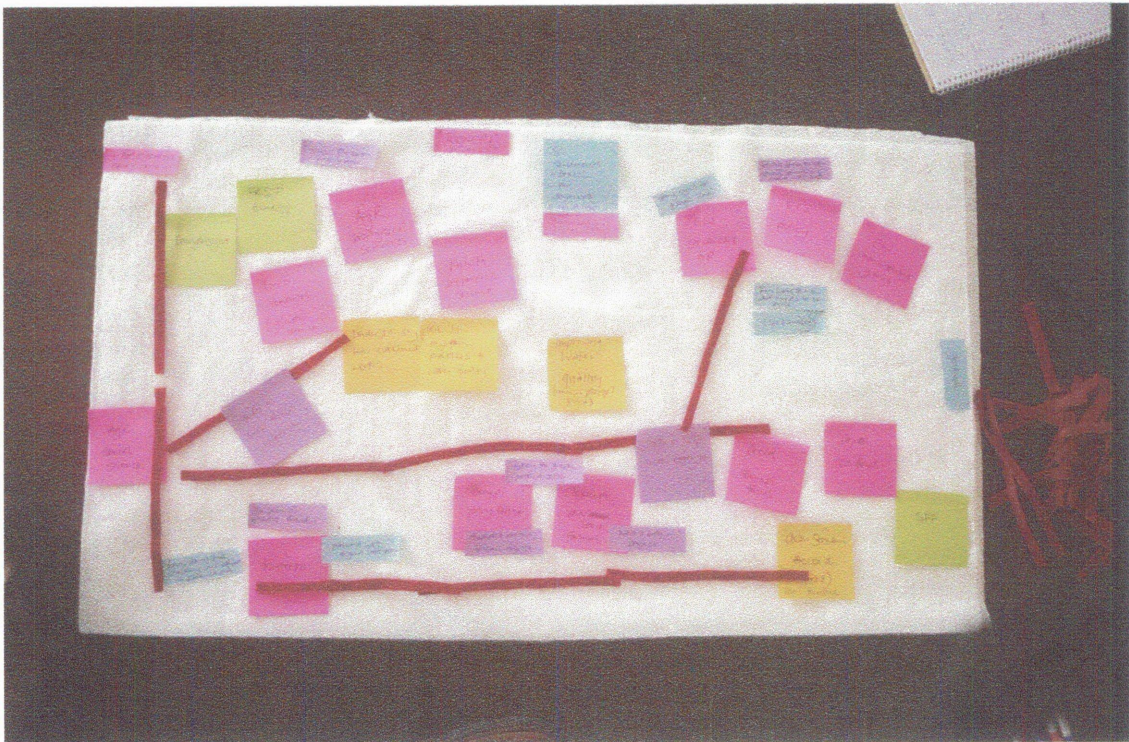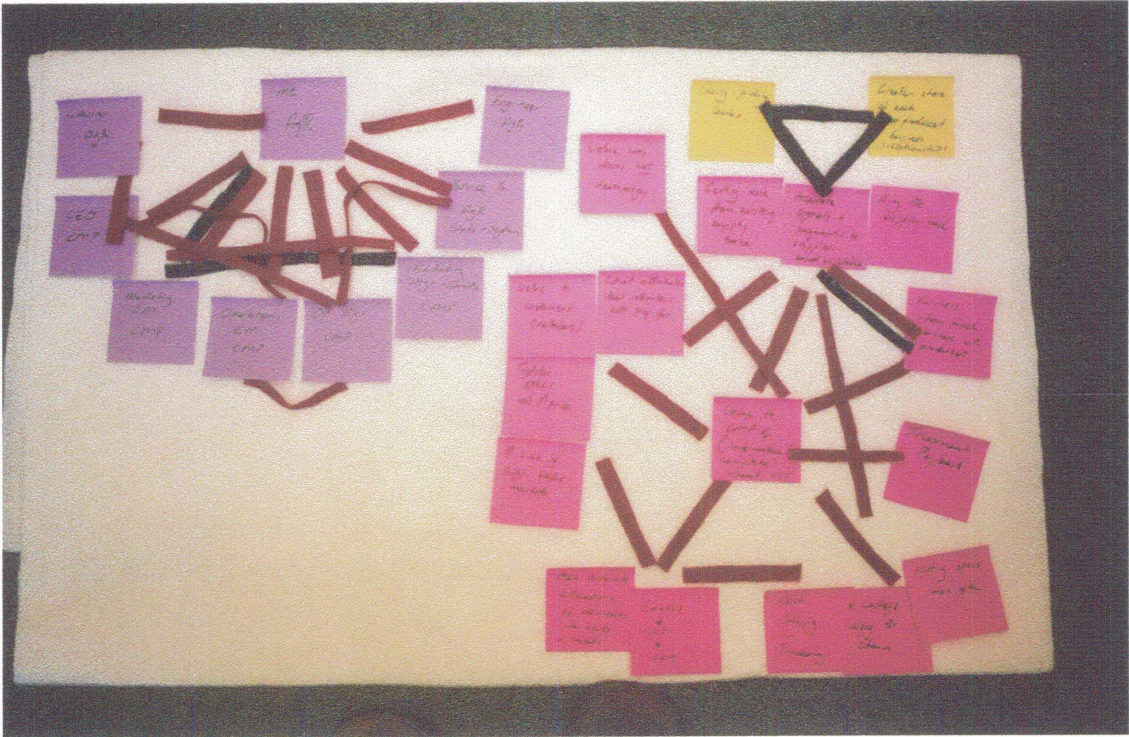
Figure 5.3 Maps constructed by participants in the pilot 160

Table 5.2 Characteristics of the sample

Participant Affiliation	Number interviewed
Catchment Management Authorities (CMAs)	10
Department of Primary Industries (DPI)	12
Water Authorities	1
Community Representatives	4
Department of Sustainability and the Environment (DSE)	14
Local Government	7
Victorian Farmers Federation (VFF)	2
Trust for Nature (TFN)	2
Landcare	1
Parks Victoria (Parks Vic)	1
Environment Victoria (EV)	1
Greening Australia (GA)	2
Victorian National Parks Association (VNPA)	1
Non-government policy advisor	1
TOTAL	**59**

These roles are reported below in Table 5.3. Generally, implementing the NVMF was the major focus of the roles of these participants. When more than one taped interview was available for a particular organisational role, the interview of the participant for whom the NVMF was most central in their position was selected. This sub-sample was intended to be illustrative rather than definitive.

Table 5.3 Core organisational roles in formulating and implementing the NVMF

Organisation	Role	Number of interviews		
		Tot	Taped	Reported*
Department of Sustainability and Environment (DSE)	• Head office policy formulation	4	3	1
	• Head office overseeing of policy implementation	4	3	1
	• Regional policy implementation	2	2	1
Catchment Management Authority (CMA)	• Formulation of regional vegetation management plans	3	3	1
	• Implementation of NVMF through catchment management programs	2	2	1
Department of Primary Industries (DPI)	• Implementation of NVMF through DPI programs	2	2	1
Local Government	• Implementation NVMF through administration and enforcement of planning schemes, including permit applications to remove native vegetation	2	2	1
Environment Victoria (EV) and the Victorian National Parks Association (VNPA)	• Represent interests of environmental groups in NVMF policy process	2	2	1
Victorian Farmers Federation (VFF)	• Represent interests of farmers in NVMF policy process	2	2	1
Unaffiliated community representatives	• Represent interests of regional community in NVMF policy process	4	2	1

*This is the number of interviews for which a causal map was presented in the thesis.

In-depth interviews- analysis

An interpretive analysis was applied to the data collected in the in-depth interviews. The aim in this analysis was gain knowledge about the dynamics at play in the policy system under study and their implications for management. This analysis was conducted in four iterative stages. In the first stage, causal maps were constructed to explicate the issues, events and decisions that individual participants described in the interviews and the relationships among them. In other words, the causal maps constructed in the first stage identified the system of problems of concern to individual participants. Having identified the system of problems of concern to individual participants, the focus in the second stage was on identifying which problems in each of the maps represented critical points for management intervention. These points were categorised as either critical leverage points or critical constraints.

While the focus of the first and second stages of the interpretive analysis was on explicating each participant's understanding of the policy system, the focus in the third and fourth stages was on synthesising these understandings. In the third stage, the identified critical leverage points and constraints were compared and contrasted across causal maps with a view to identifying common, emergent themes. In the fourth stage, the identified critical leverage points and constraints were further categorised according to whether they would tend to have either a destabilising or stabilising effect on system behaviour.
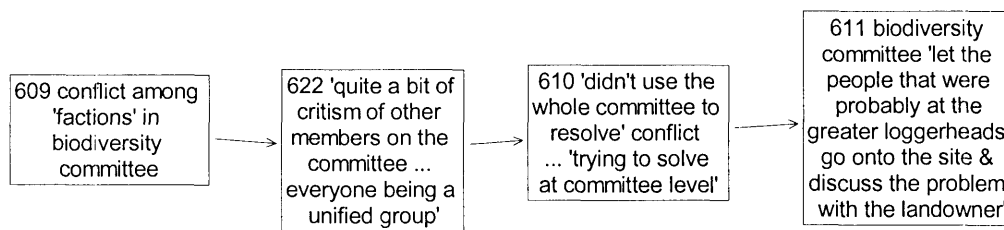
Constructing the causal maps

Creating individual items

As noted earlier the first stage of the analysis provided a means of explicating the connections between particular issues, events and decisions described by participants in the interviews and the calls to action implied. The first step in constructing a given causal map was to create the individual items that would represent the particular issues, events and decisions that the participant described in the interview. These items were based on the words or statements that the participant wrote on Post-it notes or expressed verbally. These words or statements were presented within quotation marks in the item. If the only modification to a statement was to change the tense to maintain consistency the modified statement was still presented within quotation marks.

To illustrate the nature of this process, the following is a block of text transcribed from the interview that was used to construct the items in Map 7 (reported in the next chapter):

> There was quite a bit of criticism of the other members on the
> committee rather than everyone being a unified group......we had
> [one] faction very much at war against [another faction] ...instead
> of trying to solve it at a committee level we let the people that
> were probably at the greater logger heads go onto the site and
> discuss the problem with the landowner.

The detailed descriptions of the factions were replaced by the general descriptions in the square brackets so as to preserve anonymity. Four items were constructed from this text as shown in Figure 5.4. The numbers in the boxes are simply randomly allocated item identifiers.

| 609 conflict among 'factions' in biodiversity committee | → | 622 'quite a bit of critism of other members on the committee ... everyone being a unified group' | → | 610 'didn't use the whole committee to resolve' conflict ... 'trying to solve at committee level' | → | 611 biodiversity committee 'let the people that were probably at the greater loggerheads go onto the site & discuss the problem with the landowner' |

Figure 5.4   Representing participants' descriptions as causal map items

In representing participants' descriptions as causal map items, a concerted effort was made to retain the participant's wording. At the same time, if a participant did not explicitly state a key aspect as an action when an action was implied, the participant's original wording was modified to reflect the implied action. When an action was implied but not explicitly stated, it was included in the item outside the quotation marks that delineated the participant's original wording. Such an approach draws attention to the management implications of the aspect in question. Thus it provided a basis for identifying potential constraints and leverage points in the policy system.

Similarly, a concerted effort was made to include the actors that the participant referred to in a statement. Where this was not a part of a statement, but was implied or referred to by the participant in the broader discussion of which the statement was a part, the relevant actor was included in the statement outside of the quotation marks. Thus, in Figure 5.4 the biodiversity committee is specified as the relevant actor to clarify who the participant was referring to in item 611.

Sometimes in the interview, a participant expressed a statement that provided a contrast to an earlier statement that they had made. When this was the case, both the original statement and the contrasting statement were included in a single item in the map. The original statement was presented first followed by a series of three dots and the

contrasting statement. This is demonstrated in Figure 5.4 by item 610. The three dots are conventionally interpreted as 'rather than' (Ackermann, Eden & Cropper 1993). Combining contrasting statements in this manner can help to clarify meaning and can also help to identify points in the policy system where, from the participant's perspective, a decision can be made or action can be taken to pursue alternative paths. This, in turn, highlights management implications and provides clues as to possible constraints and leverage points.

If a participant expressed an idea in a way other than that of a single statement or a pair of contrasting statements then my interpretation of their idea was presented in an item without quotation marks. This is illustrated in Figure 5.4 by item 609. Note that the only word within quotations is the word 'factions.' Item 5.4 was constructed in this way because the participant's broader discussion suggested that there were tensions among various factions in the committee that would not have been captured by the statement 'we had [one] faction very much at war against [another faction].' In other words, it appeared that this statement was an illustrative example of a broader issue.

A practical constraint on the degree to which it was possible to use the exact wording of participants in the items was imposed by the Decision Explorer software that was used to draw the causal maps (Banxia Software Limited 2005). This software limited the number of characters that could be represented in a single item to 159.

Linking items in the perceptual maps

The structure of each causal map was built up by linking items with arrows so that the item at the head of the arrow is an outcome or implication of the item at the tail of the arrow. A two way arrow implies a reciprocal relationship. An arrow accompanied by a negative sign implies that the item at the tail of the arrow had a negative impact on the realisation of the item at the head of the arrow. The process of linking items in this way results in chains of items that have the hierarchical structure illustrated in Figure 5.5. At the top of the hierarchy are overarching goals.

Overarching goals are generally supported by organisational strategies which are, in turn, supported by a portfolio of policy options. Ackermann, Eden and Cropper (1993) observe that some features of organisational strategies that distinguish them from policy options are that strategies tend to have long term implications, they tend to be high cost and irreversible, they require a portfolio of actions to be realised and they may require a change in culture. The items closest to the bottom of the hierarchical chain tend to be specific observations that explain the need for the policy options and strategies higher in the chain.

Hence the meanings of items in causal maps are given not only by their content but also by how they are linked together (Eden & Ackermann 2004). As a result an item with the same or similar content may have different meanings in different maps because of differences in the chains of items leading to them and from them.

Figure 5.5 shows the three types of items that were generally distinguished in the causal maps. Goals were represented as shadowed boxes with rounded edges, critical leverage points and critical constraints (as discussed below in relation to the second stage of the analysis) were represented as shadowed and plain ovals respectively. Items that were not goals, critical leverage points or critical constraints were represented as plain boxes.

Participant Verification

The aim in this part of the analysis was to check whether the representations of the understandings of participants, as depicted in the causal maps, actually resonated with participants. For this part of the analysis, I contacted a sub sample of the participants and asked them if they would be willing to meet with me to provide some feedback on whether, and the extent to which, the causal maps reflected what they had conveyed in the previous interviews.
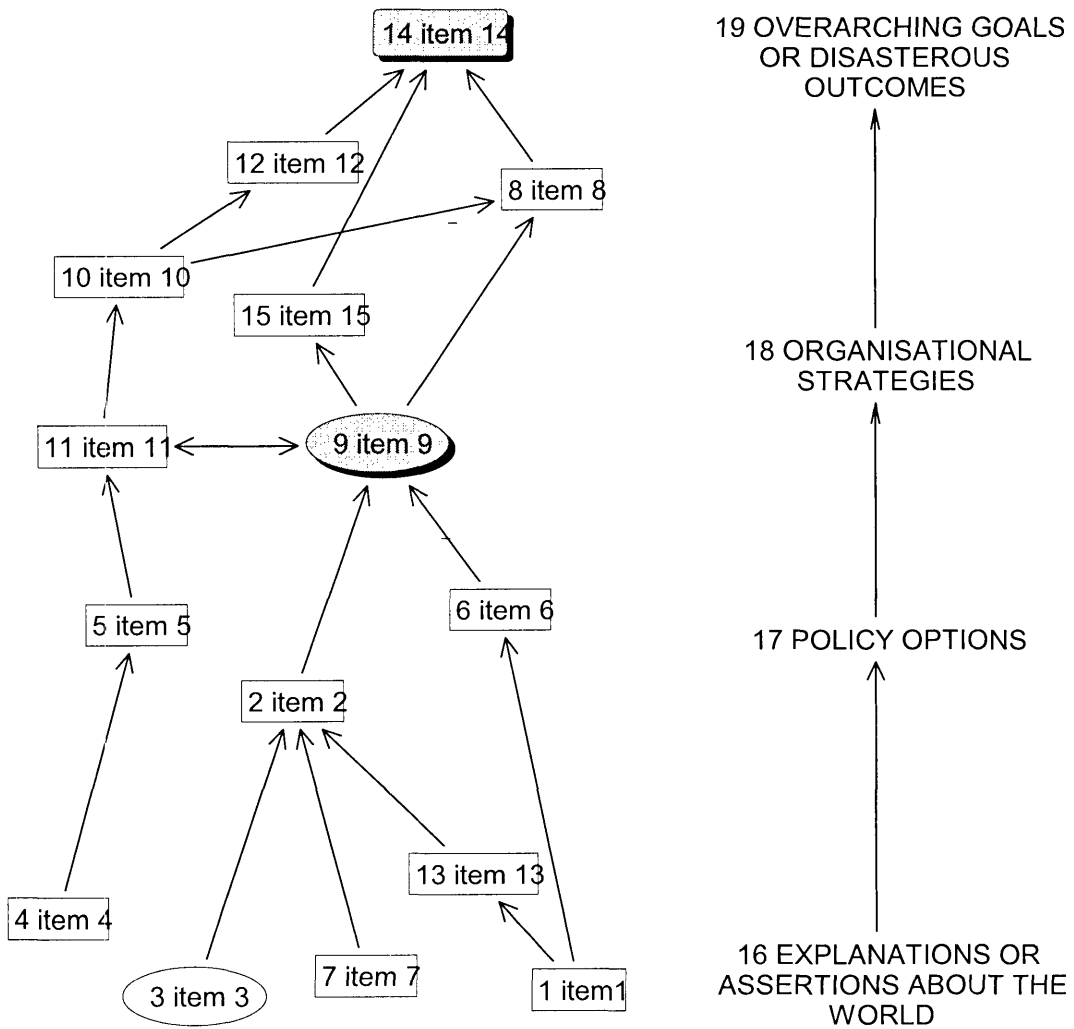
Figure 5.5 Structure of causal maps

The main criterion for selecting the people to approach for this part of the study was diversity. Specifically, the aim was to cover some diversity in the organisational roles of participants, and the way in which they had approached the previous interviews. In addition, one participant was selected because I felt that I had not adequately represented a critical dimension that the participant had conveyed in the previous interview. On the basis of these considerations, five participants were selected to take part in participant verification interviews.

The participant verification interviews were conducted in December 2005 and January 2006, some 14-17 months after the original in-depth interviews. Despite the time that had elapsed, I was able to get in touch with four of the five participants that I had selected to participate. Of these, one was unable to make the interview on the day. As a consequence, two more of the people who had participated in the in-depth interviews were selected, contacted and asked if they would be willing to participate in this part of the study. Both of these people agreed to meet with me. In total, five participant verification interviews were conducted.

In preparation for the participant verification interviews I printed off the causal maps as large format posters. I also retrieved the Post-It notes and photos from the in-depth interviews. Generally, I began the participant verification interview by reacquainting the participant with the previous interview experience through the photos and Post-It notes as applicable. If the participant had not used these materials I prepared for the interview by going through the field notes and the tape-recording of the previous interview. In the absence of the cues provided by the photos and Post-It notes I began the interview by reviewing some of the points that the participant had made in the previous interview. Once the participant's memory of the experience was engaged they appeared to readily recall their experience of the previous interview.

Having re-established a rapport with the participant and reacquainted them with the previous interview I then unfurled the causal map, which represented what they had

conveyed in the previous interview. If the participant did not initiate a process of navigating pathways through the map themselves, I encouraged them to do so by pointing to some possible pathways. In addition, I handed the participant a red pen to make any adjustments to the map as they saw fit. While participants tended to be a little overwhelmed by the complexity of the map at first, it didn't take long for them to start navigating their own pathways through the map.

Apart from a few minor clarifications, all of the participants expressed the opinion that, as best as they could recall, the maps were consistent with what they had conveyed in the previous interview. The points of clarification raised were incorporated into the participants' maps, either at the time or post-interview. In all cases, the maps resonated with participants' thinking at the time of the verification interviews and all participants were enthusiastic about expanding on the maps and exploring their implications. So much so that, on average, the verification interviews took about twice as long at the previous in-depth interviews.

Thus it was not possible to restrict the conversation to how well the causal maps captured participants' thinking at the time of the previous interview. Once participants had established a connection with the maps they were much more interested in using the maps as a springboard for further exploration. Such explorations of the maps were not incorporated as revisions. The responses of participants who took part in the verification interviews suggested that the process of reviewing the causal maps provided participants with new insights on the system and their understanding of it.

Identifying critical leverage points and constraints

As noted above, the focus in the second stage of the analysis was to identify which items in participants' maps represented critical points for management intervention. These points were categorised as either critical leverage points or critical constraints. Critical leverage points were points in the policy system where, depending on the decision or action taken, alternative chains of events could eventuate that could either promote or

hamper the realisation of policy goals. Hence these were potential points of bifurcation where management intervention could either promote the existing pattern of order or shift the policy system into a state of instability, at least until a new pattern of order is established.

Critical constraints establish pre-conditions, initial conditions or critical assumptions which, unless altered, or removed, would exclude the possibility of particular courses of action. Thus critical constraints were points in the system where limits were set on the options open for consideration. In combination, critical constraints and leverage points drew attention to opportunities for promoting continuity or change in system behaviour.

Because the meaning of an item in a map was contingent upon the content of the item as well as the chain of logic that led into and out of it, determining whether an item was a critical point and why, was contingent upon developing an understanding of the meaning of the item in the context of the map as a whole. This meant that the process of identifying critical leverage points and constraints was highly iterative; as the researcher switched back and forth between thinking about the content of the item itself and thinking about the item in the context of the map as a whole. Through this iterative process the researcher's evolving understanding of the map as a whole informed their understanding of the criticality or otherwise of the item. The researcher's evolving understanding of the criticality of the item, in turn, informed their understanding of the map as a whole and the criticality of other items represented in the map. This iterative process of developing understanding describes a hermeneutic circle (Geertz 1979).

Identifying emergent themes

In the third stage of the analysis, the focus shifted from understanding the perspectives of the individual participants to synthesising these perspectives in order to provide a richer understanding of the policy system. The aim in this stage was to compare and contrast critical leverage points and constraints across the sample as a whole with a view to

identifying emergent themes. Emergent themes were identified using a hermeneutic process similar to that described in the previous section.

Specifically, the process involved switching back and forth between the comparing and contrasting critical points in the context of individual maps and comparing and contrasting these points across the sample as a whole. Through this iterative process the researcher's evolving understanding of emerging themes across the sample as a whole informed their understanding of emerging themes in the context of individual maps. Likewise, the researcher's evolving understanding of emerging themes in the context of individual maps informed their understanding of emerging themes across the sample as a whole. As emergent themes were identified they were repeatedly compared, contrasted and refined until it was possible to categorise all of the critical points into a theme while retaining the essential meaning of each point, for the purposes of the study and as understood by the researcher. In recognition that there may be multiple meanings underlying any given critical point, it was not assumed that the emergent themes identified through this process would be mutually exclusive.

Destabilising versus stabilising critical points

The intention in the fourth stage of the analysis was to provide a deeper understanding of the dynamics of the policy system by exploring interactions among the identified critical leverage points and constraints across the sample as a whole. This involved categorising the critical constraints and leverage points according to whether they would tend to have either a destabilising or stabilising effect on the behaviour of the policy system.

Generally, critical points were categorised as destabilising if they would tend to promote a shift in the behaviour of the policy system away from the existing pattern of order. On the one hand, these points would tend to increase unpredictability and decrease the scope for co-ordinated central management control, at least until a new pattern or order emerges. In doing so, these points would tend to decrease scope for integration and efficiency in the policy system. On the other hand, critical points categorised as

destabilising would also tend to enhance scope for adaptability and self-organisation in the policy system. Critical points were also categorised as destabilising if they would tend to promote behaviour that was inconsistent with intended policy (i.e. behaviour that was apparently inconsistent with the policy goals or with the means of achieving such goals as prescribed by the policy).

Critical points were categorised as stabilising if they would tend to promote behaviour that was consistent with the existing pattern of order in the policy system. On the one hand, these points would tend to increase predictability, scope for co-ordinated central management control, integration and efficiency in the policy system. On the other hand, critical points categorised as stabilising would also tend to decrease scope for adaptability and self-organisation in the policy system.

Critical constraints were categorised as destabilising if removing them would tend to promote stability in the behaviour of the policy system. Critical constraints were also categorised as destabilising if they implied an intention to promote adaptability and qualitative change in the policy process.

In contrast, critical constraints were categorised as stabilising if removing them would tend to promote instability in the behaviour of the policy system. Critical constraints were also categorised as stabilising if they tended to imply an intention to promote co-ordination, predictability and control in the policy process.

Having categorised all of the critical leverage points and constraints as either destabilising or stabilising, the final aspect of this analysis involved tracing the dynamic effects of these points within and across the causal maps.

Summary and Conclusions

In this chapter the approach that was used to elicit and analyse multiple perspectives on the dynamics at play in the native vegetation management policy system in Victoria was justified and described. Consistent with the overarching lens of Complexity Theory and the management orientation of the research purpose, an interpretive methodological perspective guided the research design and the choice of data collection and analytical methods.

Key features of the research design were the case study approach; the cyclical nature of the research process and the incorporation of mechanisms for reflexivity in data collection and interpretation.

The data collection involved five rounds of interviews which became more tightly focused in purpose as the study progressed. In the next chapter, the causal maps that were constructed on the basis of data elicited in the final round of interviews are reported.