

CRAFTING COOPERATION IN THE COMMONS

An Economic Analysis of Prospects for
Collaborative Environmental Governance

Graham Roy Marshall

B.Sc.Agr., Hons. (U.Syd.); M.Ec. (U.N.E.)

School of Economics

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University of New England,

Armidale, Australia.

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DECLARATION

I certify that the substance of this thesis has not already been submitted for any degree, and is not being submitted for any other degree.

I certify that, to the best of my knowledge, any help received in preparing this thesis, and all sources used, have been acknowledged in this thesis.

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Graham Roy Marshall

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ABSTRACT

A collaborative vision for agri-environmental governance—whereby collaboration among stakeholders in addressing problems supposedly leads them to cooperate more in implementing solutions—emerged in the 1980's. This vision was prompted by mounting dissatisfaction with the progressive vision upon which such governance had been founded, a vision that had resulted in compartmentalised, paternalistic governance. It was based on a modern worldview regarding social behaviour as mechanistic and concerns about scientific progress as irrational.

Accomplishments to date in pursuit of this collaborative vision through the favoured vehicle of integrated catchment management (ICM) have mostly been disappointing. While governments remain outwardly optimistic that administrative refinements to ICM programs will ultimately deliver success in this pursuit, others argue that systemic cultural changes are required. Prominent among the latter's concerns is the complacency with which leaders have addressed the challenge of translating the vision into practice.

There is an emerging consensus in Australia that the complexity of environmental governance requires learning through adaptive management—wherein policies are regarded as experiments to be learned from—rather than through the rational-comprehensive approach typically associated with the progressive vision. However, as yet the literature in respect of the collaborative vision is silent on how adaptive management's experimentation might proceed according to science's hypothetico-deductive method rather than in an *ad hoc* manner. In particular, no coherent theory of how collaboration increases cooperativeness in this setting—from which hypotheses motivating experimental design could initially be deduced—has been presented.

Accordingly, the aim of this study is to propose, test and elaborate a framework of rational-choice theory upon which hypothetico-deductive pursuit of the collaborative vision for environmental governance might fruitfully be instigated. The focus empirically is on Australian agri-environmental governance. The first objective in attending to this aim is to place the collaborative vision in historical context by reviewing the Australian experience with agri-environmental governance, both preceding and succeeding the emergence of this vision.

The second objective is to propose a theoretical framework capable of serving as a starting-point for scientific pursuit of this vision. This framework was synthesised from developments in the rational-choice theory of collective action. It highlights the role that increasing-return, or positive-feedback, dynamics play in the emergence of spontaneous large-group cooperation, and thus the importance of the feedback upon which these dynamics depend. Collaboration's contribution to cooperation thus is seen to arise from its feedback-facilitation role.

The third objective was to explore empirically how the proposed theoretical framework applies to collaborative agri-environmental governance in Australia. To this end, a case study was undertaken of a program of Land and Water Management Planning that has been underway in the central-Murray region of NSW since 1991. This involved the application of both qualitative methods (content analysis of in-depth interviews) and quantitative methods (ordered-probit regression analysis).

The proposed theoretical framework was found to be corroborated by the behaviour observed in the case-study setting. It appears therefore that the collaborative vision is no pipe dream, in so far as this framework suggests that it is possible for collaboration in solving a problem to enhance cooperation in implementing the solution. Nevertheless, the increasing-return dynamics that make large-group spontaneous cooperation possible also make it difficult to achieve. These dynamics can lead past patterns of uncooperative behaviour to 'lock-in'.

Hence widespread commitment to the collaborative vision cannot occur without systemically jettisoning aspects of our culture that are adapted to, and thus reinforce, the progressive vision. These aspects include beliefs, values and institutions. The prospects of achieving this cultural shift appear to depend vitally on the emergence of leadership that is authentically committed to bringing the collaborative vision to fruition.

LIST OF ACRONYMS

CIG	Community Implementation Group
CMB	Catchment Management Board
CMC	Catchment Management Committee
CMR-LWMP	Central-Murray region's Land and Water Management Planning
CMT	Catchment Management Trust
CoA	Commonwealth of Australia
CPR	Common-pool resource
CWG	Community Working Group
DLWC	Department of Land and Water Conservation (NSW)
DWR	Department of Water Resources (NSW)
ESD	Ecologically Sustainable Development
EPA	Environmental Planning and Assessment
IAD	Institutional Analysis and Development
ICM	Integrated catchment management
IMB	Irrigation Management Board
LWMP	Land and Water Management Plan/Planning
LWMPAT	Land and Water Planning Assessment Team
MDB	Murray-Darling Basin
NHT	Natural Heritage Trust
NSW	New South Wales
RAP	Regional Assessment Panel
SAP	State Assessment Panel
SCMCC	State Catchment Management Co-ordinating Committee
SRIDC	Southern Riverina Irrigation District Council
TCM	Total Catchment Management
USA	United States of America

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1. INTRODUCTION

I have seen him, when dismissed for low scores, sitting in the dressing room like a student pondering the cause of his mistake and thinking out effective methods of overcoming his error. He has always been a critic of his own defects and this no doubt is the secret behind all his greatness and success (Bert Oldfield on Donald Bradman, 1938).

1.1 *Collaborative environmental governance: Vision or hallucination?*

A new vision for environmental governance in Australia emerged in the mid-1980's. It was based on a belief that fostering collaboration between the different civil groups and government agencies with an interest in the outcomes of the governance process (called 'stakeholders') would lead them to cooperate with one another more in implementing the decisions arising therefrom. In this thesis it is called the 'collaborative vision'. The impetus for its emergence can be found in growing recognition within the civil and governmental spheres that the existing way of organising this governance, which derives from the 'progressive vision' for social organisation, is ill-adapted for coping with the kinds of complex environmental problems that nowadays arise with increasing rapidity.

The progressive vision has its origins in positivist epistemology which emerged in the seventeenth century. Accordingly, it views human social behaviour in atomistic-mechanistic terms, and therefore presumes that the best solution to any given problem will be found by dividing it into parts and solving the parts separately. Moreover, this vision was influenced too by fears within liberalism regarding the irrationality of the 'public', which in common usage includes everyone except those regarded as experts (Owens 2000). Hence the progressive vision led to governance being organised paternalistically, with the public collaborating in decision-making as little as possible.

The record so far in attempting to use collaboration to increase spontaneous cooperation within environmental governance has been disappointing. The vehicle most commonly used in Australia for pursuing the collaborative vision has been integrated catchment management (ICM). The specifics of ICM programs differ between the states and territories of the Commonwealth, and a diversity of collaborative sub-programs (e.g., Landcare) are nested within the organisational structure they provide (Commonwealth of Australia (CoA) 2000a; Gardner 1999).

Generally, there is mounting concern that, after more than a decade of efforts to introduce the collaborative vision through ICM, the gap between vision and actual behaviour remains wide and the estimated costs of environmental degradation continue to escalate (e.g., Bellamy *et al.* 2000). Towards the end of the 1980's the cost of repairing rural land degradation in Australia was estimated in various studies to cost around \$2 billion in total (Conacher *et al.* 1995). In contrast, a recent study concluded that expenditure of \$7 billion per year over a decade is required for this problem to be addressed effectively (Virtual Consulting Group and Griffin nrm 2000). Furthermore, the cost imposed nationally by land and water degradation is estimated currently to be \$3.5 billion per year, excluding the cost of pests and weeds (CoA 2000b).

The reaction to these figures in the recent *Report of the Inquiry into Catchment Management* (CoA 2000a p. 84) was that “the problems facing Australia’s catchment systems will not be solved in a decade or even a quarter of a century. They will take generations to address”.

Moreover:

Over the past decade, a compelling body of evidence has emerged that Australia’s catchment systems are facing enormous and ongoing threats from human activities. Unless we, as a national community, begin to address these problems, the quality of our life will be substantially eroded over the coming decades. It is not overstating the matter to say that the ecologically sustainable use of Australia’s catchment systems is the most pressing contemporary public policy issue facing the community. ... Australians want the talking to stop and the action to begin (ibid. pp. 1, 3).

While governments remain outwardly optimistic that pursuit of the collaborative vision through ICM programs will succeed subject to various administrative refinements occurring (e.g., CoA 1999; 2000b), there are growing concerns elsewhere that success in this pursuit will remain elusive until cultural change occurs more systemically (e.g., Bellamy *et al.* 2000; Dovers 2000b). A prominent concern relates to the perceived complacency with which the relevant governmental and civil leaders continue to address the task of learning how they might implement the vision more effectively.

For instance, in the *Report of the Inquiry into Catchment Management* (CoA 2000a p. 5) it was found that “the current approach to, and application of catchment and natural resource management in Australia is ad hoc, inconsistent and confusing”. A related finding was: “The problems that beset catchment management at present do not emerge from the approach itself, but rather *how* it has been put into effect” (ibid. p. 38).

In a similar vein, a recent review of the international experience with ICM (known in the USA as ‘integrated/participatory watershed management’) led to the following conclusions:

Unless practitioners think long and hard about how to do participatory watershed management, the movement may indeed fail. Failure, if it occurs, will not be caused by the critics, but because the proponents ... of this exciting approach have not done their homework and come to grips with needed programmatic changes. ... Each project seemingly starts out in a vacuum with little attention to what has gone before, and—as a result—commits the same mistakes. ... If we do not convene soon to share experiences, learn from our mistakes, and provide hard-hitting assessments of the multipurpose participatory watershed project, the baby may indeed go out with the bathwater. Our hearts may be in the right place, but where are our heads? (Rhoades 2000 pp. 334, 335, 341).

1.2 *Research problem*

Implicit in this plea for systematic learning from ICM experiences is the idea of adaptive management. This idea involves treating policy solutions for complex problems as experiments to be learned from (Dovers 2000b). At this stage there is no coherent theory of how collaboration might promote spontaneous cooperation in the context of environmental governance. Such a theory is required initially to generate the hypotheses required for the process of choosing and designing policy experiments to become scientific rather than *ad hoc*. Of course, any initial theory would continue to be refined as evidence accumulates regarding the veracity of its predictions.

Accordingly, there is a pressing need to identify a theoretical framework upon which systematic pursuit of the collaborative vision for environmental governance via adaptive management can be instigated. Neoclassical economics, the social-scientific tradition with arguably the greatest influence over Australian environmental policy in recent decades, predicts that spontaneous cooperation within groups of any significant size is highly improbable—even if their members have collaborated previously and thereby agreed to cooperate further. The implication of this theoretical tradition is that the collaborative vision is in fact a ‘pipe dream’ or mirage, and learning how to pursue it more effectively is therefore a waste of time.

Neoclassical theory is not the only body of coherent social theory purporting to explain the relationship between collaboration and spontaneous cooperation. In particular, advances in the rational-choice theory of collective action, particularly by ‘new institutionalists’, not only indicate that spontaneous cooperation within large groups is possible but also offer insights into how it might be promoted by facilitating collaboration among group members.

Nevertheless, the new institutionalism remains “a boiling cauldron of ideas” (Williamson 1999 p. 18). Among its diverse strands of thought, the tradition of common-property studies, which crystallised as a multi-disciplinary endeavour at the 1985 Conference on Common Property Management held at Annapolis in the USA (Jensen 2000), has particular relevance to the kinds of questions raised by attempts to pursue the collaborative vision for environmental governance. This tradition has its proximate origins in attempts to explain numerous real-world exceptions to the prediction implied by the passage below from Garrett Hardin’s (1968 p. 1244) famous article “The tragedy of the commons”—namely that, consistent with the neoclassical prediction, spontaneous cooperation within a group of any significant size is impossible:

Picture a pasture open to all. ... [T]he rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd ... But this is the conclusion reached by each and every herdsman sharing the commons. Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit—in a world that is limited.

1.3 *Aim of the study*

The aim of the study is to propose, test and elaborate a framework of economic theory upon which hypothetico-deductive pursuit of the collaborative vision for environmental governance through adaptive management might fruitfully be instigated in Australia. The particular domain of environmental governance focussed upon in this thesis is ‘agri-environmental governance’, as defined in section 1.4.

Towards this aim, the specific objectives are to:

- (i) Place this collaborative vision and what its pursuit entails into historical context. This is achieved by reviewing Australian experiences with agri-environmental governance before and after the emergence of the collaborative vision;
- (ii) Review the corpus of collective-action literature originating from rational-choice economics, and thereby synthesise a theoretical framework enabling systematic assessment of the prospects for realising this vision; and
- (iii) Undertake a case study of a current program of collaborative agri-environmental governance in order to explore and elaborate the applicability of this theoretical framework in the Australian context.

1.4 *Terminology*

Some comments on the terminology used in this thesis are now in order. Whereas *government* refers to the formal organisation and institutions of the state, the term *governance* is less restrictive and recognises the diversity of ways that governmental and civil organisations can work together in addressing collective problems. According to McGinnis (1999 p. 1): “Governance is the way society as a whole manages the full array of its political, economic, and social affairs”.

The increasing currency of the term *governance* has been interpreted to mark a transition to “a broad concern with a wide range of governance mechanisms with no presumption that these are anchored primarily in the sovereign state” (Jessop 1995 pp. 310-311). Use of this term acknowledges that political power can be distributed externally to the state as well as within it (Goodwin 1998).

Given that the term *natural resources* represents those attributes of the natural environment that are of interest to humans (Conacher *et al.* 2000), and governance self-evidently addresses only matters of interest to humans, the terms *environmental governance* and *natural-resources governance* are synonymous. To simplify exposition, the former term is used throughout this thesis.

The portion of environmental governance focussed upon in this study is accordingly referred to as *agri-environmental governance*, where the prefix *agri* is shorthand for agricultural and livestock production. The descriptor ‘agri-environmental’ seems to have been coined in the context of *agri-environmental policy* which gained prominence in Europe in the early-1990’s in acknowledgement of the “environmental effects of agriculture hav[ing] become the subject of both environmental and agricultural policies” (Baldock *et al.* 1996; see also Potter 1998; Scheele 1996).

This study’s focus on the agri-environmental portion of overall environmental governance is justified on two grounds. Firstly, it is warranted by the scale of the problems with which this portion is concerned. For instance, the area of cultivated land in Australia affected by dryland salinity has been predicted to increase from at least 2.5 million hectares (5 per cent of all cultivated land) currently to 12 million hectares (22 per cent) if current rates of increase continue (CoA 2000b). Secondly, most attempts until now to pursue the collaborative vision through ICM have been concerned primarily with agri-environmental issues (Hooper 1995a;

Hooper 1995b; Macpherson 1997).

1.5 Outline of the thesis

The thesis is presented in five parts. Part I, containing chapter two, addresses objective (i) of the study by presenting a historical review of how and why the collaborative vision for agri-environmental governance emerged in Australia. The focus here is particularly on the New South Wales (NSW) Government's Total Catchment Management program. The chapter also includes a discussion of the successes and failures encountered in trying to realise the collaborative vision through ICM programs. In addition, recent proposals for reform of these programs are considered.

Part II of the thesis comprises chapters three, four and five and is concerned with objective (ii). Chapter three provides a literature review of insights and predictions from comparative-static—including neoclassical and prisoner's dilemma—models of collective action. Chapter four discusses the weaknesses of these comparative-static or 'first-generation' models, focussing in particular on their failure to account systematically for the increasing-return dynamics associated with collective action. It contains too a review and synthesis of 'second-generation' developments in the rational-choice theory of collective action seeking to rectify this failure. Chapter five considers the role that hierarchical organisation plays in fostering collective action, and explores the significance of increasing-return dynamics for present choices in respect of how governance should be organised hierarchically.

Part III contains chapters six and seven and provides contextual and methodological background to the case study that was undertaken in accordance with objective (iii) of the thesis. The context of the case study of collaborative agri-environmental governance reported herein—namely the Land and Water Management Planning (LWMP) Program in the central-Murray region of NSW, Australia—is described in chapter six. The rationale for case-study analysis is considered in chapter seven. Moreover, the particular methodology applied in the present investigation—including qualitative as well as quantitative analysis—is explained and justified.

Part IV of the thesis comprises chapters eight, nine and ten, and presents the findings from addressing objective (iii) of the study. The findings from the qualitative analysis are presented in chapter eight. In chapters nine and ten, the specific hypotheses tested in the quantitative analyses are justified (largely on the basis of the theoretical framework discussed

in chapters three to five), and the results of testing the hypotheses are presented and discussed. Both these chapters are concerned with understanding the determinants of farmers' preparedness to cooperate within the case-study LWMP program. Chapter nine focuses on cooperation by farmers in terms of complying with the 'on-farm' requirements of the LWMPs, whereas chapter ten focuses on their preparedness to cooperate in the sanctioning of farmers regarded as not complying satisfactorily with those requirements.

Part V includes chapters eleven and twelve. Chapter eleven considers the degree to which the case-study findings are consistent with second-generation developments in the rational-choice theory of collective action as reviewed in chapters four and five, before proceeding to draw some broad policy implications in respect of how the collaborative vision of agri-environmental governance might henceforth be pursued more effectively. In chapter twelve the conclusions of the study are presented.

PART I:

RESEARCH PROBLEM IN CONTEXT

2. THE PAST, PRESENT AND PROSPECT OF AUSTRALIAN AGRI-ENVIRONMENTAL GOVERNANCE

2.1 *Introduction*

Degradation of Australia's natural environment as a result of agricultural land use persists—and in some key areas continues to worsen—despite attempts of policy makers to address this issue over more than six decades. During the 1980's, Australian governments responded to public concerns in respect of this lack of success by signaling a shift from their early approaches to this issue—typically driven from the 'top down' by a hierarchy of experts spread across various agencies and co-ordinated in only a limited sense—to approaches emphasising collaboration between agencies and between governments and the public.

One of the primary justifications for this emphasis has been a belief that collaboration enhances the prospects of solutions being implemented with less hierarchical intervention, or more spontaneously, than would otherwise be the case. However, this belief has gained little support from the experiences to date in attempting to apply this approach through the favoured administrative vehicle of ICM.

As observed by North (1990 p. 102), "history matters" because it constrains what is possible in the present and future¹. Hence it is likely that choices made without a historical perspective regarding institutional arrangements will be inferior to those that would be made with such a perspective. Moreover, analyses of why particular institutional changes succeed or fail would be incomplete. North (ibid. p. 100) remarked in this vein that: "We cannot understand today's choices ... without tracing the incremental evolution of institutions".

Accordingly, this chapter reviews how the types of institutional arrangements constituting Australian ICM programs arose and have subsequently evolved. For the sake of brevity, the review focuses on developments in NSW as well as at the Commonwealth level². The decision to focus on NSW among the various states and territories of the Commonwealth followed from the choice of a NSW-located case study for the empirical research undertaken for this thesis. The hope is that this review casts fresh light on the reasons for the limited

¹ This argument is elaborated in sections 5.3.2 and 5.3.3.

² Recent accounts of developments in other Australian states and territories have been provided by Gardner (1999) and CoA (2000a).

success so far in pursuit of the collaborative vision through ICM programs, and thereby suggests productive ways forward.

In section 2.2 the modern origins of the progressive vision for agri-environmental governance are considered. The implications of this vision for how Australian agri-environmental governance has been practised are then reviewed in section 2.3. This leads to a discussion in section 2.4 of how, from the 1970's onwards, the progressive vision has come under increasing criticism. The collaborative vision that arose in response to this challenge, and the experience to date of its pursuit through ICM programs, is addressed in section 2.5. Some observations regarding the task that lies ahead in reconciling the rhetoric of ICM with the on-ground reality of agri-environmental governance are then offered in section 2.6. Finally, concluding comments are presented in section 2.7.

2.2 *Origins of Australian agri-environmental governance*

As shall become evident as this chapter proceeds, modern ideology retains considerable influence over contemporary Australian agri-environmental governance. Accordingly, this historical review begins with an overview of this ideology.

2.2.1 *Modernity*

Most cultures throughout history have had a unifying ideology—"a grand narrative elaborating a set of shared assumptions that rationalize decision and action in the face of the great unknown" (Norgaard, 2000b p. 1)—and the culture of the West is no different. The origins of Western ideology can be traced to Judaism which taught that the earth and all life on it were created by a single God according to a grand design. God gave people dominion over 'nature'—their planet and all other life. This Western narrative, with its Christian and Islamic variations, differs from the ideologies of most other cultures which "have nebulously intertwined people and animals and their associated gods" (Norgaard, 2000b p. 2).

René Descartes (1596-1650) is regarded as originating modern philosophy. His famous proclamation "Cogito, ergo sum"³ in his *Meditations on First Philosophy*, published in 1641, sought to transfer the imprimatur of Reason from religious and other traditional authorities to every individual. Thereby he laid the ground for a secular science committed to neutrality

³ Usually translated as "I think, therefore I am".

with regard to questions of meaning and value (Hollis, 1994 p. 24). This philosophy was embraced by 'liberal' thinkers, perhaps most notably John Locke (1632-1704), who were then dedicated to protecting individuals from the arbitrary authority of essentially feudal political structures floundering in their attempts to regulate increasingly urban societies. Liberalism thus came to be rationalist and humanist, rejecting hereditary authority and supernatural sanctions on behaviour (Denoon, 1985).

As a result, the dominant liberal epistemology has been positivism. In its broadest sense, positivism refers to a theory of knowledge which asserts the primacy of observation and the pursuit of causal explanation by means of inductive generalisation (Wacquant, 1993). This theory secularised the traditional Western ideology by "imagining people and how they perceived and thought as outside the world over which they had dominion, much like God was imagined to perceive and control the world" (Norgaard, 2000b p. 2). Nevertheless, the idea that God created the world according to a grand design persisted. Hence positivists presumed that the myriad phenomena of the world could be explained by simple, and discoverable, laws or universal 'truths'. The basis of this reductionist theory of knowledge was elementary indeed: The universe is lawful, and the same basic laws hold everywhere (Goldenfield *et al.*, 1999). Knowledge was thus regarded as useful to the extent that it could be applied anywhere (Norgaard, 1992 p. 77).

In pursuing these universal laws, positivists assumed further that nature operated as if it were a machine. Accordingly, all the parts of nature, as well as the relationships between them, were regarded as unchanging. It follows that the parts are knowable independently (Norgaard, 2000b). Perhaps the most important ancestor of this atomistic-mechanistic conception was Descartes who purportedly had a dream in 1619 which revealed that the universe could be described in mathematical terms (Spiegel, 1991).

As a consequence of the monumental advances in knowledge that Isaac Newton (1643-1727) and others obtained from applying positivist methodology to the physical world during the scientific revolution, and that James Watt (1736-1819) and others achieved technologically during the subsequent industrial revolution, modern ideology rose to prominence throughout the Western world. The supposed laws governing the operation of the natural world were thus expected to yield steadily to scientific investigation, thereby allowing endless progress in terms of technology and prosperity (Norgaard, 2000b). All this was held to be possible by discovering the relations between the parts of nature, without having to discern the purpose

or meaning of the whole (Hollis, 1994).

When the social sciences began to coalesce in the mid-eighteenth century, it was against a background of positivism having contributed so successfully to understanding the natural world, as well as to bestowing prestige and rewards of a more material kind upon its adherents (Hollis, 1994). In consequence, the ‘principle of unity of the scientific method’ rose to prominence within the social sciences. This principle proclaimed that the positivist procedures of natural science are directly applicable to the social world, the goal being to discover invariant laws, or at least law-like generalisations, about social phenomena (Wacquant, 1993). Thomas Hobbes (1588-1679) laid the groundwork for expanding the conception of the natural world to include people by applying mathematics to devise a mechanistic psychology of the human mind and human relations. Sir William Petty (1623-87) fostered further progress towards positivist social science by introducing his method of “political arithmetic”. The materialistic nature of this endeavour he described as follows: “ ... I have taken the course ... to express myself in terms of *number, weight, or measure*; to use only arguments of sense, and to consider only such causes as have visible foundations in nature”. This required him to leave those causes “that depend upon the mutable minds, opinions, appetites, and passions of particular men to the consideration of others” (as quoted in Spiegel, 1991 pp. 122, 125).

Auguste Comte (1798-1857), the founder of the French lineage of positivism, followed this materialistic course and referred accordingly to his ‘science social’ also as ‘social physics’. His social science thus emphasised the measurable aspects of social phenomena: the factual as against the speculative, the useful as against the idle, the certain as against the indecisive, and the precise as against the vague (Dahrendorf, 1985). Consequently, the modern ideology came to regard questions of value as outside the realm of legitimate scientific inquiry and of interest only to religious authorities. The secular order would be left to deal objectively with all other questions, those of so-called ‘fact’. However, one question of value is so deeply embedded in this ideology that, until recent decades at least, it has been regarded widely in the secular order as fact. This is a belief in materialism, or that “being human is about material power and control and that the abundance of nature is there to be creatively taken” (Norgaard, 2000b p. 3). An earlier expression of this belief by Locke (quoted in Neimark and Mott, 1999 p. 42) goes as follows:

God gave the World to Men in Common; but since he gave it them for their Benefit, and the greatest conveniences of Life they were capable to draw from it, it cannot be supposed he meant it should

always remain common and uncultivated. He gave it to the use of the industrious and rational ...

The ideas of Comte, together with those of John Stuart Mill (1806-73) (1960/1843), dominated the philosophy of science until critiques from ‘post-positivists’, most notably Karl Popper, emerged from the 1960’s onwards. These critiques discredited positivism as a philosophy of science by demonstrating that people are incapable of God-like neutrality, or true objectivity, in posing theories. Nevertheless, the positivist method arguably still dominates the design and implementation of empirical social research (Wacquant, 1993).

The desirability of persisting with modern ideology has been questioned on the empirical front as well. For instance, quality of life indices suggest that material progress is becoming increasingly irrelevant to well-being in rich nations even though it continues to have much to offer poorer nations (Eckersley 2000). However, the impressive contributions of modern thinking to material welfare over the last two centuries assure its continued dominance for some time yet. Real GDP per capita increased eight-fold between 1820 and 1992 for the world on average, 13-fold in Western Europe, 17-fold on average in the USA, Canada, Australia and New Zealand, and 28-fold in Japan (Maddison 1995). In addition, modernity has proven adept at self-correcting its policies within its own epistemological shell in the light of disappointments with how development has actually unfolded (Apthorpe 1985). Thus:

Two world wars and the threat of thermonuclear war have only modestly challenged the modern life story. Global warming, biodiversity loss, increasing income inequality, and ethnic violence are now being dismissed as evidence that human progress is not complete, that we have not yet let the grand narrative unfold to the fullest (Norgaard 2000a p. 3).

2.2.2 *The progressive vision for governance*

The origin of the liberal rationale for the state is usually attributed to Hobbes (1991/1651). He argued that in a state of nature, with no one in a position of authority, all people equally would have a natural right to do as they wish. Given his view that humans are afflicted inherently with “a perpetuall and restlesse desire of Power after power, that ceaseth only in Death”, he concluded that the state of nature inevitably would become a “warre of every man against every man” in which life would be “solitary, poore, nasty, brutish, and short” (quoted in Ball *et al.* 1995 p. 60). Reasoning that this must be avoided at all costs, Hobbes’ solution was that people provide for their security by entering into a social contract to establish a *Leviathan*, or a political authority. They would surrender every right but one—the right to

self-defence—to this authority. Government would thus be founded in the governed giving it consent to do anything necessary to sustain peace and order. Despite its authoritarian flavour, this solution has been regarded as proto-liberal because of its starting premise that individuals are equals and everyone has a natural right to be free (Ball *et al.* 1995).

It was Locke (1632/1690) who built on this premise to develop a justification for political authority that was definitely liberal. In contrast to Hobbes' state of nature as war, Locke's is merely inconvenient because many people are unwilling to respect the natural rights of others. These rights he usually referred to as life, liberty and property. In his view, this inconvenience justifies people entering a social contract to establish a political society with a government to make, interpret and enforce laws that protect their natural rights. Government then has power only in so far as it does what it must to preserve the life, liberty and property of its subjects. Civil society, or the 'people' or 'public', retains the right to overthrow and replace the government if it violates these natural rights (Ball *et al.* 1995; Wells *et al.* 2000). This conception of the social contract was devised as a justification for the second English revolution of 1688. Locke sought to demonstrate that the sovereign, James II, had violated the terms of the social contract and that citizens therefore were within their rights to dissolve his government (Betts 1998).

Following Locke's reasoning, support by liberals for democratic government was based classically on the potential it afforded to free people from infringements of their so-called natural rights—for instance, due to restraints on commerce and discrimination on the basis of class, creed and kin—associated with feudal and other traditional forms of government. Accordingly, classical liberals were less impressed by the prospects democracy afforded for people ruling themselves than by the opportunity it provided to free people *from* government. In most cases, support from liberals for democracy nowadays still derives from a belief that it offers the best chance of holding governments accountable to the people. Although contemporary liberalism values the right of people to participate in political activity, for the most part it is enamoured more by democracy's prospects for protecting people's rights of privacy and free action. Participation in public life is typically regarded as just one right, no more important than the right to engage in private pursuits. In this dominant liberal view the state should impose no duty upon people taking part in political activity (Ball *et al.* 1995).

The reluctance of liberalism to actively advocate democracy as a way of people coming to rule themselves can be traced to a long-held fear of the irrationality and irresponsibility of

'the mob'. This was a theme of Comte, as well as of Jean-Jacques Rousseau (1712-78) and Jeremy Bentham (1748-1832) (Norgaard 1994; Weale 1999). It was given added force in the twentieth century especially by Schumpeter (1947) who advanced three arguments against popular participation in government: the incompetence of typical citizens, the tendency to irrationality on the part of ordinary citizens; and the opportunities that public participation allows for special interests to pursue their own narrow aims. In consequence, modern democracy is typically representative rather than direct. The populace elects an assembly of representatives to further its interests. Instead of orators seeking approval for their proposals directly from the populace, elected representatives are constrained by knowing that they may not be re-elected if they support policies that go against the wishes of their constituents (Elster 1998b).

A further implication of modern ideology for how liberal democracy has evolved derives from the former's atomistic-mechanistic conception of social behaviour. From this viewpoint, democracy is reduced to summing votes to measure which set of values dominates. Norgaard (1994 p. 145) has characterised this conception as follows: "People are preferences with votes. Democracy is simply a matter of addition". According to Cohen (1998), this is one of two conceptions of democracy: the aggregative conception. The other is the deliberative conception that relies on establishing "conditions of free public reasoning among equals who are governed by the decisions" (ibid. p.186). Such deliberation or arguing aims to transform individuals' preferences as well as resolve matters of fact (Elster 1998b).

Comte was concerned that the march of progress, albeit inexorable, might be slowed by a populace he regarded as irrationally sceptical of modernity's promise of material progress without a downside. Consistent with advocating that positivism should emphasise the positive as against the critical (Dahrendorf 1985), he argued that democracies would foster progress most successfully if professionals trained in scientific rationality advised representative legislatures on how best to proceed and if legislatures, after setting broad goals on the basis of this advice, delegated to these professionals responsibility for final policy design and implementation (Norgaard 1994).

Torgerson (1990) has described how this 'progressive' vision for governance resulted in tremendous effort and ingenuity being devoted to designing administrative techniques and processes that manage people through the methods of scientific investigation. Hence there has been a preoccupation with dividing problems into parts and solving them separately, in the process seeking policies that can be applied as universally as possible. At the

same time as atomistic problem-solving led to a proliferation of government agencies, and sections within them, the reductionist orientation encouraged creation of elaborate top-down administrative hierarchies seeking to ensure that policy responds uniformly to a class of problem irrespective of the specifics of each instance. Another belief inherent in this approach is that problems and solutions should be assessed by professionals according to objective (or ‘technical’) criteria only, with politicians only afterwards injecting values when choosing between alternative solutions.

The nature and process of ‘bureaucratisation’ of this kind has been extensively analysed, particularly within sociology, and most influentially there by Max Weber (1864-1920). He also was an adherent of progressive rationality, as reflected by his epithet, “the future belongs to bureaucratization” (Weber 1978 p. 1401). He viewed rational bureaucracy as technically the most satisfactory form of organisation, for those in authority as well as for those subject to it.

Nevertheless, Weber was pessimistically resigned to bureaucratisation separating people from the means of production and leading to increasingly formalised organisation. Further, he was concerned that with bureaucratisation comes the increasing power of officials and consequently the risk of the bureaucracy eventually controlling the policy and actions of the government it is supposed to serve. He believed that this risk could best be averted by assuring the freedom of representative parliaments which he saw, together with a system of political parties, as a vital arena for developing leaders capable of exercising real control over the bureaucracy (Albrow 1970)

Weber paid little attention to problems associated with ‘red tape’ and bureaucratic inefficiency. However, concerns in this direction had long been held, as indicated by the French philosopher Baron de Grimm’s comment in 1765 that:

The real spirit of the laws of France is that bureaucracy ... [is] not appointed to benefit the public interest, indeed the public interest appears to have been established so that offices might exist (quoted in Albrow 1970 p. 16).

Such concerns have been extensively analysed by economists, as well as by political and other social scientists. The relevant economic literature is reviewed in section 3.4.1.

2.3 *Progressive agri-environmental governance in Australia*

This section provides an account of how modern ideas, and particularly those in respect of progressive governance, influenced Australian approaches to agri-environmental governance.

2.3.1 *Attempts at regulating land use by farmers*

Modern ideology emerged and became embedded culturally during a time that Kenneth Boulding (1970 p. 146) referred to as the “era of the great plain”. During the seventeenth century when John Locke lived, for instance, the European colonisation of North America began to expand rapidly. Neimark *et al.* (1999) have described how the existence until the late nineteenth century of a steadily advancing area that contained free land and undiscovered resources was a primary factor in the development of the USA and in the beliefs of its inhabitants.

Once the frontier finally reached the Pacific Ocean, the problem of sharing limited land and other resources among an expanding population had to be faced seriously for the first time.

The historical significance of this moment was captured by Turner (1894 p. 227) as follows:

The stubborn American environment is [at the frontier] with its imperious summons to accept its conditions ... What the Mediterranean Sea was to the Greeks, breaking the bond of custom, offering new experiences, calling out new institutions and activities, that, and more, the ever retreating frontier has been to the United States directly, and to the nations of Europe more remotely. And now, four centuries from the discovery of America ... the frontier has gone, and with its going has closed the first period of American history.

Thirteen years later the President of the USA, Theodore Roosevelt (1907), recognised this turning point in his annual address to Congress with the words:

... there must be the look ahead, there must be a realization of the fact that to waste, to destroy, our natural resources, to skin and exhaust land instead of using it so as to increase its usefulness, will result in undermining in the days of our children the very prosperity which we ought by right to hand down to them amplified ...

Efforts to curb the frontier mentality of Australian farmers did not begin seriously until some decades later, notwithstanding a severe drought beginning in the 1890's which “starkly showed the dangers inherent in exceeding resource and environmental limits to production” (Dumsday *et al.* 1990 p. 180). Although farmers continued “to mine ... natural resources 1910-30 following the nineteenth century pattern”, by 1930 widespread concern had arisen regarding the extent of agricultural land degradation, particularly soil erosion (Godden 1999 p. 9). In the 1930's the widespread cropping practice of bare fallow caused serious soil structure decline and thus further severe erosion (Dumsday *et al.* 1990). Only then were there beginnings of a widespread recognition that Australian agriculture might not be capable of indefinite expansion (Godden 1999).

Even so, it seems that the resolve of governments in Australia to regulate farmers' detrimental effects on the environment was finally triggered as a result of international publicity in the mid-1930's about the link between land use and soil degradation in the dustbowl region of the USA (Bradsen *et al.* 1987). The Australian public's widespread interest in this issue at this time is evidenced by the following statement made to the South Australian Parliament in 1939:

During the last few years the question of soil conservation has been on the lips of practically everyone. So much publicity has been given to it ... [It is] ... an evil of which everyone was aware (quoted in Bradsen 2000 p. 278).

New South Wales passed the first state soil conservation legislation: the Soil Conservation Act, 1938. South Australia followed in 1939, Victoria in 1940, Western Australia in 1945, Queensland in 1951 and the Northern Territory in 1969 (Bradsen 1988). There is considerable scope in these Acts to regulate the activities of farmers. For instance, Section 15A of the NSW legislation can be used to require landowners to do or refrain from certain activities likely to cause erosion or further land degradation. Section 17 allows areas of erosion hazard to be declared which then allows notices to be issued to landholders to carry out works, adopt land management practices and limit stock numbers.

Nevertheless, to this day, Australian governments have demonstrated limited resolve to use these Acts, or other applicable legislation introduced subsequently, to coerce farmers into adopting conservation works and measures. This can be attributed to the political power that the agricultural sector has been able to wield, largely as a result of the ferocity with which it has clung to a belief that ownership of agricultural land confers an absolute natural right to work it without interference from anyone else. The belief can be traced to Locke's proposition, reproduced below, that we earn the right to own land as property by mixing our labour with it:

As much land as a Man Tills, Plants, Improves, Cultivates, and can use the Product of, so much is his Property. He by his Labour does, as it were, inclose it from the Common ... (quoted in Neimark *et al.* 1999 p. 41, emphases in original).

To this Locke added the proviso that the right to acquire property holds only to the extent that we "leave enough, and good enough, for others" (quoted in Wells *et al.* 2000 p. 107). In his view, therefore, one person's natural right to property should be constrained by a duty to avoid infringing upon the same right held by others. However, with property abundantly for the taking during the "era of the great plain", this proviso came to be sidelined. Thus

unconstrained, Locke's conception of natural rights became narrowed to the so-called 'absolutist' doctrine that land and possessions of a free person should be protected unconditionally from encroachment by the state (Bromley 1996).

In Australia, this doctrine became elaborated by agricultural communities to celebrate "the special elevated virtue of rural living, and the 'mission' of rural people to defend embattled faiths and 'standards'" (Verrall *et al.* 1985 p. 21). Farmer demands for freedom in how they use their land thus were supplemented by expectations that their culture or 'way of life' also be protected⁴. This has been most evident perhaps in their opposition to government policies perceived to threaten the 'family farm'. The emergence and persistence of such expectations was based partly on a conviction that agriculture is fundamental to all economic activity (Mauldon *et al.* 1974) and is consistent with Batie (1986 p. 4) observing how farmers in the USA became regarded as "manager[s] of nature, extracting a bounty to support the continued material prosperity of the nation". In fact, Australian school children were for many years taught that Australia rode to prosperity 'on the sheep's back' and thus grew up believing "that if it were not for farmers and graziers they would not have led the kind of life they have enjoyed" (Aitken 1978).

The influence of rhetoric of this kind on Australian politics can be explained partly by farmers having been much more interested in politics than any other social group (Aitken 1978). The disproportionately high representation of farmers and graziers in Australian parliaments, especially in the colonial parliaments of the nineteenth century, can be attributed partly to this high level of political interest. However, it can also be attributed to the delineation of electorates in the past having been weighted so as to benefit the rural voter (Warhurst 1990). Another possible reason for the political efficacy of agrarian absolutist rhetoric in Australia is that farmers, due to their narrower exposure to alternative beliefs, have been more "dogmatic, hard to persuade" than other social groups (Aitken 1978 p. 147).

Aside from these reasons for the political effectiveness of agrarian absolutist rhetoric, Australian urban people have, by and large, been susceptible to it. For Australians, observed Mackay (1999), genuine heroes are those people who make personal sacrifices in pioneering new frontiers. The agricultural pioneers who pushed back and settled the Australian spatial frontier indeed have been idolised, perhaps especially because the early nation's success as a

penal colony relied in large measure on a fear of space. How this fear became a founding myth of Euro-Australian culture has been emphasised by Hughes (1996 p. 596) as follows:

Would Australians have done anything differently if their country had not been settled as the jail of infinite space? Certainly they would ... Space, in America, had always been optimistic; the more of it you faced, the freer you were—"Go West, young man!" In Australian terms, to go west was to die, and space itself was the jail.

Farm families accordingly gained extensive sympathy from other Australians due to their lives being perceived as isolated and beset by "the wrath and perversities of nature" (Mauldon *et al.* 1974 p. 113).

By and large, therefore, Australian citizens have been fairly content to accommodate the farming community's claims of absolute rights attached to land occupation. That governments also were afflicted with "the political sentimentality of all things agrarian" (Bromley 1996 p. 19) is indicated by the following observation by Warhurst (1990 p. 113):

Departments of agriculture/primary industry, far from being disinterested servants of their minister, have long held a reputation for fiercely representing and defending the interests of their 'clients': the farmers and other rural producers. Ministers have apparently done likewise.

This view is supported by recent survey evidence from Australia and the USA that staff of government agencies dealing with agri-environmental issues tend to be more supportive of policies that farmers perceive are fair (McCann 1999; McCann *et al.* 1999).

Although some of the reasons for its development and persistence in Australian are unique, agrarian absolutism as outlined above is common across the industrialised world. As Bromley *et al.* (1990 pp. 199-200) remarked:

... farmers ... have succeeded in resisting virtually all conditions on their producing behaviour ... Any change in the status quo production domain of the farmer must inevitably be purchased by the state with bribes, subsidies, or concessions at other places in the policy arena. In short, farmers in the industrialised nations deal with their governments from a position of strength—such strength arising from unquestioned property 'rights' in land, with those property rights then successfully transmitted through the political process into a presumptive entitlement for favoured treatment at the hands of policy makers

Hence despite bipartisan parliamentary support for legislating the various state's soil conservation Acts, and thus for regulating agricultural land use in the public interest (Bradsen *et al.* 1987), the will of Australian governments to enforce these Acts soon

⁴ This belief has been apparent recently in the reluctance of farmers to embrace suggestions that they remodel themselves as 'land managers', thereby operating their properties for values (e.g., biodiversity conservation) other than traditional agricultural production (e.g., CoA 1999) .

evaporated. Loss of political will similarly undermined efforts to enforce soil conservation legislation in the USA (Nowak 1984). Bradsen *et al.* (1987) argued that a major difficulty with the Australian soil conservation programs derives from the soil conservation and related Acts being framed with insufficient rigour to ensure that state government bureaucracies had no alternative but to enforce them. On this question Bradsen (1994 p. 442) commented that:

All programs, whether based on legislation or not, must be administered, and there can never be the complete absence of discretionary action ... But the rule appears to be that programs with a heavy reliance on discretion and appropriate administrative attitudes have minimal chances of ensuring efficacy.

In consequence, the soil conservation Acts have served as little more than signals of good intentions. McDonald *et al.* (1993 p. 374) lamented accordingly that: “The acts exist in the hope that landholders will do the right thing ... The legislation may not lack teeth, but it is not enforced”.

2.3.2 *Emphasis on technical innovation*

The soil conservation legislation of the Australian states was administered originally by soil conservation agencies modeled largely on the United States Soil Conservation Service (Conacher *et al.* 1995). In turn this Service had its origins in the Progressive Conservation Movement which emerged in the United States in the 1890’s. Faithfully pursuing the agenda that Comte had laid out two centuries or so earlier, Progressive Conservationists argued strongly that positivistic science could push back the natural limits to expansion of production. Their goal was technically-efficient development of all natural resources for the purpose of better satisfying the material aspirations of consumers (Batie 1989).

This ‘progressivist’ faith in the ability of science to overcome agriculture’s degradation of soil and other natural resources encouraged optimism that conservation objectives might be achievable without the political conflict that would accompany coercing farmers to comply with legislation. Bradsen (2000 p. 278) has argued accordingly that any sense in Australia of landholders having an obligation to conserve the landscape was undermined as a result of following the approach in the USA—based on “a markedly higher degree of unconstrained individualism than applied in Australia”—rather than developing an Australian approach.

In any case, governments in neither Australia or the USA were committed to enforcing the coercive aspects of soil conservation and related legislation. Instead, state governments in Australia embraced a central role in the research and development of improved on-farm

conservation techniques and running extension programs to encourage adoption of these techniques. Moreover, the development of techniques was influenced strongly by the types of techniques favoured by the United States Soil Conservation Service (Conacher *et al.* 1995). The result was a strong emphasis on publicly-funded extension of engineering solutions to farmers (Bradsen 1987). These were primarily structural works, such as dams and contour banks (Martin *et al.* 1992).

The reductionist, progressivist, and mechanistic orientations of this strategy are noteworthy. In respect of the first orientation, it was presumed that the program would be most effective if conservation solutions were sought that could be applied anywhere. Thus conservation techniques developed for North American conditions were expected to be as effective under Australian conditions. With regard to the second orientation, it was presumed that farmers should, and would, follow passively the so-called objective advice of experts—who in turn should not be distracted by farmers' allegedly less objective knowledge and ideas (McDonald *et al.* 1993; Syme 1995).

Engineering solutions were emphasised because they could be designed and installed as 'objectively' as possible, with minimal dependence on the 'subjective' involvement of farmers. The alternative strategy of attempting to change farmers' land management practices required a greater investment in understanding local conditions, both biophysical and social. Moreover, Australian soil conservation legislation was amenable to such an engineering emphasis. Bradsen *et al.* (1987 p. 163) found as follows that this represented a further failing of the legislators: "... the [soil conservation] Acts do not have a clear conception of land use management and place, or allow administrators to place, far too much emphasis on works".

The mechanistic orientation of the program is evident in a rational-comprehensive method which seeks exhaustive, as well as objective, analysis of a problem (Curtis *et al.* 1998b). Agri-environmental systems are analysed by this method as if they are machines comprised of parts with unchanging relations. It is a method that presumes each agri-environmental issue can be comprehensively understood in an objective sense and is therefore amenable to prescriptive solutions with predictable results. Consequently, it proceeds on the presumption that goals, actions and time-frames can be fixed in advance (Bellamy *et al.* 2000). It is not surprising therefore that it tends to neglect 'non-material' attributes of a system that are difficult to analyse mechanistically, such as its political and social attributes, which nevertheless may have important influences on how goals, actions and time-frames unfold in

practice (Curtis *et al.* 1998b).

In any case, the intention of the engineering-based approach to agri-environmental conservation was to identify and promote solutions that did not reduce, and hopefully improved, the profitability of the farm businesses adopting them. Nevertheless, it became increasingly common for financial inducements, including subsidies and income tax concessions, to be offered to farmers when the solutions being promoted were unprofitable for them (Reeve 1997). These inducements normally targeted adoption of on-farm works, sometimes for problems that would have been solved more cost-effectively by changes to land management practices.

The financial inducements normally did not catalyse adoption of conservation works to the extent required, mainly because the available funds had to be spread over too many farmers (Martin *et al.* 1992). Even when such inducements led farmers to adopt conservation works, moreover, the hope that farmers would go on to maintain the works at their own expense was usually misguided (Barr *et al.* 1992). Despite the failure of the expert-driven research and extension approach to live up to original expectations, by and large in Australia it retained support from governments and the public until about the mid-1970's (Syme 1995). This period has been referred to as the 'technocentric era' of Australian agri-environmental conservation efforts (Woodhill 1997).

Extension programs were particularly popular with politicians because they gave an appearance of action being taken, yet with the advantage of being far less costly than other possible courses of action (Vanclay 1992). As highlighted in the following comment, initiation of extension programs also tended to become a knee-jerk reflex for government administrators:

'When all else fails, fall back on a plea for more of a conservation education effort'. This is the first law for administrators of ineffective conservation programs, and also for those disillusioned advocates of simplistic solutions to our conservation problems (Nowak 1984 p. 225).

The usual practice of giving field officers within soil conservation programs both extension and regulatory roles reinforced, given the much heavier emphasis on extension, the reluctance of governments to carry out the regulatory role. This was because regulatory diligence would have undermined the field officers' relationships with farmers required for successful extension (Bradsen 1987; Conacher *et al.* 1995; Reeve 1997).

As governments came to recognise the dependence of the research and extension emphasis on offering financial inducements to farmers, and in turn the full cost of making this approach work, they looked to moral suasion as a way of achieving greater adoption of conservation measures for a given government outlay. This remains the case in Australia where, as reported later in this chapter, governments continue to call for landholders adopting a ‘landcare ethic’. The origins of this strategy are often attributed to Aldo Leopold (1949 p. 204) who urged the necessity of people embracing a:

... land ethic [that] enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land ... [It] changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also for the community as such.

2.4 *Challenges to the progressive vision*

Meanwhile, the wider community was beginning to question some of the tenets of modernity, especially perhaps with respect to its implications for the condition of the natural environment. The discussion now turns to reviewing this trend and its implications for the evolution of agri-environmental governance in Australia.

2.4.1 *Environmentalism*

As wool prices boomed and fertilisers increased cropping yields in Australia during the 1950’s and 1960’s, agricultural land degradation all but disappeared as a political issue (Bradsen 1988). The public’s concerns more generally regarding environmental issues during this period became less motivated by threats to material standard of living and more by a desire to protect the aesthetic and amenity values of the natural environment (Batie 1989). Thus in the affluent 1960’s “an environmental tsunami slowly built up into the modern environmental movement” (Neimark *et al.* 1999 p. 180). The beginnings of this popular ‘environmentalism’ are often located with Rachel Carson’s *Silent Spring* which, as exemplified by the excerpt following, tended to present the environmentalist case in emotive terms:

As man proceeds toward his announced goal of the conquest of nature, he has written a depressing record of destruction, directed not only against the earth he inhabits but against the life that shares it with him ... The question is whether any civilization can wage [such] relentless war on life without destroying life itself, and losing the right to be called civilized (Carson 1962 pp. 85, 99).

As a result, the people of Australia and other affluent nations increasingly became concerned in the 1960's about pesticide use and air and water pollution. By the early 1970's the environmentalist agenda had expanded to include overpopulation, energy consumption and nuclear radiation (Papadakis *et al.* 2000). These issues were part of a wave of public concern regarding the stresses on the natural environment due to economic growth (Chisholm 1992). In Lockean terms, this development can be understood as the public exercising its prerogative to reconceptualise the social contract such that the property for which it holds natural rights—that governments are duty-bound to protect—would henceforth encompass the natural environment.

Environmentalism became an international political issue when the United Nations Conference on the Human Environment was convened in Stockholm in 1972. The natural environment was identified there as critical to successful development—rather than merely an obstacle to economic growth that science would steadily erode. Moreover, the need for national governments to formulate and implement environmental policies was successfully promoted. Government agencies and ministries concerned with environmental conservation were established in Australia and other nations as a consequence, and extensive national environmental legislation followed.

Nevertheless, Australian governments of the early to mid 1970's continued to view environmental issues as minor technical problems solvable entirely by technical solutions. By the late 1970's these governments were treating environmental concerns more seriously, although their responses to an increasingly diverse range of issues were largely *ad hoc*. New agencies had been established by the state and federal governments to deal with environmental matters. However, these agencies tended to be poorly integrated with existing agencies which, in the progressivist tradition, continued to regard as irrational any concerns that conventional forms of economic growth were unsustainable due to their contributions to degrading the natural environment.

Although the new departments attempted to challenge the older ones, normally they were unsuccessful by virtue of being positioned lower in the bureaucratic hierarchy and run by a 'junior' minister (Papadakis *et al.* 2000). Departments of agriculture or primary industry were particularly determined to protect farmers from attempts by environment-oriented departments to regulate their detrimental environmental impacts (Warhurst 1990). Thus in the report of the 1975-77 Commonwealth and State Government Collaborative Soil

Conservation Study (Department of Environment, Housing and Community Development 1978) there was tacit acceptance of the absolutist view of property rights in agricultural land, and thus of governments being obligated to offer financial inducements to farmers to gain their cooperation with soil conservation programs

By the beginning of the 1980's, the emphasis of environmental concerns regarding economic growth had expanded from protecting the amenity and aesthetic values of the environment to maintaining it as a healthy and stable ecological setting for all life (Batie 1989). The World Conservation Strategy launched in 1980 (International Union for the Conservation of Nature 1980) represented an important international expression of this shift. It emphasised the urgency of integrating economic and environmental concerns in order to maintain natural resources for future generations (McTainsh *et al.* 1993a).

In 1982 a special session of Governing Council of the United Nations Environment Program was held to review progress since the 1972 Stockholm Conference on the Human Environment in addressing environmental and economic issues in an integrated fashion. Dissatisfied with the progress achieved, it established the World Commission on Environment and Development (popularly known as the Brundtland Commission) to identify innovative ways forward (Pearce *et al.* 1989). The overall recommendation in the Commission's report *Our Common Future* was that human activities should be redirected towards 'sustainable development' which it characterised in the following terms:

Humanity has the ability to make development sustainable—to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development 1987 p. 8).

The so-called Brundtland Report proposed specific measures for implementing this concept which, together with the impetus provided by the World Conservation Strategy, led the United Nations General Assembly to convene the United Nations Conference on Environment and Development (UNCED) in 1992. Principle 4 of the United Nations Declaration on Environment and Development, 1992, one of five agreements reached, stated that “in order to achieve sustainable development, environmental protection shall constitute an integral part of the development process ...”. This was signed by most of the 187 governments represented (Grubb *et al.* 1993 p. 87). The need to integrate environmental and economic policy, together with the idea of sustainable development, was thereby firmly established on the political agenda at international and national levels. Moreover, agreement to this principle signaled a broad-based rejection of the progressivist view that

environmentalist concerns regarding economic growth are necessarily irrational.

2.4.2 *Initiatives from the Commonwealth Government*

The Australian Constitution does not mention the natural environment, thus making environmental policy a residual power that falls into the domain of the state governments (Papadakis *et al.* 2000). Accordingly, the Premier's Conference of 1946 decided that soil erosion should be tackled through state government agencies and that the role of the Commonwealth should be to assist and co-ordinate the activities of those agencies. Despite considerable pressure at that time for the Commonwealth to take a leading role in soil conservation, and to provide significant funding, it did not do so (Martin *et al.* 1992).

The Commonwealth only became substantively involved in environmental policy once this became the subject of international concern, since only itself among Australian governments has the power to put international agreements into effect (Bradsen 1994). To compensate for lacking a direct constitutional mandate to determine environmental policy, it has instead sought to influence the environmental policies of state and territory governments indirectly. This has been possible, firstly, by way of its constitutional powers in relation to external affairs, taxation, corporations, and trade with other nations; secondly, as a result of its capacity to attach conditions to funding the environmental programs of state governments; and, finally, due to its status as a landowner (Industry Commission 1997). Since 1992 the Commonwealth's role has been consolidated by the Intergovernmental Agreement on the Environment which established a framework for co-ordination among state and federal jurisdictions (Bradsen 1994).

An early case of international influence on Australian environmental policy occurred when the emphasis of the 1980 World Conservation Strategy on care of land was reflected in the National Conservation Strategy for Australia prepared in 1983. Several state governments subsequently prepared their own conservation strategies which similarly emphasised the need to care for land resources. The National Soil Conservation Program, which provided co-ordination and funds to tackle soil degradation, also began in 1983 (McTainsh *et al.* 1993b). In July 1989, the National Landcare Program was announced (later renamed the Decade of Landcare) by the then Prime Minister, Mr. Robert Hawke, effectively reformulating the National Soil Conservation Program on a project basis (Musgrave *et al.* 1994).

The Decade of Landcare program arose out of a joint submission to the Commonwealth by the National Farmers' Federation (NFF) and the Australian Conservation Foundation (ACF), the peak organisations in Australia representing agricultural and environmental political interests, respectively. Although unlikely allies at first glance, the NFF was convinced that continuing land degradation threatened long-term agricultural and pastoral viability. In turn the ACF accepted that blame for land degradation should not be attributed retrospectively to agricultural producers—on the basis that “land degradation was a national responsibility, created in part by previous government policies” (Toyne *et al.* 2000 p. 5).

Thus conflict was averted by leaving farmers' presumptions of absolute rights from land ownership unchallenged retrospectively. However, this mutual accommodation would not have been possible without the public, through government, agreeing to bolster the approach of offering farmers financial inducements to engage in conservation activities. Aside from the quantum leap in the level of funding made available—an initial commitment of \$340 million over the decade—the Landcare program was novel in so far as the funding was provided directly from the Commonwealth rather than indirectly via state government programs.

The decade-long funding commitment was considered essential for giving landholders confidence that support would be maintained while they were making the transition to land-use practices consistent with preventing further resource degradation. The ACF was optimistic that its ‘no blame’ approach and the decade of unprecedented funding would result in a rapid phasing-out of practices contributing to land degradation (Toyne *et al.* 2000). In their 1989 joint submission to the Commonwealth the ACF and NFF said their aim was to ensure “that Australia’s agricultural and pastoral lands are used within their capability by the year 2000 and that there is sustainable use of lands from that time on” (quoted in Toyne *et al.* 2000 p. 5).

The Commonwealth had a policy of funding Landcare primarily on a catalytic basis. Accordingly, the aim was to ‘kick-start’ local activity by supporting the formation and facilitation of Landcare groups, education and awareness-raising activities, demonstration sites, and so on (Curtis *et al.* 1998a; Woodhill 1997). This approach was consistent with the Commonwealth Department of Primary Industries and Energy stating in the same year that it was “trying to encourage a process of self-help ... some day the local community has to pick up all this” (House of Representatives Standing Committee on Environment, Recreation and

the Arts 1989 p. 72).

Local people were expected within a decade to become sufficiently 'empowered' that they could fully take over responsibility for Landcare-type activities, so that ongoing external support would be unnecessary. Taxpayers were thus led to believe that within ten years, subject to their support, Australian agriculture could be placed fully on the path of sustainable development. By virtue of their forbearance, the nation would avoid the bitter urban-rural conflict that would result from the alternative route of challenging farmers' claims to absolute rights from land ownership.

In response to the Brundtland Report, in 1990 the Commonwealth initiated the development of an Australian strategy for 'ecologically sustainable development' (ESD) (James 1997). The result of this process was promulgated in 1992 as the National Strategy for Ecologically Sustainable Development. The aim of ESD is "to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations" (CoA 1992b p. 6). The Commonwealth committed itself to the Strategy's implementation. A commitment by the states in the same year to ESD principles is recorded in the Intergovernmental Agreement on the Environment (CoA 1992a).

2.4.3 Increased complexity of environmental governance

In the 1970's meanwhile, with governments and farmers still struggling to come to terms with the limitations of Australia's land resources, the end of the frontier or expansionary phase with respect to Australia's water resources was first heralded⁵ (Quiggin 2001; Randall 1981a; Watson *et al.* 1980). Recognition of a need to shift from a focus of developing unexploited water resources toward allocating the finite capacities of water systems equitably and efficiently thus began to emerge within agri-environmental deliberations.

At this time the importance of protecting the allocation of water to natural systems also began to be acknowledged. This was highlighted most dramatically by the campaign of environmental groups between 1979 and 1983 to prevent construction of a dam on the Franklin River in Tasmania's south-western wilderness. The campaign precipitated an upsurge in membership of environmental groups and large protest rallies. It made the environment a national election issue for the first time, thus prompting the Commonwealth

Government to exercise its constitutional powers over external affairs to prevent construction of the dam (Papadakis *et al.* 2000).

Less dramatically, but nonetheless a growing source of conflict, abstraction of water from streams and other water systems was approaching levels that threatened the capacity of these systems to assimilate materials (e.g., sediments, nutrients, pesticide residues, salt) draining from surrounding catchments while continuing to offer the other services traditionally expected from them (e.g., support for natural habitats, and provision of clean water and recreation opportunities). Moreover, there was a growing realisation that storing or abstracting water was not the only way that land-use management influenced water systems, and that these influences were often multi-faceted (Watson *et al.* 1983). For instance, soil conservation works such as dams or contour banks may reduce sedimentation and nutrient loading of streams at the expense of restricting inflows to streams of rainfall run-off.

By this time, at least in industrialised nations, the public's faith in governments and science to rectify and prevent environmental problems had diminished considerably (Batie 1989). The rational-comprehensive approach to environmental governance had failed to prevent what was widely perceived as an environmental crisis. Moreover, the public became aware of how various policies associated with governments advocating this approach had contributed to land degradation. In Australia, these included insecurity of tenure under the leasehold system, fertiliser subsidies, subsidised irrigation water, drought relief programs, tax concessions for land clearance and price supports for crops (Conacher *et al.* 1995). People had become generally less trusting that experts really knew what was best for them. Syme (1993 p. 3) observed:

The days of the DAD (Decide, Announce, Defend) style of planning have gone. The public is demanding more input. In fact the argument that no public consultation at all will result in greater conflict may be the only general rule for public interaction in water resources management.

From analysis of data from *World Values Surveys* carried out in 1981-3, 1990-3 and 1995-97, Inglehart (1999) identified two reasons for this development in industrialised societies. Firstly, there seems to have been a shift in people's values in these societies, with a weakening emphasis on the goals of economic and physical security that favour strong authority. Secondly, there has been a corresponding rise in educational levels and in mass

⁵ For instance, the NSW Water Resources Commission Act 1976, which replaced the Water Conservation and Irrigation Commission with the Water Resources Commission, signaled a statutory intention to move away from the expansionary phase to a more 'mature' phase of water resource management.

political skills. Thus:

In the long run, industrialized societies of both East and West must cope with long-term changes that are making their publics less amenable to doing as they are told, and more adept at telling their governments what to do (ibid. p. 251).

2.5 *A collaborative vision for environmental governance*

Faced with citizens becoming less committed to the progressive vision for environmental governance, governments in Australia began to recognise the need for a new, more collaborative, vision. A discussion of developments in this direction, focussing particularly on the NSW experience, follows.

2.5.1 *Origins of integrated catchment management in New South Wales*

Given the multiplicity and complexity of the land-water interactions associated with the emergence of water resource conflicts, and the fact that water policy decisions had historically been made independently of land policy decisions, there were in the early 1980's increasing demands that policy processes in respect of land, water and other natural resources be integrated. These calls echoed a proposal considered more than forty years earlier by senior members of the NSW Government. The idea of integrating soil, water and vegetation conservation within NSW emerged from discussions prior to the 1941 election between Sir William McKell, then Leader of the Opposition, and the Director for Soil Conservation.

However, neither the establishment of the NSW Department of Conservation in 1944 (consisting of the Soil Conservation Service, Forestry Commission and the Water Conservation and Irrigation Commission) nor a number of subsequent attempts at co-ordinating administrative arrangements, realised McKell's ideal of successful intra-governmental co-ordination (Booth *et al.* 1988). The Government continued to rely on traditional bureaucratic devices, such as inter-departmental committees, which were later criticised for spawning a "cult of coordination" (Paterson 1986 p. 96) and "not really penetrat[ing] the problem" (Eddison 1985 p. 149).

McKell's idea was resurrected by the NSW Government in 1983 when the Commissioner of the Soil Conservation Service began to actively promote the concept of ICM with the 'brand name' Total Catchment Management (TCM) (Burton 1985). The National Soil Conservation Program, launched that same year, advocated applying a similar approach nationally—so did Watson *et al.* (1983 p. 102) who, faithful to the reductionist tradition, envisaged:

A hierarchical system [that] could be administered from a central authority with decentralised submanagement agencies in each of a number of relatively homogeneous water management areas.

Rather than introducing a new program, it would have been possible to use the regional planning provisions of the (NSW) Environmental Planning and Assessment (EPA) Act, 1979, to manage natural resources on a catchment basis. This legislation was acknowledged by John Burton (1985 p. 34), a key proponent of the TCM approach, to be a “rather remarkable piece of legislation which sets out to bring a new approach to land use planning and management in New South Wales”. However, in contrast to the regulatory approach to catchment management that relying on the EPA Act would have involved, the proponents of TCM believed that greater long-term success would be achieved by inducing positive changes through so-called voluntary cooperation. The law was regarded as better for telling people what not to do than for effectively persuading them what to do (Farrier *et al.* 1999).

A digression on the meaning attributed to ‘voluntary’ in the literature regarding TCM and ICM is in order at this point. This term is normally used in this literature as an antonym for ‘obligatory’. Hence it is not uncommon for adoption by farmers of conservation practices to be regarded as voluntary even when it is motivated by financial inducements (e.g., subsidies, tax rebates, etc.) the existence of which depends ultimately on the threat of hierarchical coercion by government (i.e., in ensuring that farmers do what they have been financially rewarded to do, as well as in raising the taxes necessary to provide these inducements). In Levi’s (1988) terminology, adoption of this kind would qualify only as ‘quasi-voluntary’ cooperation. To avoid ambiguity in this thesis, the term ‘spontaneous’ is used instead of ‘voluntary’ to signify cooperation that does not rely on hierarchical coercion or the threat of it, except of course when the latter term is in a passage that has been quoted directly.

In any case, in 1984 the NSW Premier approved a proposal to set up an Interdepartmental Committee on Total Catchment Management, and John Burton was commissioned to prepare a background paper to assist the Committee’s deliberations. This key document, entitled *Development and Implementation of Total Catchment Management Policy in NSW: A Background Paper* (Burton 1985), became available the following year. In this document

it was proposed that TCM be based:

... on the recognition of an inter-relationship between land-based resources and [depend] essentially on the thesis that such resources can most effectively be managed using a systems approach, with the catchment serving as the basic management unit (ibid. p. 6).

A priority of the TCM program was achieving integration within government. For instance, it was observed that:

Because it transcends a range of resources and management techniques, the implementation of TCM requires cooperative activity between a range of government agencies and professional disciplines (ibid. p. 6).

The existing system of multiple agencies, each with its own specialised functions for different aspects of environmental governance, was to be retained. However, the TCM program would add an overlay of integrative procedures with the aim of ensuring that each agency considered developments within other agencies (Gardner 1999).

The importance for achieving land and water conservation objectives of a planning approach that promotes cooperation between civil and governmental spheres was also highlighted in the *Background Paper*. The EPA Act, with its objective (s.5) “to provide increased opportunity for public involvement and participation in environmental planning and assessment”, had represented a previous major advance in this direction. The first step in the procedure it details for developing a regional environmental plan is preparation by the responsible government agency of (a) an environmental study of the relevant region, and (b) a statement of the aims, objectives, policies and strategies intended to be included in the plan. Once prepared, these documents are required to be exhibited publicly, and any person is eligible to make a written submission in response.

In the second step of the process, the agency must prepare a draft regional environmental plan, on the condition that the submissions in response to the first step are taken into account. Once the draft plan is prepared it must be advertised and placed on public exhibition. Any person can then make a submission in writing in respect of the draft plan. The director of the agency, after considering these submissions, has the option of directing that a public inquiry be held. Following the consideration of submissions received, and any findings of a public inquiry if one is established, the agency may produce a revised draft plan. This process may be repeated. The agency eventually submits a final version of a draft plan to its Minister, who may approve, modify or reject it (Burton 1985 p. 34).

In considering the desirability of these procedures for TCM, it was noted in the *Background Paper* that Goodman (1984 chapter 7) had justified public involvement in planning by a belief that it can help to achieve benefits including the following:

- The utilisation of knowledge available within the groups involved;
- The clarification of the standpoints of the different stakeholders;
- The identification of sensitive issues and means for preventing adverse impacts;
- Reaching a consensus when there are different viewpoints regarding the plan; and
- Gaining the cooperation of stakeholders in implementing the plan.

It was noted too in the *Background Paper* that:

... the majority of investigators make it clear that this kind of [public] involvement should start at the earliest possible stage in the planning process. If a plan is not presented to the key community interest groups until it has reached the stage of a formally published draft document, it is probably too late to achieve their effective involvement ... [Accordingly, the hope was] that whatever course of action is adopted for the preparation and presentation of TCM plans, the community involvement process will be much more extensive, will be planned much more carefully and deliberately, and will be put into effect at a much earlier stage in the process, than the EPA Act requires (Burton 1985 pp. 80-81).

Stress was placed in the *Background Paper* on the need for careful design of a public or community involvement program, and on the importance of government appreciating that the financial and staff costs of effective community involvement can be substantial. It was observed that:

The experience of many investigators would certainly suggest that if the community involvement programme is not taken seriously, and properly designed, timetabled and funded, then it is not worth doing at all (ibid. p. 82).

A year later the importance of the communication facilitated by community participation in the TCM process was reiterated by G.M. Cunningham (1986 p. 5), then the Chief of Services for the Soil Conservation Service of NSW, in the following terms:

There will always be conflicts in land use ... but these will be minimised as we all understand each other's needs and are sensitive to the impacts that our activities may have on others.

TCM was adopted as a policy of the NSW Government in 1987 (Booth *et al.* 1992). Interestingly, the report of the *Review of Reforms in the Water Industry* (NSW Government 1988 p. 6) published in the following year commented that the Interdepartmental Committee on TCM established three years earlier had “not been an effective co-ordinating mechanism.

... The problem seems to be that the major players are spread over too many portfolios”⁶. While observing that “workable co-ordination is urgently required”, it was remarked also that “a number of agencies argued in their submissions that they should co-ordinate the function” (ibid. p. 8). It was recommended that “ideally, all major natural resource administrations ... be placed in the same portfolio so that co-ordination would be possible under one Minister”. However, if this were not possible the recommendation was for the DWR and the Soil Conservation Service to be placed under the same Minister and for the first of these to take the lead role through a ‘co-ordinating committee on river basin management’ established in place of the Interdepartmental Committee. It was proposed that the new committee’s membership include high-level representatives from appropriate government agencies, statutory authorities and local government.

2.5.2 *The Catchment Management Act, 1989*

The TCM Policy was given legislative backing by the Catchment Management Act, 1989 (Burton 1991). TCM was defined in the Act (s.4) as “the coordinated and sustainable use and management of land, water, vegetation and other natural resources on a water catchment basis, so as to balance resource utilisation and conservation”. The Commonwealth and other states had also become interested in the concept of ICM by this time. For instance, it was used as the basis of the Natural Resources Management Strategy (NRMS) of the Murray-Darling Basin Ministerial Council (Murray-Darling Basin Ministerial Council 1989). The NRMS, and thereby the ICM concept, was given considerable administrative force through its translation into the allocation criteria for the Murray-Darling Basin Drainage Program, a major source of funds for investment in conservation-related drainage works (Marshall *et al.* 1996).

The Catchment Management Act provides for a network of catchment management committees (CMCs), co-ordinated by a State Catchment Management Co-ordinating Committee (Co-ordinating Committee or SCMCC). CMCs consist of members appointed by the responsible Minister. Nowadays this is the Minister for Land and Water Conservation⁷. However, originally—against the advice of the *Review of Reforms in the Water Industry*—it was the Minister for Agriculture (whose portfolio then included the NSW Soil Conservation

⁶ The review group was chaired by John Burton.

⁷ The Minister for Land and Water Conservation and the Minister for the Environment are technically responsible for urban areas, although in practice the day-to-day management is by the first of these (Farrier *et al.* 1999).

Service, the role of which is now part of the charter of the Department of Land and Water Conservation). A majority of the members are to be landholders or land users within the catchment area. Other interests required to be represented are: persons who have an interest in environmental matters within the catchment; local government; and, government departments or authorities with responsibility for environmental governance within the catchment. The chairperson and deputy chairperson of a CMC are appointed by the relevant Minister.

The functions of a CMC within its catchment area (s.15(1)) included:

- (a) to promote and co-ordinate the implementation of total catchment management policies and programs;
- (b) to advise and co-ordinate the natural resource management activities of authorities, groups and individuals;
- (c) to identify catchment needs and prepare strategies for implementation;
- (d) to co-ordinate the preparation of programs for funding;
- (e) to monitor, evaluate and report on progress and performance of total catchment management strategies and programs;
- (f) to provide a forum for resolving natural resource conflicts and issues ...

The Act also provides for the establishment of catchment management trusts (CMTs). The membership provisions for these are similar to those for CMCs. However, unlike CMCs, CMTs have the authority to “enter into cost-sharing or other arrangements in connection with the carrying out of works” through “generat[ing] revenue by levying and recovering catchment contributions” (s.27(1)). They also are authorised to administer funds, employ staff, construct and operate works, purchase and hold property, enter into contracts, and so on. The Minister can also allow a CMT to exercise the functions of a CMC (s.27(2)). The Minister’s decision to establish a CMT must have regard to whether, *inter alia*, “the formation of a Trust is the most appropriate means of achieving equitable cost sharing” and “there is clear support by the landholders, land users and the community for the formation of a Trust” (s.21(2)).

The SCMCC consists of members appointed by the responsible Minister. Its membership includes senior officers of relevant government agencies as well as representatives of land users, environmental interests, local government and CMCs (s.9(1)). Hence its membership is more inclusive than envisaged for the co-ordinating committee on river basin management that was proposed in the *Review of Reforms in the Water Industry*. It has played an important role *inter alia* in overseeing how funds are allocated between NSW catchments (Verhoeven

1997a). Although not specifically required by the Act, the SCMCC reports to the Rural and Natural Resources Committee Cabinet Committee, composed of Ministers with relevant portfolios, which provides policy advice to the NSW Cabinet (Gardner 1999).

As at October 1998, there were 45 CMCs. The area covered by individual CMCs ranged from a few square kilometres in densely-populated urban areas to tens of thousands of square kilometres in the west of NSW. Five Regional Catchment Co-ordinating Committees also had been established as sub-committees of the SCMCC to achieve a strategic regional focus and economies of scale in natural resource planning on the eastern side of the Great Dividing Range where individual CMCs were regarded as too small for these purposes. In 1998 there were three CMTs in operation (Farrier *et al.* 1999). Establishment of so few CMTs appears to have been due to political opposition by farmers to their underlying ‘user-pays’ rationale. This opposition led the Minister for Agriculture to make a commitment soon after the Catchment Management Act was legislated that no further CMTs would be established (Burton 1991).

Although the Catchment Management Act authorised CMCs to carry out various co-ordinating functions, they were not granted any statutory powers to assist them in doing so. In the Act *co-ordinate* is defined narrowly as:

... to bring together or liaise with authorities, groups or individuals to ensure effective total catchment management, but does not include the control or direction of the activities of those authorities, groups or individuals.

According to Booth (in Booth *et al.* 1996 p. 28), one of the architects of the Act, it would have “killed” CMCs to have given them statutory powers. He believed that the public would soon perceive CMCs as just another level of government if they were given such powers. Moreover, existing legislation, including the Clean Waters Act, the Water Administration Act, the Soil Conservation Act, and the Environmental Planning and Assessment Act, were seen to provide all the statutory powers necessary, even if they are not administered directly by CMCs (Burton 1985). Verhoeven (1997b p. 5) explained that the belief underlying the Act “is that peer pressure will be much more effective than the threat of penalties ... ” (see also Gardner 1999).

How this peer pressure was supposed to arise and acquire sufficient strength to overcome partisan interests has been left unclear. Presumably it was expected to result in part from the formalised advisory powers of CMCs. These powers have included advising the NSW Government about the relative merits of bids from their constituents for project funding. This

influence has been exerted via the strong representation of CMCs (and now Catchment Management Boards—see section 2.5.6) on the Regional Assessment Panels (RAPs) established by the NSW Government that cover their territory. The rankings made by these Panels are conveyed to the State Assessment Panel (SAP), which similarly has strong representation from the SCMCC, which then makes funding recommendations to the NSW Government⁸ (Gardner, 1999).

It seems that peer pressure for citizens to cooperate spontaneously with catchment management strategies was also expected to emerge as a consequence of promotion of community participation by the CMCs establishing ‘community ownership’ of the strategies (NSW Landcare Working Group 1992). Similarly, it seems that peer pressure for the various levels and agencies or government to cooperate with catchment management strategies was anticipated to arise from community participation empowering the CMCs in terms of knowledge, skills and cohesion to make government agencies more accountable (Marshall *et al.* 1996).

Aside from creating peer pressure, there have been occasional suggestions by proponents of TCM that it promotes spontaneous cooperation by means of the social dynamics unleashed as a result of fostering an ongoing process of collaboration between those with a stake in how a catchment management strategy is developed. Nevertheless, the specifics of how this might occur have again been left vague. For instance, Booth (in Booth *et al.* 1996 p. 20) used the following metaphor to illustrate the importance of investing in a deliberative process:

... Yitshak Rabin ... had the power to tackle the [Palestinian] issue with brute force ... But when it came to the crunch—when he wanted to bring about change he moved away from ‘the stick’ approach and decided on ‘process’. He couldn’t resolve the complex issues by getting the people directly from one position to the end point needed. He knew he had to go via a series of steps ...

It was not anticipated that the TCM program would involve a significant increase in the resources provided by the NSW Government for land and water conservation. For instance, Cunningham (1988 p. 43) argued that:

In today’s economic climate where governments are faced with escalating non-discretionary expenditure, it is essential that notions of self-help be promoted to achieve catchment management. No longer can the Government foot the bill for catchment protection ...

⁸ Membership of Regional Advisory Panels and the State Advisory Panel have been drawn where possible from existing CMC and SCMCC membership, respectively. However, CMC and SCMCC membership has been supplemented in forming these Panels to satisfy the Commonwealth’s requirements for a range of skills and experience, including with respect to biodiversity conservation issues and the interests of indigenous people (Gardner 1999).

This notion of self-help had already been introduced in the Victorian salinity management planning process where cost-sharing principles were used to apportion the costs of implementing conservation across groups according to their respective shares of benefits. This was a significant departure from the Victorian Government's prior policy of fully meeting the capital costs of conservation works and requiring farmers to share only the costs of operating and maintaining them (Sappideen *et al.* 1992). In addition to the resources provided under such cost-sharing arrangements, it was expected that the remaining resources needed to implement TCM would be freed up by TCM succeeding in reducing duplication and inconsistency between government agencies (Booth *et al.* 1992; Cunningham 1986).

As it happened, the Commonwealth established the Decade of Landcare program in the same year that the Catchment Management Act was legislated in NSW. Consistent with this program viewing Landcare groups as having an important role in implementing the vision or philosophy of ICM at the farm level (Toyne *et al.* 1989), the NSW Government prepared the document *Decade of Landcare: Draft Plan for NSW* (NSW Landcare Working Party 1991) in which Landcare groups were viewed as part of the TCM framework and a tangible expression of its vision at the level of local action (Martin *et al.* 1992). Thus it was anticipated that much of the government contribution of resources to the local activity of CMCs would be funded from the Landcare program. With a similar view taken elsewhere, Landcare groups became viewed by state governments as:

... the vehicle through which integrated resource management actions are implemented ... Integrated Resource Management gives Landcare an overall, strategic catchment management direction, the focus for coordination of activities and an ongoing participatory management role (AACM *et al.* 1995b p. 27).

2.5.3 *Achievements of integrated catchment management*

The following achievements have been claimed from TCM and related programs interstate:

- Community expectations regarding the quality of environmental governance have been raised, and the community holds government accountable for these expectations (AACM *et al.* 1995b).
- A network of CMCs and CMTs has been established which represents 99 per cent of the area of NSW (Verhoeven 1997a).
- Foundations have been laid for moving from a centralised, reductionist, approach to environmental governance to a regional approach that enables solutions to be tailored to regional conditions and circumstances (Jennings *et al.* 1999).

- Catchment committees have been allowed considerable latitude to adapt their mode of operation to local circumstances, thus assisting them to obtain a local identity (Martin *et al.* 1992).
- There has been reasonable success during the planning stage, particularly in identifying environmental problems, elaborating community goals and visions and proposing catchment management strategies (Margerum 1996; Price 1996; Woodhill 1997).
- Programs to raise awareness among, and educate, the public regarding conservation issues have been conducted (Woodhill 1997).
- A positive attitude towards integrated planning of resource management has emerged (Musgrave 1996a; Verhoeven 1997a).
- Community perceptions of the key responses to natural resource problems have shifted from a dominant focus on engineering-based approaches to a realisation that these need to be complemented by policy reform, legislative controls and changes at the level of individual behaviour (Bellamy *et al.* 2000).
- Development of catchment strategies has empowered catchment committees to emerge as a key broker for local interests interested in accessing conservation funding from governments (*ibid.*).
- Forums have been provided for bringing together groups that previously had not communicated frequently (*ibid.*; Cameron *et al.* 1996).
- The language associated with integrated catchment planning has often “allowed negotiations to progress among interests that were diverse and often irreconcilable without substantial constraints on property rights” (Reeve *in press*).

Perhaps the last of these achievements warrants elaboration. Reeve (*ibid.*) has argued that the language that came with ICM—of people who share a catchment becoming empowered to cooperatively solve its natural resource problems—served to reframe agri-environmental issues so that, at least temporarily, it became possible to negotiate the restriction of property rights in land ownership without making this explicit. This reframing thereby enabled catchment planning to:

... as it were, tiptoe past the slumbering dragon of absolutist property rights rhetoric which, if roused, has the potential to politicise the process and remove it from local control, an outcome that would be unattractive to both local agency staff and landholders (*ibid.*).

Consistent with this thesis, Bellamy *et al.* (2000 p. 276) observed how the Herbert River Catchment Co-ordinating Committee, operating within Queensland’s ICM framework, initially chose to address threats to biodiversity in the catchment by revegetating riparian

zones on public lands instead of risking the divisive course of considering the preservation of remnant vegetation on private lands.

2.5.4 *General concerns with integrated catchment management*

Perhaps the most striking reason for concern regarding the achievements of TCM and its inter-state ilk is that, despite the existence of these programs for a decade or more, widespread agri-environmental degradation persists. Hence:

The scientific evidence suggests that a number of degradation problems [in rural Australia] will probably become even more serious ... A high proportion of our agricultural land is, or will be in the relatively short term (the next 50 years), affected by at least one form of land degradation. Up to one-third of our rivers are in extremely poor condition and another 40 per cent or more show clear signs of degradation (CoA 1999 p. 4).

It is not surprising, therefore, that widespread concerns have arisen due to a lack of visible gains from TCM (AACM *et al.* 1995b). Consistent with these concerns, Bellamy *et al.* (1999) concluded that progress by Australian ICM approaches toward improvements in the natural resource base at a catchment scale is yet to be systematically demonstrated. Dovers (1999) commented how the optimism in official statements accompanying these and other ESD-related programs have not been matched yet by positive changes in the natural environment. More specifically, some commentators doubt that on-ground progress with ICM has been sufficient given the scale of land degradation problems to be addressed (Martin *et al.* 1995; Reeve 1997).

Criticising the ICM approach, or at least how it has been practised so far, on the basis of an apparent lack of positive environmental outcomes may be premature at this stage. Visible improvements in environmental quality often lag considerably behind implementation of solutions, so for now it is probably more reasonable to evaluate its outcomes for the relevant human processes and activities rather than for the condition of the environment (Bellamy *et al.* 1999). As Born *et al.* (2001 p. 8) have concluded from experiences with ICM-type programs in the USA:

The ultimate accomplishment measure may be environmental outcomes ..., but relying solely upon environmental outcomes is overly simplistic, can take decades, and fails to capture the significance of other potential achievements and impacts.

Yet many concerns remain when this process-oriented yardstick is adopted. For instance, confusion persists about what the concept of ICM really involves in practical terms (AACM *et al.* 1995b; Hooper 1999). Bellamy *et al.* (1999 p. 351) found accordingly that

operationalising ICM⁹ approaches “is proving to be a considerable challenge”. Probably the most telling concern is that it has been rare for ICM strategies or plans developed in Australia to progress to successful implementation (AACM *et al.* 1995b; Bellamy *et al.* 2000; Mitchell *et al.* 1993; Pigram *et al.* 1994; Syme *et al.* 1994). Thus Price (1996 p. 32) reported that: “... few [ICM] groups have yet to go beyond [the] planning phase, and it fair enough to state that many community groups feel ‘strategised’ to death”. Nevertheless, Australia has been far from alone in this respect (Born *et al.* 2001; Born *et al.* 1995; Innes *et al.* 2000; Margerum 1999).

Margerum (1999) has identified three general phases of collaborative processes like ICM. The first (‘problem-setting’) phase aims to bring together representatives of the relevant interests (‘stakeholders’), obtain their commitment to a collaborative process, and develop the ‘infrastructure’ to facilitate collaboration. The second (‘direction-setting’) phase involves the stakeholders identifying problems, exchanging information, resolving conflicts, agreeing to common goals, reaching consensus, and identifying implementation actions. Within the third (‘implementation’) phase, stakeholders specify actions, roles and tasks. They design the implementation process and go on to implement actions and monitor outcomes.

In some cases, lack of progress with the implementation phase might be explained by catchment committees not seeing strategies emerging from the first two phases as serving a guiding role in the implementation of substantive on-ground action. For instance, Bellamy *et al.* (2000 p. 273) reported how members of the Herbert River Catchment Co-ordinating Committee, based in Queensland:

... do not perceive [their] strategy as guiding catchment stakeholders to implement substantive action to resolve catchment issues. Rather [they] perceive the strategy more as a vision for the future and a means at this point in time in securing eligibility for project funding from state and federal government sources.

Nevertheless, it appears from a survey undertaken by Margerum (1999) of stakeholders involved in Australian ICM programs that many catchment committees *are* frustrated by a lack of progress in translating their strategies into actions. Similarly, Margerum (1996 p. 8) found that:

... many people are now asking—including the [ICM] committees themselves—what they have accomplished for the investment of time and resources ... Furthermore, when I asked the state agency

⁹ These authors actually use the term *integrated resource management* to refer to ICM-type programs. Other authors also sometimes use the terms *integrated environmental management*, *integrated ecosystem management*, *integrated watershed*

and local government stakeholders what changes or adjustments their organisation had made in response to the committee, few could cite any changes.

Thus a Commonwealth-initiated review of Australian ICM experiences reported NSW Government stakeholders as expressing “continual frustration at the slow pace by which TCM is able to achieve regional planning and management of land and water resources” (AACM *et al.* 1995a p. 14). Vanclay (1997) likewise concluded that efforts to achieve public participation in Australian ICM had often failed to produce tangible outcomes other than satisfying the legislative and political requirements of these programs.

In some quarters, frustrations of this kind have been used as evidence that environmental governance approaches based on collaboration with, or participation by, by the public are fundamentally flawed. Thus Rhoades (2000 p. 330) observed, after reviewing international experiences with ICM-type programs, that critics were “starting to argue wistfully that the participatory rhetoric has outrun the ability to accomplish” and that a return to centralised expert-driven governance “without the noise of participation” should be reconsidered.

Nevertheless, it seems that such a conclusion is premature given a considerable consensus that the thought and resources devoted to designing and applying collaborative approaches to environmental governance have not been sufficient to give them a fair chance of proving themselves (e.g., AACM *et al.* 1995b; Bellamy *et al.* 1999; Dovers 1999; Innes *et al.* 2000; Margerum 1999; Rhoades 2000). Perhaps the most fundamental of the justifications offered for this view is that, although these approaches are predicated upon influencing those informal social mechanisms that are critical for stakeholders cooperating voluntarily with one another, there has been little appreciation of the need to understand how such mechanisms function and how they can be influenced.

The central importance of informal social processes for the ICM approach is clearly implied by its rhetoric of community ownership, community empowerment, peer pressure and consensus-building through dialogue. In contrast, the literature on ICM focuses mostly on conceptualising the approach, celebrating its virtues *ex ante*¹⁰, and discussing how to structure its organisation and processes in formal terms. As a result it offers few guiding principles that governments, communities and other stakeholders can use to translate into

management, and so on, to mean much the same thing.

¹⁰ Thus Bellamy *et al.* (1999 p. 345) have remarked: “The literature is full of enthusiastic presentations as to why such programs will solve many problems—*ex ante*”.

practice the rhetoric of community-government partnership, community empowerment, peer pressure and so on (Bellamy *et al.* 2000).

Government administrators responsible for how ICM programs are established and run indeed seem typically to have shown little regard for the importance of harnessing and fostering informal social mechanisms when designing the programs. Thus it was found from a review of Australian ICM programs that:

... we are far from understanding the operation of the human decision making system. We see this system as including everyone from the individual farmer to representatives of Commonwealth agencies (AACM *et al.* 1995b p. 26).

These reviewers found “a profound lack of understanding” by both governments and communities about the meaning of community empowerment (AACM *et al.* 1995b p. 32). They observed that in none of the ICM programs studied had a plan been prepared for how the community groups involved might mature eventually into organisations with greater independence. Consequently, they emphasised the importance of utilising knowledge of group dynamics and other aspects of social behaviour when designing ICM programs.

Martin *et al.* (1992) explained this neglect in terms of a prevalent view among administrators in natural resource agencies that knowledge of social processes is self-evident and does not justify the level of research devoted to technical problems. In turn, this view has been traced to a lingering materialistic bias in these agencies towards technical problems amenable to technical solutions (Woodhill 1997). This bias surfaces in judgements that social research is about ‘human stuff’ that is too much like ‘common sense’ to require ‘real science’. It has been characterised as follows by the eminent evolutionary biologist Edward O. Wilson (1999 p. 202):

Everyone knows that the social sciences are hypercomplex. They are inherently far more difficult than physics and chemistry, and as a result they, not physics and chemistry, should be called the hard sciences. They just seem easier, because we can talk with other human beings but not with photons, gluons and sulfide radicals. ... Such is the paradox of the social sciences. Familiarity breeds comfort, and comfort breeds carelessness and error. Most people believe they know how they themselves think, how others think too, and even how institutions evolve. But they are wrong.

From this bias the opinion often follows that it is not necessary to employ specialists to study or promote social processes (Mobbs *et al.* 1999). The outcome of all this is, in the view of Rhoades (2000 p. 337), the “social underdesign” of participative ICM programs because “the very science we need most in watershed research ... —a solid social science—is the one seen as most dispensable”.

At this stage, therefore, the social knowledge underpinning the design of ICM programs “is almost entirely anecdotal” (Rhoades 2000 p. 333). Since the bias in natural-resource management agencies against the value of social knowledge has started to weaken only recently, Dovers (1999 p. 101) has predicted that environmental governance programs will for some time yet continue to develop *ad hoc* “in the absence of structured learning from past or current experience”. Consistent with this view, Hooper (1999 p. 3) has contended that current Australian approaches to ICM are based on a “poorly understood need for an integrated approach” and on “dubious premises and assumptions about co-ordination”.

According to Bellamy *et al.* (1999), the types of social knowledge most needed in this area are those that help to answer questions like the following: If ICM approaches do work, what makes them work? What fosters or inhibits the process of ICM implementation in terms of the tractability or severity of natural resource problems? What are the necessary arrangements, procedures and processes that need to be put in place so that the ICM approach works best? Until these questions are answered satisfactorily, these authors maintained that researchers, administrators and other stakeholders should reserve judgement regarding whether, to what extent, and how the ICM approach might contribute towards greater sustainability in using and managing the natural environment. After all, “the implementation of [ICM] programs in Australia is in a formative and largely experimental stage” (Bellamy *et al.* 1999 p. 343).

2.5.5 Particular concerns

At this stage it may be useful to look more closely at some of the specific problems identified as inhibiting the conversion of ICM concepts into practice—particularly with respect to the idea that collaboration of stakeholders during the problem-setting and direction-setting phases makes it more likely that they will cooperate spontaneously during the implementation phase. Indeed, many such problems have been identified in reviews of Australian ICM programs undertaken in recent years (e.g., AACM *et al.* 1995a; AACM *et al.* 1995b; CoA 2000a; Healthy Rivers Commission 2000; Dale *et al.* 1996; Margerum 1999; Syme *et al.* 1994). Here it is proposed to touch upon a few of the more common problems identified in these reviews. The aim is to illustrate the scale and nature of the challenge that remains if the expectations raised by the proponents of the ICM approach are ever to be met. The particular concerns discussed here relate to less-than-expected achievements with regard to integration within government, integration between state governments and regional

communities, and in gaining spontaneous cooperation by farmers with policies designed to introduce conditions on how they use their land.

Ineffective collaboration within government

Integration of the different agencies and levels of government often remains weak. Thus it has been observed in the Australian setting that “there is little evidence of an integration between agencies at the policy and planning level” (AACM *et al.* 1995b p. 27). Woodhill (1997 p. 5) has observed that “poor coordination of government policies, programs and agencies both within and between the three tiers of government is endemic and one of the most regularly criticised features of the current situation”. Specifically in relation to the TCM program, or at least to how it has performed in terms of coastal river management, a recent NSW Government review found:

Virtually all entities with river management responsibilities now express a commitment to ‘total catchment management’ ... However, the reality is that river problems are commonly treated in isolation from others, and management action is ... certainly far from well integrated ... [E]fforts [undertaken] commonly treat problems in isolation ... [I]ndividual agencies and [local government] councils tend to devise strategies and plans that aim to protect specific parts of aspects of a river by harnessing their own particular powers and applying their own long established skills and approaches (Healthy Rivers Commission 2000 pp. 17-18).

Hence it appears that collaboration by government stakeholders in most ICM processes is yet far from having established peer pressure to cooperate spontaneously with one another that is strong enough to overcome their historical predilections to ‘go their own way’ at best, and to practise ‘turf warfare’ at worst. Within the NSW bureaucracy, to some extent this seems to have been due to strategic responses to the designation of one agency (now the Department of Land and Water Conservation, or the DLWC) as the ‘lead agency’ for TCM. Cullen (1997) has observed that this has led to other key agencies, including NSW Agriculture and the Environmental Protection Authority, perceiving TCM to be a program ‘belonging’ to this lead agency and not as a whole-of-government exercise. The *Report of the Inquiry into Catchment Management* (CoA 2000a pp. 72-73) remarked upon this type of problem as follows:

Competition between administrative departments for standing and authority in environmental matters can lead to differing advice and recommendations. ... Such competition between departments amounts to ‘turf warfare’ with the result that the efforts of the departments are directed at winning the competition rather than solving the problems.

An attempt in NSW to reduce impediments of this kind to effective intra-governmental collaboration was made in 1991 when the DLWC was formed by amalgamating a number of resource management agencies, including those responsible for soil conservation and for water resources (Crean *et al.* 1999). To some extent this appears to have meant only that the strategic behaviour that occurred previously between agencies soon re-emerged between sections of the amalgamated agency. One symptom of this seems to have been the DLWC establishing community-based committees for river, groundwater and vegetation management independently of the TCM program, despite these responsibilities being prime functions of the SCMCC under the Catchment Management Act (Booth *et al.* 1997).

Ineffective collaboration between state governments and communities

Doubts have also been expressed regarding how successful ICM processes have been at encouraging state government agencies to engage in authentic collaboration with communities in respect of environmental governance. One line of criticism relates to a perception that the agencies involved have failed to take seriously enough their commitments to collaborate with, or 'partner', communities in developing and implementing solutions to their environmental problems. Part of this criticism, alluded to previously, relates to administrators failing to appreciate what it takes for government to be accepted as a worthy partner by local communities and, conversely, what it takes to empower communities sufficiently that they can be accepted as worthy partners. Thus Jennings *et al.* (1999 p. 7) observed in the context of Australian regional planning:

For citizen empowerment to occur, there ... needs to be a culture of governments transferring power to citizens. This is often not the case with government professionals seeing few benefits in sharing power with those perceived as having limited skills and abilities in areas traditionally administered by professionals (see also Martin *et al.* 1992).

Lack of progress by the TCM program in improving collaboration between governments and communities has been attributed also to confusion regarding how these programs relate to the activities of Landcare and other types of local conservation-oriented groups (AACM *et al.* 1995a; Martin *et al.* 1992). It was observed previously that the NSW Government has regarded the activities of Landcare groups as important for translating the catchment strategies developed by CMCs into on-farm actions. Moreover, it was anticipated originally that administrative and technical support to Landcare groups would be provided largely through the TCM program. CMCs were also to ensure allocation of regional funds to on-ground activities (by Landcare or other local groups) according to priorities set out in their

catchment management strategies (Booth *et al.* 1992).

Landcare groups indeed have been relied upon heavily as a means of connecting CMCs with their constituencies (Curtis *et al.* 1998a). Nevertheless, it has been difficult to accommodate Landcare groups under a TCM umbrella in a way that does not make farmers feel that the Landcare program has become less responsive to its 'grass roots'. Perhaps this is because TCM, as a so-called community-based structure organised from the 'top down' instead of from the 'bottom up', has been viewed suspiciously by many rural people (Martin *et al.* 1992). In any case, a weakness identified in the ICM programs of all states has been the lack of attention paid to developing relationships between catchment committees and Landcare groups (and other local groups) (AACM *et al.* 1995b). Even so, the TCM program has been criticised for depending too much on Landcare groups as vehicles for achieving participation by the wider public in CMC deliberations, on the basis that "Landcare groups are not really representative of farmers in a local region" (AACM *et al.* 1995a p. 17).

Moreover, the heavy emphasis on Landcare groups as convenient vehicles for community participation has been questioned on the basis that communities differ in terms of participatory culture, and natural resource issues differ in terms of the nature of participation they would benefit from. Thus "'recipes' for participation are untenable ... Context is all important" (Bellamy *et al.* 1999 p. 350). Similarly, Dovers (2000a p. 7) criticised the lack of attention typically given to choosing from the many possible forms of participation when selecting "participatory pathways" under specific circumstances and for particular purposes.

Reluctance of administrators to devolve responsibilities to ICM committees has been blamed also on administrators lacking an appreciation of how long is required to achieve real community empowerment, and the benefits therefrom, and thus tending to force the pace of so-called participative processes (AACM *et al.* 1995a; Hollick 1992). Given this administrative culture, there has often been resistance to devolving real, rather than 'ceremonial', responsibilities and powers to community-based committees. This has, by discouraging wider community participation in collaborative processes set up by these committees (Hollick 1992), weakened efforts to empower communities in terms of their capacities for self-organised collective action. As a result of all this it has been suggested that:

... it is probably fair to say that the [Australian] ICM process has largely been driven by government institutions ... [Thus] programs such as ICM ... often have the opposite effect to that which they aspire to achieve. Many of these programs ... can reinforce notions that natural resource management issues

are taken care of by government programs ... (Price 1996 p. 33).

Indeed, programs predicated on the participation of local communities have proliferated at a time when there has been a tendency for their legal standing in natural resource policy deliberations to be downgraded (Dovers 2000a). Not surprisingly local communities have become increasingly distrusting of governments that talk about empowering them to play a greater role in environmental governance. Thus Dovers (*ibid.* p. 7) has cautioned that:

Community-government partnerships may turn sour if we do not extend and empower community engagement. Loss of political trust in Australia, weariness of chancy annual funding rounds, and a suspicion that community involvement equals government abrogation of duty will all take their toll. If we are serious about community engagement, then we must assure its position in the public policy landscape.

The problem of administrators misunderstanding the social requisites of the TCM program was identified in a national review of ICM programs as being serious enough to justify a “need to development training courses for middle management in natural resource management agencies. Integrated management skills rather than warm fuzzy thinking are needed” (AACM *et al.* 1995a p. 20). Likewise, Curtis *et al.* (1998b p. 37) identified as important the need to develop “an agency culture that supports community participation”.

Given Burton’s (1985 p. 82) comment that “if the community involvement programme is not taken seriously ... then it is not worth doing at all”, one might wonder why governments have continued to emphasise a role for community participation in ICM. Martin *et al.* (1992) suggested that the enthusiasm of politicians and administrators for community participation in environmental governance reflects partly an opportunistic strategy of seeking to shift from themselves some of the blame for persistent resource degradation. A further reason seems to relate to the Commonwealth’s policy of distributing Landcare funds according to a system based, at least in the first instance, on priority-setting of funding bids by regional communities. The regional-community-based structure of ICM programs satisfied this criterion at the same time as providing opportunities for state-level natural resource agencies to influence the funding deliberations of ‘tame’ community-based committees¹¹.

To some extent, therefore, ICM programs have allowed state natural resource agencies to co-opt for their own purposes a Commonwealth-imposed community-based system of

¹¹ In the final analysis the freedom of ICM committee members to resist such influence is limited by the knowledge that they owe their appointment to the Minister responsible for ICM and therefore at least partly to the administrators advising him or her.

resourcing conservation activities. Some idea of the success of this strategy is indicated by the estimate by Curtis (1998) that Victorian Government agencies at that stage had captured at least 60 per cent of Landcare funds allocated to north-east Victoria, as well as almost all Commonwealth funds provided through the Natural Resources Management Strategy of the Murray-Darling Basin Commission (also administered regionally through an ICM framework). According to Toyne *et al.* (2000 p. 10), manoeuvring of this kind:

... made it easier for State Governments to withdraw from regional Australia and from their traditional role of providing agricultural support. The Federal Government has provided funds for positions such as Landcare coordinators, allowing the State funded agricultural extension officers to be withdrawn.

Lack of progress in shifting farmers from an absolutist view of property rights

The lack of progress in ICM programs with gaining cooperation by farmers with proposals that they accept conditions on how they use their land provides a further illustration, and the last to be considered here, of the challenges that lie ahead in achieving agri-environmental sustainability through this approach. This is partly because, to a large extent, the economic interests of farmers have dominated ICM committees (Curtis *et al.* 1998b). For instance, in NSW there is the requirement in the Catchment Management Act that landholders comprise at least 50 per cent of the membership of CMCs and CMTs. Consequently, policies seeking to restrict farmer land-use rights are rarely given sustained consideration. It would appear that current approaches to ICM have served more to legitimise than to challenge the longstanding strong influence of the farming community over agri-environmental policy.

Conversely, the efforts of other citizen groups to become similarly empowered have been frustrated. Thus Jennings *et al.* (1999 p. 7) have observed that citizen groups who are already empowered tend to dominate Australian participative regional planning processes unless particular care is taken to design and apply such processes to give those currently with less political power “a voice in their future”. Accordingly, environmental groups have become increasingly pessimistic about TCM addressing their concerns. As a result, it has been observed that CMCs became increasingly regarded as just another lobby group. Hence in a national review of ICM it was found that the 50 per cent requirement of landholder representation on CMCs represents an “imbalance” (AACM *et al.* 1995a p. 21).

Consistent with this finding, Hooper (1999 p. 4) discovered from a survey of stakeholders in ICM programs underway in the Dawson Valley and Liverpool Plains that “[t]he current organisational structure for catchment management is questionable because of the

vested interests of participants”. Similarly, the recent *Report of the Inquiry into Catchment Management* (CoA 2000a p. 41) includes a comment that:

... there is a view among some areas of the community that catchment management organisations are elitist and removed from the community. For example, the Goulburn Valley Environment Group states that the interests of primary industry dominate catchment management in their region.

Existing ICM representation rules, while perhaps advantageous to farmers in the short term, are thus depleting the scarce goodwill available among the citizenry to search for a longer-term accommodation between agriculture and other interests that is sustainable both environmentally and economically. The following observation by Batie (1986 pp. 9-10) in respect of the USA would seem to apply equally to the Australian context:

... it is increasingly difficult to view agriculture as a ‘way of life’ that deserves to be held above the standards society demands of businesses. And today’s agriculture is undeniably a business.

Rather than empowering the citizenry in terms of self-reliance in avoiding further escalation of agri-environmental conflicts between farmers and others, existing ICM arrangements make it likely that solutions to these conflicts will in the foreseeable future continue to rely heavily on external intervention—especially provision of financial support channeled through cost-sharing mechanisms—by governments. This is particularly of concern given observations that, on current trends, the resourcing requirements of agri-environmental conservation will increasingly exceed the capacities of governments in Australia (Young 1997). As Conacher *et al.* (1995 p. 141) have observed: “... Australia is living beyond its means ... like the farmers, the country cannot afford the price [of agri-environmental conservation]”. Likewise, referring to the USA, Batie (1986 p. 10) commented: “If we’re realistic we must recognize that we’ll probably never have a cost-share program big enough to treat more than a small percentage of the nonpoint [agri-environmental] problems”.

Meanwhile, state governments have remained reluctant to intervene by way of imposing controls on farmers, perhaps fearing “that a regulatory approach to ICM could focus farmers’ energies on resisting interference by bureaucrats rather than on improved land management” (Hollick 1992 p. 51). Moreover, departments of agriculture or primary industry have remained strong advocates for the interests of farmers. For instance, Toyne *et al.* (2000) discussed how proposals for making Landcare funding conditional upon farmers accepting certain responsibilities in terms of sustainable use of their land (e.g., accept prohibition of broadacre clearing of remnant vegetation) were resisted by government agencies responsible for agriculture, whereas environmental agencies were more supportive.

Nevertheless, the wider public seems to increasingly regard government-agriculture ‘joint manoeuvres’ of this kind as a betrayal of the hopes held out to it that engagement of farmers in collaborative policy deliberations would lead them to cooperate more spontaneously by converting to sustainable land use practices. For instance, a recent editorial in the *Sydney Morning Herald* (Editor 2000 p. 8) remarked upon evidence that not one case of illegal land clearing had been prosecuted since the enactment of the NSW Native Vegetation Conservation Act, 1997, despite an estimated 270 breaches of the Act in that time. A spokesperson for the Minister for Land and Water Conservation (responsible for administering the Act) was reported as saying, on the basis that “you can work very co-operatively with landholders”, that the minister is not concerned about the lack of prosecutions. The editor’s retort was:

Well, yes, but that should not mean getting so cosy with [landholders] that an irresponsible minority can get away with acts of environmental vandalism. It is not acceptable for one class of law-breaker—some of whom live in electorally sensitive rural electorates—to be handled with co-operative kid gloves, while people accused of offending against other laws are taken before the courts.

Hence despite governments ostensibly converting to ICM approaches for environmental governance, their efforts to gain farmer adoption of conservation practices have continued largely to target farmer awareness and attitudes, complemented where necessary by financial inducements. Bradsen (2000 p. 295) has expressed disappointment accordingly that “what is viewed as a ‘new’ way of approaching land degradation, supplanting the ‘old’, is rather ... an entrenching of the reliance on non-obligatory responses”. Other commentators sharing this disappointment include Barr *et al.* (1992), Curtis *et al.* (1998a) and Vanclay (1995). On the other hand, Reeve (in press) has conceded some optimism that the transition in ICM programs to participative, or discursive, methods of raising awareness and changing attitudes might assist the evolution of norms that eventually bring about self-imposed restrictions by farmers on the property rights associated with their land ownership.

Comment

On balance, most ICM programs have fallen far short of satisfying the expectations raised at their inception, including in enhancing the degree to which stakeholders in agri-environmental problems are prepared to cooperate spontaneously in implementing solutions. Despite the hope originally held out by the NSW Government that the TCM program would promote self-help and thereby reduce the need for governments to “foot the bill for catchment protection” (Cunningham 1988 p. 43), for instance, the dependence of this

program on government funding is escalating rapidly.

Unless the public's mounting suspicions that voluntarist rhetoric has degenerated into a diversionary tactic are mitigated by evidence to the contrary, there may well be an enduring loss of the public goodwill required for collaborative approaches to succeed. The prospects of progress sufficient to provide such evidence appear remote unless the call by Bellamy *et al.* (1999)—for further development of the ICM approach to be grounded in lessons drawn systematically from past and current experiences with ICM, rather than remaining based on unquestioning acceptance of the approach's founding assumptions—is heeded as a matter of urgency.

2.5.6 *Recent developments in Australian ICM policy*

Meanwhile, governments in Australia have been responding to various concerns raised about ICM programs, including some of those discussed above. For the sake of brevity, the focus here is on the responses of the NSW and Commonwealth Governments.

1996 Review of Total Catchment Management

In 1996 the Minister for Land and Water Conservation instigated a review of the roles, functions, structure and operations of the TCM program “so that actions needed to strengthen its effective operation could be identified” (Department of Land and Water Conservation 1997 p. 1). Adroitly sidestepping the kinds of concerns discussed above, the review “confirmed that TCM plays key, unique roles essential to successful natural resource management in NSW” and maintained faith with “achieving positive management through the voluntary efforts of government and the community” (*ibid.* pp. 1, 4).

Although it was acknowledged that “some people” believe that CMCs and CMTs should be given legislative power to direct state government agencies, local government, and other groups, the emphatic conclusion was that this would “duplicate existing roles and confuse existing legislative accountabilities. The co-ordinating role of TCM bodies ... can be achieved using non-statutory means” (*ibid.* p. 5). As a result of the review, actions were recommended—involving clarification of protocols, guidelines and administrative processes—to enhance the ability of TCM to perform this co-ordinating function informally. For instance, the DLWC was to investigate options for promoting consistency and compatibility between the strategies of CMCs and CMTs, on the one hand, and the requirements of the EPA Act and the Local Government Act 1993, on the other. The set of

possible options included CMC representation on local government committees, as well as incorporation of relevant components of catchment management strategies in statutory planning instruments (including those provided for in the EPA Act).

The idea of incorporating aspects of CMC strategies in statutory plans seems to have signaled an incipient acceptance that legal formalisation of consensus-based catchment strategies might usefully complement efforts to promote spontaneous forms of cooperation. This nascent shift seems also to be reflected in the review advocating a “contractual approach to project implementation and program management ... ” (ibid. p. 4). This proposal was justified as follows: “TCM is based on a partnership between government and community. As TCM becomes more mature, efficient and equitable cost sharing arrangements which translate this principle into practice need to be developed and agreed upon” (ibid. p. 13).

A further finding from the review was that the problem of “confusion” about the roles of CMCs and CMTs *vis a vis* Landcare and other local action groups should be addressed by a community awareness program developed and implemented by the NSW Government and the SCMCC. Hence it seems that the view was taken that the structure of the relationship between these bodies is not itself confusing, but rather that the confusion arises only because the community has lacked an adequate understanding of the structure. In any case, the framing of this issue in terms of “confusion” failed to account for fundamental community suspicions of government motives for imposing their own administrative structures over the top of volunteer-based programs like Landcare.

The earlier-identified problem in NSW—of specific classes of natural resources being addressed by community-based processes independent of each other as well as the TCM program—was also addressed in the review. CMCs were to be recast as over-arching such single-issue processes and thus having a role of reviewing and providing advice to the Minister of Land and Water Conservation, through the SCMCC, “on matters such as whether plans developed by water, groundwater and vegetation management committees, for example, are consistent with the catchment management strategy and its intent” (ibid. p. 6).

Given the problems for inter-agency integration discussed earlier with respect to the DLWC being the lead agency for TCM, another notable recommendation from the review (administered by the DLWC) was that this arrangement be maintained. The reason given was that: “Continuation of this arrangement allows the expertise built up within the Department since the introduction of TCM to be used effectively ... ” (ibid. p. 15). Another reason might

be adduced from an observation made two years earlier regarding the TCM program: “There is strong agency rivalry about who should *own* catchment management” (AACM *et al.* 1995a p. 24, original emphasis).

Another interesting outcome given the earlier-identified problem of administrators lacking an understanding of the social requisites of effective TCM—and the associated suggestion that they undergo training in this respect—was the finding that skills training for CMC and CMT members is important for making TCM more effective. No equivalent finding was made with respect to administrators.

Catchment Management Committees replaced by Catchment Management Boards, 1999

The next major development in the TCM program was the announcement by the Minister of Land and Water Conservation in December 1999 that the CMCs in place at the time were to be replaced by 18 catchment management boards (CMBs). In explaining the need for the reform, a number of factors were identified as being responsible for why CMCs

... varied in achieving results:

- limited guidance and consistency in developing catchment management strategies;
- a lack of acceptance and official recognition of their strategies;
- limited capacity to have their strategies adopted by those responsible for action;
- in recent years, focussing on grant programs as the main tool for implementing their strategies; and
- a scale of operations which, for many issues, was too small to allow for serious consideration of the trade-offs necessary to achieve desired outcomes (Department of Land and Water Conservation 2000 p. 5).

The CMBs were expected to “draw on the valuable experience of the pioneering catchment management committees, while tackling natural resource management in a more focussed and outcome-oriented way” (*ibid.* p. 5). This move to a strategic planning framework was perhaps anticipated most notably in the 1995 national review of ICM strategies commissioned by the Commonwealth. There it was recommended that attention be “directed to priority issues and their solution, using effective stakeholder participation and priority ranking processes, rather than attempting to solve all problems simultaneously” (AACM *et al.* 1995b, p. 3 appendix A). Accordingly, it is acknowledged in the new NSW framework that the plans developed by CMBs will need to be modified over time as new information becomes available (Department of Land and Water Conservation 2000).

This seems to have been the first explicit recognition in official TCM documents of the need to shift from rational-comprehensive planning to adaptive management. In recent years a growing number of commentators on Australian policy processes for environmental governance have come to recognise that the largely prescriptive solutions emerging from the rational-comprehensive approach to planning are ill-matched to the complexity of an increasing number of issues arising in this area.

A consensus has been emerging that the appropriate paradigm for addressing such issues is one of adaptive management (Bellamy *et al.* 1999; Dovers 1997; 1999). From this viewpoint, strategy development is necessarily an emergent process (Bellamy *et al.* 2000). Policy interventions in social and natural systems are regarded as hypotheses to be tested and learned from. Adaptive management thus aspires to scientific rigour at the same time as recognising explicitly the contingencies inherent in the natural and social systems to which it is applied. Following Dovers (2000a p. 6), it seems that the hardest challenge to be faced by the TCM program in converting to this approach will be the cultural one of “accepting that what we do is experimental—we are taking just one step in the very long story of human settlement of Australia”.

Given the observations made earlier regarding the persistence of agrarian absolutism and progressivism within ICM programs, two comments regarding the stated functions of CMBs are pertinent here. Firstly, the placing of “support rural production” prior to “protect the environment” in functions (a) and (d) might reasonably be interpreted as signaling, albeit subtly, where the allegiance of the TCM program is likely to remain in cases where these two aspirations are at odds¹². Secondly, function (d) is concerned with developing greater understanding *only by the community* of what is required to effectively pursue the collaborative vision for environmental governance.

It is interesting too that the establishment of the CMBs seems to be associated with further developments in NSW Government thinking about how strategies emerging from the TCM program might usefully be complemented by statutory planning instruments. At the time of putting the CMBs in place, for instance, it was noted that the Water Act 1912, the EPA Act

¹² Section 7(1) of Catchment Management Regulation 1999, under the Catchment Management Act 1989, states that the functions of each CMB are “(a) to identify the critical opportunities, problems and threats associated with the use of natural resources so as to support rural production and to protect the environment” ... (d) to assist in developing a greater understanding within the community of the issues identified and action required to support rural production and protect the environment, ...”.

and other related Acts were under review. More specifically, it was signaled that: “More formal relationships between the various [catchment management] Plans and environmental planning instruments may emerge from these reviews” (Department of Land and Water Conservation 2000 p. 7 of introduction). Perhaps these developments will accord with the view of Farrier *et al.* (1999 p. 126) that “there is no reason why the environmental planning and catchment management systems [in NSW] should not complement each other, with environmental planning instruments providing the ground rules within which voluntary cooperative management can be taken”.

In setting up the CMBs, the informal social mechanisms underpinning them seem to have been addressed more substantively than was the case with the CMCs. Thus all CMB members have been equipped with a ‘support package’ that spells out their roles and obligations. For instance, board members are expected to:

- keep their constituents informed on the board’s deliberations and provide regular feedback to the board from them;
- represent the interests of the board on other community, industry and government committees with a focus on natural resources;
- participate in board discussions in a spirit of seeking consensus; and
- promote any consensus reached by the board to, and advocate its adoption by, other parties.

Social attributes identified as important for consensus-based decision making included: trust and respect among board members; responsible use of the power to oppose decisions; and emphasis on seeking positive-sum solutions wherever possible, rather than zero-sum solutions. Furthermore, each CMB is required *inter alia* to: develop and apply a communication strategy to inform, consult and educate the community about the board’s work; and develop ways of co-ordinating planning and action between the board and other parties contributing to environmental policy-making.

The attention to these social considerations represents a significant advance given the previous neglect of this area. Nevertheless, it will be interesting to monitor how well these considerations are addressed in practice. For instance, the persistence of the minimal requirement of 50 per cent representation of landholders—although additional selection criteria have been introduced in an attempt to obtain a more representative blend of members despite this constraint—makes it likely that landholders will remain more successful in

satisfying their sectional interests than other groups. Scepticism is encouraged too by the latest changes again disregarding calls to improve the 'social know-how' of government administrators involved in the TCM program.

Establishment of the Natural Heritage Trust (NHT)

In 1997, with about two years of the Decade of Landcare program left to run, the Commonwealth Government established the NHT with a contribution of \$1.25 billion over five years. The establishment of the NHT has been attributed to two main criticisms of the Decade of Landcare program.

The first criticism, largely from farmers, was that Landcare funds were being spent too much on planning, education and awareness-raising activities and not enough on directly financing on-ground conservation activity (AACM *et al.* 1995b). Consequently, the focus of the NHT is clearly oriented towards on-ground implementation (Curtis *et al.* 1998b). However, as Woodhill (1997 p. 2) remarked, the shift by the Commonwealth from a catalytic model of funding to an implementation model opened up "a can of worms".

Under the catalytic model, funds had been spread broadly in order to raise awareness and understanding of conservation issues as widely as possible across all landholders. The administrative complexities associated with allocating public funds according to anticipated public benefits, as well as ensuring accountability, were largely avoided by restricting Landcare expenditures on private land to activities with a very clear public benefit, such as demonstration projects or revegetation for biodiversity conservation.

In contrast, with an implementation model, public funds need to be targeted to achieve sufficient investment in particular locations to foster real momentum towards conservation. Hence funding requests need to be prioritised, and these priorities need to be justified. Where NHT funds are spent on private land, moreover, there is a need to ensure that they are used as authorised. In turn, there was heightened recognition of a need to "challenge the sacred cow of private property rights and the voluntary approach to action by landholders that has characterised ICM and landcare to date" (Woodhill 1997 p. 2). As a result there has been an attempt to make Landcare groups more accountable for the funds they receive, largely by imposing more rigorous application procedures. This has served to increase considerably the administrative load of these volunteer-based organisations (Curtis 1998). As Toyne *et al.* (2000 p. 8) have remarked, "... the acquittal requirements for funding today are rigid. The

most practical skill of Landcare members today is often their ability to write submissions”.

The Commonwealth has also sought through the NHT to strengthen accountabilities within funding processes by means of a Partnership Agreement¹³. This formalises the roles of RAPs and SAPs in evaluating and providing advice regarding NHT funding applications. A specific requirement is that RAPs assess funding applications according to integrated regional strategies. It is implied that these strategies need to be endorsed by the Commonwealth and the relevant state government. The RAPs and SAPs must have majority community membership and be chaired by a community representative. In response to these requirements, the state governments generally have supplemented their existing ICM structures (Gardner 1999).

The second criticism concerned “the compartmentalisation of Landcare funding into programs jealously administered by either the Federal agriculture or environment departments ... This led to complex and often overlapping applications by groups for funds” (Toyne *et al.* 2000 p. 8). The establishment of a Natural Heritage Board to allow administration of Commonwealth funding of environmental governance to be controlled jointly by the Commonwealth Ministers for Primary Industry and the Environment was meant to address this complaint (Papadakis *et al.* 2000).

Nevertheless, it seems that the potential of this administrative reform to streamline funding procedures has been frustrated by “the difficulty bureaucrats have in endorsing funding of works on private land. This has always encountered resistance within the [Commonwealth] Public Service, and particularly within Treasury” (Toyne *et al.* 2000 p. 8). Thus in recent years there has been a trend, encouraged by the agencies responsible for leading the ICM programs of the state governments, and partly in response to the increasing administrative burden faced by Landcare groups, for individual groups to become linked through so-called networks. Aside from providing economies of scale in meeting government demands for planning and accountability, formation of networks has helped individual groups to compete for funding, enhanced their impact on ICM committees and government, and strengthened their ability to disseminate information (Curtis 1998; Curtis *et al.* 1999).

¹³ See Gardner (1999) for a detailed account of arrangements for administering the NHT.

Aside from the administrative burdens imposed by the NHT program, other reasons given for its failure to achieve substantial on-ground improvements in critical areas (e.g., problems of vegetation clearing, salinity and water quality) have included:

- the continuing opposition by government agencies for agriculture or primary industry to proposals that on-farm activities be funded on the condition that recipients accept reciprocal responsibilities (Toyne *et al.* 2000);
- politicians seeking to gain electoral advantages by sharing NHT funds extensively rather than targeting them (*ibid.*);
- state governments engaging in ‘cost-shifting’, for instance by replacing state-funded agricultural extension officers with Commonwealth-funded Landcare co-ordinators (CoA 2000a; Toyne *et al.* 2000);
- lack of research to provide the information needed to determine how funds should be allocated to achieve objectives (Pannell *et al.* 1999a; Toyne *et al.* 2000).

In consequence, despite its much greater funding, fears have been expressed that the NHT initiative will achieve not much more than extend the successes of the Landcare program in terms of raising community awareness of natural resource issues (Toyne *et al.* 2000). The goal of the Landcare program itself—to achieve ESD on all farms within a decade—is now recognised by its original proponents to have been “hopelessly optimistic” (*ibid.* p. 6).

Towards a post-NHT national policy

With the NHT program due to end in 2002, deliberations are underway with respect to what will replace it. In December 1999, a steering committee comprising officials from the Commonwealth, state and local levels of government circulated the discussion paper *Managing Natural Resources in Rural Australia for a Sustainable Future* (CoA 1999). The paper provides official recognition that, despite the considerable escalation of funding for programs directed at this area since 1989, the rate of change in on-ground behaviour has been insufficient. Thus:

Despite extensive efforts and the successes to date, degradation problems persist in large areas of rural and regional Australia ... We now know that the decline in the condition of our natural resources in some areas is outstripping our efforts to counteract it using current approaches (CoA 1999 pp. 4-5).

In particular, the paper indicates that a major reason for this lack of on-ground progress has been the difficulty of achieving desired changes in on-farm behaviour. It signals, as follows, that considerable cultural change will be required for this obstacle to be overcome:

Quite fundamental changes in land use and management practices may be required at the farm level

and across regions in order to sustain an area's capacity for long-term sustainable production or to protect areas that are critical for other uses ... Changes in land use ... could still involve a difficult transition process that will need wider community support (CoA 1999 p. 6).

For instance, the paper presents a “vision of rural industries built on sustainable natural resource management” which includes “some farmers ... managing their properties for other values” and “landholders ... fully integrating environmental outcomes, including biodiversity conservation, into their business operations to complement public conservation reserve management” (CoA 1999 p. 9). It is observed that fundamental changes of this nature will not occur unless policy instruments are introduced that provide adequate financial incentives to landholders. That these incentives are likely to take the form of inducements, rather than punishments, is indicated by the “principle [that] governments will invest in activities to the extent that is sufficient to trigger the desired investment ... ” (CoA 1999 p. 30). This is consistent with the observation in the paper that:

As it is structured at present, agriculture in many parts of Australia is incapable of supporting the necessary level of investment in, for example, salinity prevention, and it cannot be assumed that voluntary responses under the current structure will make an appreciable difference (CoA 1999 p. 63).

Development of the ‘landcare ethic’ and ‘landcare movement’, and of landholders’ ‘capacity for natural-resource management’ through education and training, nevertheless is also emphasised in the discussion paper. Landcare groups would remain a “key delivery mechanism” for environmental governance programs (CoA 1999 p. 69).

Probably the most substantial change proposed in the discussion paper is that of “placing greater emphasis on packaged or block funding by governments to regions, to implement regional strategies ... developed by regional and catchment communities ...” (CoA 1999 p. 31). Governments would accordingly decide whether to fund a catchment strategy in its entirety, rather than specific activities within a strategy. This reform would require a catchment community receiving block funding to be accountable for implementing its strategy as authorised. Agreements would state the reciprocal obligations of all parties, including those in respect of sharing the costs of implementation. Release of funds would depend on progress in meeting strategy targets.

The discussion paper emphasises also the importance of nurturing the community capacity (designated as knowledge, skills and resources) required for this devolution to the regional level to be effective. It was anticipated that building the capacities of regional communities to this level might require a further 10-15 years. Organisational structures for community-

based regional management would be responsive to local natural and social conditions. It was suggested that in future we may see regionally-based organisations (possibly statutory) with responsibilities for environmental governance authorised to: borrow and to levy regional taxes and charges; make decisions about resource use and allocation; negotiate outcomes for inter-regional issues; and be the main vehicle for government funding of environmental programs.

It is pertinent to observe at this point that institutional arrangements approximating this model have been in place since 1996 within the LWMP program of NSW's central-Murray region. This program is the subject of the case study of collaborative agri-environmental governance undertaken for this thesis. An outline of the particular institutional arrangements introduced in that program is provided in section 6.5.

With designated Commonwealth funding for environmental governance coming to an end in 2002, there is keen interest in what will happen thereafter. After successfully lobbying together for the establishment of the Landcare program in 1989, the ACF and the NFF jointly-commissioned a study that quantified the investment required to conserve rural landscapes and the productive and environmental services they provide. Thus it was estimated that around \$7 billion in public and private investment will be required annually over a decade (Virtual Consulting Group and Griffin nrm 2000b).

Phillip Toyne and Rick Farley, who represented the ACF and NFF respectively in the 1989 negotiations, “find the basis for [the above] cost estimates convincing” (Toyne *et al.* 2000 p. 15). They have proposed that “a 1% National Landcare Tax should be imposed for the next ten years to raise funds in the order of \$30 billion. This is the government contribution indicated by the ACF-NFF study ... ” (ibid. p. 18). Nevertheless, under their proposal, in contrast to previous programs, funds would be provided to private landholders such as farmers only on the condition that they reciprocate by agreeing to a goal of sustainable land use and allowing monitoring of their progress against this goal. This idea of a national environmental tax was taken up in the more recent *Report of the Inquiry into Catchment Management* (CoA 2000a) prepared by the House of Representatives Standing Committee on Environment and Heritage—except that the proposed duration of the tax was extended to at least 25 years.

The Inquiry into Catchment Management was notable also for its advocacy of the Commonwealth Government exploring novel ways of providing leadership in respect of

catchment management. It contended that “Australians expect the Commonwealth Government to take a lead role” (ibid. p. 86), and that “successful co-ordinated national programs will occur only through Commonwealth legislation and facilitation” (ibid. p. 88). The Committee raised the possibility that achieving such co-ordination may eventually require the creation of a national system of environmental law, and towards this end recommended that the Commonwealth “ask and resource the Australian Law Reform Commission to examine the feasibility of, and options for, a national body of law to deal with the ecologically sustainable use of land ...” (ibid. p. 91).

The Committee went on to recommend that the Commonwealth work with the state and territory governments towards an agreement “that requires each jurisdiction to enact complementary legislation to establish an independent statutory authority, the National Catchment Management Authority ...” (ibid. p. 94). It proposed two primary purposes for this Authority: (i) facilitate the development and implementation of whole-of-catchment and catchment-region management plans and ensure that these plans are consistent with, and attain, national catchment management principles and targets; and (ii) act as a funding body for catchment plans by entering into partnership agreements with local bodies and organisations. It argued “that while the management of catchments should be consistent between jurisdictions, it is also the case that to be appropriate for any location, management must take into account the local conditions” (ibid. p. 97).

Significantly too, the Committee argued as follows that ICM should remain focussed on achieving desired behavioural change spontaneously:

The assumption underlying this approach ... is that the best outcomes will be delivered when Australians see the extent of the problems facing Australia’s catchment systems, the effect now and in the future on our lives, and as a result, voluntarily implement remedial action. ... Enforced compliance should be avoided. It should be reserved only for those cases where a particular outcome is required and all persuasive approaches have failed (ibid. pp. 79-80).

2.6 *Reconciling rhetoric and reality*

What is to be made of the apparent discrepancy in the foregoing review between the chorus of concern by commentators regarding the performance of ICM programs to date, on the one hand, and the outward confidence with which the NSW and Commonwealth Governments are proposing to devolve greater responsibilities to community-based catchment organisations, on the other? Woodhill (1997) has argued that this kind of Pollyanna response of governments to things failing to go as planned is consistent with analysis by Beck (1992; 1994) of the politics of ‘late modernity’.

Beck (1994 p. 5) has designated this epoch as that of a *risk society* during which “social, political, economic and individual risks increasingly tend to escape the institutions for monitoring and protection in industrial society”. Thus:

A revolution under the cloak of normality occurs ... The political institutions become the administrators of a development they neither have planned for nor are able to structure, but must nevertheless justify (Beck 1992 pp. 186-187).

Caught in this bind, Woodhill (1997 p. 4) argued that governments tend to use policy decisions as “charades of being in control. It is a brave government indeed ... that suggests to its voters that it does not have the answers ...”. Prior to the recent policy reviews and statements, he predicted correctly following this logic that governments in Australia would largely reject any notion that current policy directions in respect of ICM are inadequate. As he observed, governments are “ ... very happy to encourage the wider population to believe ICM and landcare has our natural resource degradation problems in-hand” (ibid. p. 1). Nevertheless: “Those in the thick of it know better” (ibid. p. 1) so the respite from public criticism is only temporary. The transition by governments to more collaborative modes of natural resource policy making—largely as a consequence of public pressure to extend to the environment more generally their natural rights to property under the terms of the Lockean social contract—was discussed previously in this chapter. Beck (1994 p. 19) has contextualised such transitions induced by public pressure as follows:

The themes of the future ... have not originated from the foresightedness of the rulers ... They have been put on the social agenda ... by entangled, moralising groups and splinter groups fighting each other over the proper way, split and plagued by doubts.

Consistent with Woodhill’s analysis, Pannell (2000 p. 3) has remarked upon the “spirit of forced optimism that still pervades most [Australian ICM-based] policy documents on salinity” despite strong evidence that an assumption pivotal to most such policies—that the

required investments in conservation practices will be undertaken more spontaneously by farmers as they become better informed about the salinity problem—is unrealistic. This charade, he concluded, is “highly counterproductive in policy realms” to the extent that it results in failure to deal with salinity problems realistically and honestly (*ibid.* p. 3).

This analysis is not inconsistent with assessments that there are many individuals within government agencies who are committed to the collaborative approach sought in ICM programs (e.g., AACM *et al.* 1995b). However, the persistent concerns regarding the performance of these programs do indicate that in most cases the partisan forces working against effective collaboration are stronger than those working towards it.

It can plausibly be argued that an important contributor to this retrograde state of affairs is that governments and community groups lack anything more than a simplistic appreciation of what is required to transform prevailing social dynamics into those that enable cooperation to occur more spontaneously among the various parties with a stake in an environmental problem. Thus Sturgess (1997a p. 34) observed that few government-community attempts at collaboration achieve what is expected from them “because of a lack of appreciation of the conditions necessary for success”. The Landcare program is a case in point, he argued, commenting that it “has not lived up to its potential”.

Midgley (1986 p. 16) has commented that many advocates of community participation share a romantic belief that “instinctive human capacities for communalism and participation will re-emerge when the corrupting influence of the state is removed”. Similarly, Fillion (1998 pp. 1101-02) has argued that proposals for community-based programs commonly neglect to consider how they can be actualised within the present economic and political context, thus giving them a “utopian flavour”. Consequently, as Owens (2000 p. 1141) has remarked, government-community collaboration “presents a more profound challenge than is sometimes acknowledged and, at present at least, remains largely aspirational”.

Aside from the ICM experience, there is ample historical evidence from elsewhere that success in building collaborative partnerships between governments and communities requires considerably more than rhetoric and goodwill. For instance, colonial attempts at community development by Great Britain and the USA in the 1950’s and 1960’s generally failed. After reviewing a range of such experiences, Midgley (1986) concluded that community initiatives supported by governments had rarely achieved successful community participation. Reflecting on this less than inspiring record, Shortall (1994 p. 250) argued that

what is crucial for success in community-based programs sponsored by governments is that proper consideration be given to the “means of advancing forward from previous problematic experience rather than pushing blindly ahead and trading on the positive connotations of the idea of participation”.

Given this record and the lack of convincing explanations for how future government-community collaborative efforts might be made more successful than those in the past, it is understandable why many senior administrators, even those sympathetic to the collaborative vision, would be cautious in investing resources and their professional reputations in its application. As we have seen, information-exchange, awareness-raising and education activities were already commonplace in pre-ICM programs targeting agri-environmental conservation—hence there were few problems in accommodating them within the new collaborative mode.

Nevertheless, the idea that collaboration of parties has the potential to enhance the social dynamics amongst them sufficiently that partisan strategies—like ‘turf warfare’, ‘cost shifting’, ‘blame shifting’, ‘vote buying’, ‘empire building’, unilateral lobbying of politicians, and so on—begin to be jettisoned in favour of cooperative strategies was quite different. Not only was it unfamiliar to most bureaucrats. It lacked a scientific rationale, and thus they were expected to embrace it as an ‘article of faith’.

In fact, neoclassical economics and the logic of the “tragedy of the commons” had provided logical support for the prognosis that spontaneous cooperation within a group of any significant size is improbable even with collaboration¹⁴. Considering how deeply contemporary bureaucracy is indebted to modern ideology for its inherited status, and the origins of that ideology in emphasising scientific logic over faith, its reluctance on balance to commit to aspects of collaboration lacking a scientific basis should not have been unexpected.

Bureaucratic appreciation of the social-dynamic concept of empowerment (or ‘capacity building’) thus remains influenced strongly by atomistic-mechanistic thinking which, as explained previously, views social properties atomistically—as nothing but the sum of the properties of individuals. In the current national-level deliberations regarding future governance of the rural natural environment, therefore, building ‘community capacity’ tends

¹⁴ As observed previously, this modern contention is often traced to Thomas Hobbes (1991/1651).

to be conceived only in individualistic terms—for instance, investing in leaders and champions, developing skills, and augmenting individuals’ access to the resources they need to undertake conservation activities (CoA 1999).

The official ICM rhetoric—which supposes that collaboration strengthens peer pressure in favour of parties cooperating spontaneously—nevertheless is predicated clearly on a proposition that social properties emerge from not only the properties of individuals but also the properties of the relationships they share. However, it appears from the foregoing review that governments, without a scientific understanding of how to actualise this proposition, by and large have been content to regard collaboration processes as opportunities for performing their traditional awareness-raising and education activities more effectively, thus accepting as windfalls any by-products of this in terms of peer pressure or other effects on social relationships.

Given that there is little to show from this *ad hoc* approach to activating cooperative social dynamics through collaboration, and the likelihood that bureaucracies will continue to resist investing systematically towards this end until convinced otherwise by scientific arguments, it would seem that social-scientific exploration of the potential of collaboration in this respect—particularly in the context of ICM—is long overdue. The urgency of knowledge of this kind would appear to be heightened by indications—in current deliberations regarding governance of the rural natural environment—that ICM-type community-based regional organisations may be devolved considerably greater decision-making authority within the foreseeable future. Unless this devolution of authority is based on a sophisticated appreciation of the undoubtedly complex interplay between hierarchy-backed cooperation and spontaneous cooperation, earlier fears that the capacity of ICM programs to promote spontaneous cooperation would be “killed” by such a strategy—due to communities and agencies coming to see them as just another layer of government (Booth *et al.* 1996 p. 28)—may well come to fruition.

2.7 *Concluding comments*

Given the rate at which estimates of government contributions required for resolving Australian agri-environmental problems are escalating, clearly there would be considerable savings if it were possible to cost-effectively develop a whole-of-society capacity supportive of these problems being handled more spontaneously—or, conversely, with less need for government intervention. Even movements at the margin in this regard—for instance,

farmers reducing by ten per cent their demands to be compensated for accepting conditions on how they use their land, or relevant government agencies spending twenty per cent less time pursuing partisan gains from turf warfare or cost shifting—would be likely to yield cost savings sufficient to warrant a substantial effort in identifying the conditions necessary for successfully promoting spontaneous cooperation through collaboration and then putting that knowledge to work.

Despite more than a decade of Australian experience with ICM programs, the feasibility of collaboration achieving such benefits in the contemporary social, political and economic context of these programs remains largely unknown. In part, this has been due to a failure to learn systematically from this experience. With the paradigm of adaptive management now gaining increasing credence in environmental policy circles, there are grounds for optimism that this problem will lessen in coming years. However, given that adaptive management uses policy interventions as hypotheses to be tested and learned from, theory from which these hypotheses can be deduced is also essential if adaptation according to this paradigm is to be more efficient than a process of randomly trying one policy option after another.

Therefore, as discussed in section 1.3, the primary aim in this thesis was to identify and elaborate such a theoretical framework. This task entails, firstly, understanding how cooperation occurs spontaneously. Secondly, it requires an understanding of the ways, if any, that governments and communities can use collaborative programs to allow the preconditions of spontaneous cooperation to be satisfied more comprehensively than would otherwise be the case.

PART II:

**TOWARDS A THEORY OF COLLABORATIVE
ENVIRONMENTAL GOVERNANCE**

3. COMPARATIVE STATICS OF COLLECTIVE ACTION

3.1 *Introduction*

This is the first of three chapters reviewing what literature from rational-choice traditions in the social sciences can contribute to understanding the nature of collective action, how it arises spontaneously, and how collaborative governance might promote spontaneous collective action. In this chapter, a start is made in this task by exploring the contribution of the comparative-static theoretical framework of mainstream microeconomics to elucidating these issues.

The exploration commences in section 3.2 with a consideration of seminal insights from neoclassical economics and non-cooperative game theory. Contributions from the influential Pigovian (‘market failure’) tradition of neoclassical thought are then surveyed in section 3.3. Limitations of Pigovian analysis as identified by neoclassical economists are considered in section 3.4. This leads into a discussion in section 3.5 of relevant aspects of neoclassical property-rights theory. Some concluding comments are presented in section 3.6.

3.2 *Early contributions to a rational-choice theory of collective action*

The neoclassical and game-theoretic origins of contemporary rational-choice theories of collective action are surveyed in this section.

3.2.1 *Neoclassical origins*

Mancur Olson’s (1965) *The Logic of Collective Action* is widely regarded as the seminal work for the development of rational-choice theories of collective action. In the previous chapter it was observed that policy deliberations regarding collaborative environmental governance have assumed that parties will cooperate spontaneously in solving a common problem once they become aware that they would be better off collectively as a result. In fact, it was the prevalence of this kind of reasoning—which had become a “cherished foundation of modern democratic thought” (Ostrom 2000a p. 137)—in the social sciences, including economics, sociology and political science, that motivated Olson to write his book.

He characterised this way of thinking as follows:

It is often taken for granted, at least where economic objectives are involved, that groups of individuals with common interests usually attempt to further those common interests ... In other words, if the members of some group have a common interest or objective, it has been thought to follow logically that the individuals in the groups would, if they were rational and self-interested, act to achieve that objective (Olson 1965 p. 1).

The flaw in this logic he identified as being the fact that other individuals in a group cannot be kept from appropriating a collective good once any individual in the group has provided it for himself or herself. In other words, “there is an externality inherent in all collective good situations, in that each individual’s provision of any amount of a collective good would confer some benefit to others” (Olson’s foreword to Sandler 1992 p. xiii).

An externality arises when the actions of one independent economic agent hold uncompensated implications for another. If those costs are transmitted via physical media rather than via prices, they are known as ‘technological externalities’ (Bromley 1989). An externality is regarded as ‘Pareto relevant’ when it is possible to modify the activity generating it so that a ‘Pareto improvement’ is the result. This is the case when the status quo is not already ‘Pareto efficient’¹⁵—a situation in which it is “impossible to make anybody better-off without simultaneously making at least one person worse-off” (Randall 1981b p. 113). Hence it is apparent that in identifying externalities as the reason for a logical flaw in ‘taken for granted’ reasoning, Olson was thinking specifically of Pareto-relevant externalities.

Olson (1965 p. 48) reasoned that, all else equal, the externality problem inherent in providing collective goods becomes more serious with increasing group size:

... the larger the group, the smaller the fraction of the total group benefit any person acting in the group interest receives, and the less adequate the reward for any group oriented action, and the farther the group falls short of getting an optimal supply of the collective good, even if it should get some.

It followed that large groups would be less likely to successfully further their collective interests than small groups. In addition, he identified two further reasons why successful collective action becomes less likely to occur spontaneously as group size is increased (ibid. p. 48). Firstly:

¹⁵ Pareto-efficiency represents a general equilibrium, or Walrasian, conception of allocative efficiency. Allocative efficiency refers to the efficiency with which productive resources are distributed among alternative uses so as to produce the optimal

... since the larger the group, the smaller the share going to any individual, or to any (absolutely) small subset of members of the group, the less the likelihood that any small subset of the group, much less any individual, will gain enough from getting the collective good to bear the burden of providing even a small amount of it ...

In other words, the chance of a group being “privileged”—such that “each of its members, or at least some of them, has an incentive to see that the collective good is provided, even if he has to bear the full burden of providing it himself”—would decline as group size increased (ibid. p. 49). The idea of groups being privileged followed from the observation that individuals with a greater interest in seeing a collective good provided typically bear “a disproportionate share of the burden of providing the collective good” (ibid. p. 35). Based on this observation, other economists coined the expression ‘free riding’ to denote a situation in which group members with less interest in a collective good stint in their own provision efforts in an expectation that other members with a greater interest will make up the shortfall (Sandler 1992).

The second reason offered for an inverse relationship between group size and the chance of success in spontaneous collective action was:

... the larger the number of members in the group the greater the organization costs, and thus the higher the hurdle that must be jumped before any of the collective good at all can be obtained (Olson 1965 p. 49).

These organisation costs include the costs of communication, bargaining and agreeing among group members and the costs of establishing and maintaining any formal group organisation. They are distinct from the costs of providing the collective good that would remain even if the good were provided unilaterally by an individual.

The reference above to an organisational ‘hurdle’ that becomes more formidable as group size expands was explained by Olson as follows. As the number of group members grows, the number having to be included in the group agreement or organisation can be expected to increase, and the cost of organisation is therefore likely to be higher as a result. Since a group with a given number of members must have a certain minimal level of organisation if it is to have any at all, and this minimal level is likely to increase with group size, the absolute cost of providing the first unit of a collective good (assuming it is divisible) will be greater for a larger than a smaller group.

mix of output. It is distinct from technical or productive efficiency which refers to the use of resources so as to obtain the maximum possible output(s) from a given set of inputs (Wallis *et al.* 1999).

Olson (1965 p. 2, original emphasis) thus concluded—in terms now characterised as “the zero contribution thesis” (Ostrom 2000a p. 137)—as follows:

If the members of a large group rationally seek to maximise their personal welfare, they will *not* act to advance their common or group objectives unless there is coercion to force them to do so, or unless some separate incentive, distinct from the achievement of the common or group interest, is offered to the members of the group individually on the condition that they help bear the costs or burdens involved in the achievement of the group objectives.

As he pointed out, this finding is all the more powerful given that it is based on an assumption that there is already perfect consensus within the group about what is wanted and how it should be achieved. Olson commented that it had been assumed typically (although often implicitly) that the most important determinant of group action is the degree of agreement in respect of these pivotal issues. Although he acknowledged that perfect consensus is very rare, he went on to argue that:

... if voluntary, rational action cannot enable a large, latent group to organize for action to achieve its collective goals, even with perfect consensus, then *a fortiori* this conclusion should hold in the real world, where consensus is usually incomplete and often altogether absent (Olson 1965 p. 60).

Given the importance of group size to his analysis, Olson proposed a tripartite taxonomy of groups according to this dimension. The first type of group is the *privileged* group already mentioned. Such a group is the smallest of the three types of groups, and there is a presumption that the collective good will be provided¹⁶. The second type is the *intermediate* group—which is too large to be privileged but not so large that “no one member will notice whether any other member is or is not helping to provide the collective good” (ibid. p. 50). It is possible for this type of group to self-provide a collective good, he reasoned, but only if it first provides itself with some group co-ordination or organisation.

The third type of group he called the *latent*, or large, group. This kind of group is sufficiently large that the contribution by any individual member to providing the collective good makes no discernible difference to the aggregate level of provision perceived by any other member. Hence, he argued, no one in such a group will react positively if a member makes a contribution, or negatively if no contribution is made—and consequently there is no incentive whatsoever for any single member to contribute. In aggregate, therefore, there would be zero contribution to providing the collective good.

¹⁶ Nevertheless, groups differ significantly in how large their membership can become before they cease to be privileged. For instance, whereas a group attracting wealthier members (e.g., addressing the concerns of medical practitioners) might

In the case of a latent group, therefore, Olson (ibid. p. 51) concluded that rational individuals would contribute to achieving their group interests only to the degree that they are induced to do so by being subjected to “selective incentives”—selective in the sense that individuals who do contribute are treated differently from those who do not. Selective incentives can be either positive or negative, “in that they can either coerce by punishing those who fail to bear an allocated share of the costs of the group action, or they can be positive inducements offered to those who act in the group interest” (ibid. p. 51). A latent group thus ‘activated’ by selective incentives to behave cooperatively was referred to as a *mobilised latent group*¹⁷.

Due to the size of a latent group, Olson argued, selective incentives can be provided only if there is an organisation to do so. However, given the earlier observation that the ‘hurdle’ of meeting the costs of establishing and maintaining an organisation increases with group size, and that provision of selective incentives is itself a (second-order) collective good, he concluded that a latent group—unlike an intermediate group—would be unable to provide itself with this organisational capacity. Moreover, he reasoned that its largeness makes it unlikely that it would have self-organised already for some other purpose and thus be able to provide selective incentives with little additional cost. For large groups, therefore, it follows that the only way out of this infinite regress is to depend on provision of selective incentives being organised by some external party.

Olson maintained that his findings with respect to privileged, intermediate and latent (large) groups are, if anything, only strengthened once incentives other than ‘economic’ (meaning *non-pecuniary* in this specific context)—for instance, social, moral, psychological and erotic incentives—are accounted for. Of relevance for the emphasis of programs such as ICM on generating peer pressure, for instance, he recognised the potential for “social pressure” to be effective amongst a group of friends in encouraging each of them to contribute to realising a group goal, “for everyday observation reveals that most people value the fellowship of their friends and associates, and value social status, personal prestige, and self-esteem” (ibid. p. 60). He argued that social incentives like these are selective incentives like any other since they discriminate between individuals: “The recalcitrant individual can be ostracized, and the cooperative individual can be invited into the center of the charmed circle” (ibid. p. 61).

remain privileged with a relatively sizeable number of members, a group attracting poorer members (e.g., attending to the concerns of buskers) may cease being privileged well before its membership reaches the same level.

¹⁷ Olson (1965 p. 51) explained his choice of terminology as follows: “Large groups are thus called ‘latent’ groups because they have a latent power or capacity for action, but that potential power can be realized or ‘mobilized’ only with the aid of ‘selective incentives’”.

Thus, he concluded, there are two reasons why social incentives will not promote cooperation within large, latent, groups. First, with this type of group each member is so small in relation to the total that “his actions will not matter one way or the other; so it would seem pointless for ... a member of ... [a] latent group ... to snub or abuse another for a selfish, antigroup action” (ibid. p. 62). Second, in a large group it is not possible for all of its members to know everyone else. Most interactions will be between relative strangers at best. As a result the social position of members ordinarily will not be affected by whether or not they contribute towards their group’s goals.

Olson recognised that these impediments to efficacy of social incentives in a large group might nevertheless be mitigated somewhat if it is structured as a “federal” group—“a group divided into a number of small groups, each of which has a reason to join with the others to form a federation representing the large group as a whole” (ibid. p. 63). He proposed that if the federated (i.e., central) organisation provides services to the small constituent organisations, it may be able to exercise social incentives to help induce members of the small groups to contribute toward the collective good of the whole group. Nevertheless, he concluded that social incentives are important primarily in small groups.

In closing this review of Olson’s pathbreaking contribution, one further observation is pertinent. He stressed that his concept of a latent group “does *not* necessarily assume the selfish, profit-maximizing behavior that economists usually find in the marketplace” (ibid. p. 64, original emphasis). The concept is valid irrespective of whether behaviour of group members is selfish or selfless, he argued, provided that their behaviour is rational—“in the sense that their objectives, whether selfish or unselfish, should be pursued by means that are efficient and effective for achieving these objectives” (ibid. p. 65). Thus:

Even if the member of a large group were to neglect his own interests entirely, he still would not rationally contribute toward the provision of any collective or public good, since his own contribution would not be perceptible ... Selfless behavior that has no perceptible effect is sometimes not even considered praiseworthy. A man who tried to hold back a flood with a pail would probably be considered more of a crank than a saint, even by those he was trying to help (ibid. p. 64).

A rational person would not, he argued, make a “futile and pointless sacrifice” (ibid. p. 64). Philanthropy or other forms of altruism, for instance, would rationally be allocated in order to benefit others perceptibly.

3.2.2 *Game-theoretic origins*

Olson's neoclassical logic of collective action has had a profound and lasting impact, for instance in the study of trade unions, military alliances and environmental conservation (Sandler 1992). Nevertheless, subsequent reformulation of this logic in game-theoretic terms has enriched greatly the original insights. For the purposes of game theory, a game is being played by a group of individuals whenever the outcome for an individual in the group depends not only on his or her own game-playing strategy, but also on the strategies of the rest of the individuals in the group (Binmore 1993).

The form of game theory predominantly used for studying collective action is 'non-cooperative' game theory. This form assumes, as does neoclassical economics, that individuals rationally seek to maximise their self-interest. More specifically, individual players of non-cooperative games are assumed to negotiate over, and abide by, agreements to cooperate only if it furthers their self-interest (Shubik 1964). Nevertheless, consistent with Olson's approach, non-cooperative game theory does not necessarily define self-interest narrowly (i.e., restrict it to material and selfish concerns).

An early impediment to development of non-cooperative game theory—inability to solve for the equilibrium of a non-cooperative game—was overcome by Nash (1951) with his now-famous Nash equilibrium concept. A combination of various players' strategies is in Nash equilibrium if no player has an incentive to deviate from his or her strategy given that no other player(s) deviate (Sexton 1994). There is also a second solution concept for non-cooperative games. A dominant-strategy equilibrium exists if no-one can become better off by changing strategies, regardless of the strategies chosen by other players. A dominant-strategy equilibrium is always also a Nash equilibrium, but the converse need not apply (Lichbach 1996).

Non-cooperative game theory thus accords with Olson's insight that rationality of all members of a group is not sufficient to guarantee that their contributions to a group will be collectively rational. That is, the Nash equilibrium of a non-cooperative game may yield an outcome that is less than optimal for all players. Individuals face a dilemma where this is the case, variously known as the 'cooperator's dilemma' (ibid.) and the 'social dilemma' (Ostrom 1998a). Although there are many types of such dilemmas, the 'prisoner's dilemma' is regarded as their canonical formulation (Lichbach 1996).

The following account of a prisoner's dilemma game is based on Axelrod (1984). There are two isolated yet interdependent players who each are faced with a single decision. That is, each must choose whether to act in accord with the interest of the other player (i.e., cooperate) or to act against the interest of the other player (i.e., defect). Each must choose without knowing what the other will do. There is no mechanism available to the players to make enforceable threats or commitments. Nor is there any way to eliminate the other player or to leave the game without making a choice. There is no possibility of changing the game's pay-off matrix. Finally, the pay-offs incorporate whatever 'other-regarding' consideration each player has for the welfare of the other. In short, the players cannot escape from the fact that they are in an interdependent situation in which they must act independently (Ostrom 1990). The resulting game can be illustrated using figure 3.1.

Figure 3.1: Payoff matrix for a two-player prisoner's dilemma game

		<i>Column Player</i>	
		<i>Cooperate</i>	<i>Defect</i>
<i>Row Player</i>	<i>Cooperate</i>	$R = 3, R = 3$ Rewards for mutual cooperation	$S = 0, T = 5$ Sucker's pay-off, and temptation to defect
	<i>Defect</i>	$T = 5, S = 0$ Temptation to defect, and sucker's pay-off	$P = 1, P = 1$ Punishments for mutual defection

The 'row-player' must choose either the 'cooperate' or the 'defect' row at precisely the same time that the 'column-player' chooses between the 'cooperate' and 'defect' columns. With each player having two choices, there are four possible choice-combinations. If both decide to cooperate they each do fairly well, obtaining the *reward for mutual cooperation* ($R = 3$ points). When one player cooperates while the other defects, the defecting player earns the *temptation to defect* ($T = 5$) and the cooperating player receives the *sucker's pay-off* ($S = 0$). If both defect, they each get the *punishment for mutual defection* ($P = 1$). For the game to be a prisoner's dilemma, the four payoffs must follow a particular order. The temptation to

defect must exceed the reward for mutual cooperation, which must exceed the punishment for mutual defection, which must exceed the sucker's pay-off¹⁸.

Each player is assumed to be self-interested (broadly so if they are concerned with the implications of their play for the other's welfare) and therefore to make the choice that yields the most points personally. If the column-player cooperates, the row-player gets three points if she also cooperates but five points if she defects. Thus defecting is better for the row-player in this case. If the column-player instead defects, the row-player gets zero points if he cooperates but one point if he defects. Thus defecting is better for the row-player in this case as well. Defecting is in fact the best strategy regardless of the choice of the column-player. Since the same reasoning applies to the column-player, he will also choose to defect.

Individual rationality thus leads to mutual defection and each receiving only one point each (i.e., two points collectively). This is a dominant-strategy equilibrium since defection is the optimal strategy for each player regardless of the other player's choice. However, mutual cooperation is the collectively-rational (i.e., Pareto-efficient) outcome, yielding six points collectively (i.e., three points for each player), compared with five points collectively for each of the remaining two choice-combinations. Individual rationality thus leads to a Pareto-inefficient outcome—both players would be better off if they cooperated and no-one would be worse off.

Hardin (1971; 1982) soon demonstrated that Olson's collective-action logic has the structure of a prisoner's dilemma generalised to n persons (n defines the size of the group, so $n = 2$ in the canonical case). With the prognosis of an n -prisoner's dilemma just as pessimistic as that for the two-person version, Olson's prediction that individuals in large groups would not spontaneously make positive contributions toward the good of their group was widely regarded as confirmed. Although Olson concluded only that a large group will not achieve its collective goals unless its members are subjected to selective incentives introduced by *some external organisation*, the continuing hold of the progressive liberal view—that it is better to govern 'the mob' than empower it to govern itself—meant that there was little consideration at that time over whether the requisite external organisations should be civil rather than governmental.

¹⁸ Aside from satisfying this ordering requirement, therefore, the numerical values in figure 3.1 are illustrative only.

3.3 *The Pigovian neoclassical tradition*

This progressive view was clearly evident in the Pigovian tradition that remained dominant among neoclassical economists during the 1960's and 1970's. This tradition has its origins in Adam Smith's insight—in his *Inquiry into the Nature and Causes of the Wealth of Nations* published in 1776—that individuals maximising their self-interest in market transactions would, under certain conditions, act as if an “invisible hand” were guiding them to contribute to the collective good. How this tradition influenced the thinking of mainstream economists about collective action is the subject of this section.

3.3.1 *Perfect competition, markets and private goods*

With the publication of Arthur Pigou's *Economics of Welfare* in 1912, economists turned to specifying more rigorously the nature of the conditions required for pursuit of self interest by individuals to coincide with their collective interest. These became known as the conditions of ‘perfect competition’—that is, conditions of static equilibrium that are necessary and sufficient for market exchanges to achieve Pareto efficiency. In such a state of equilibrium, ratios of marginal costs equal output price ratios in all areas of production, and these same price ratios equal marginal rates of substitution in all areas of consumption (Marshall *et al.* 1986). Although theoretically this outcome can be achieved too with perfect central planning, neoclassical welfare economics chose perfect competition as its theoretically-based benchmark against which to assess arguments to intervene in the workings of the “invisible hand” (i.e., by introducing various kinds of selective incentives including regulations, taxes, subsidies and so forth).

Real-world failures to satisfy conditions of perfect competitiveness thus became designated as ‘market failures’. Identification of such failures became economists' primary method of assessing whether intervention in markets, presumed to be by governments, could be justified by the standard of Pareto efficiency. The efficiency losses, and associated ‘resource misallocation’, associated with market failure are analysed using the method of comparative-static equilibrium analysis, more commonly referred to as ‘comparative statics’¹⁹. It is relevant to note at this stage two assumptions implicit in this ‘market-failure approach’. First, governments are presumed to have both the motive and means to intervene so as to correct

¹⁹ This approach is sometimes referred to also as ‘statical analysis’. See section 4.2.3 for further discussion of the nature and limitations of this method.

the market failure and thus restore Pareto efficiency. Second, the costs of intervention are assumed to be small enough relative to its benefits that they can be ignored.

3.3.2 Externalities

Among other conditions, perfect competition requires that markets exist for all goods which have an economic value (Cornes *et al.* 1996). Arrow (1970) demonstrated that Pareto-relevant externalities²⁰ arise when markets are absent. The Pigovian tradition identified externalities of this kind as the main source of market failure with respect to the natural environment. Markets exist only for goods that are excludable. A good is excludable to the extent that its owner can exclude others from its appropriation. The feasibility of exclusion depends on the availability of an exclusion technology and on its cost of application (Lichbach 1996). Although there are other important sources of market failure, including monopoly and incomplete information, externalities attributable to the non-excludability of many environmental goods have been regarded—particularly by ‘resource’ or ‘environmental’ economists using the market-failure approach—as an important cause of Pareto-inefficient appropriation and provision of these goods (e.g., Wills 1997).

Externalities vary in the degree to which they can be reciprocated or, in other words, are ‘symmetric’. Hence they have been classified as symmetric and asymmetric (Stevenson 1991) or, equivalently, as reciprocal or unilateral²¹ (Quiggin 1986). In the case of a symmetric externality, the economic activity of one party affects the utility of other parties, but it is also possible for other parties to reciprocate. Symmetric externalities occur most frequently where all appropriators of a good have similar reasons for utilising the good (Stevenson 1991).

However, unless qualified, the term *externality* is normally understood as an asymmetric externality. This kind of externality occurs where there are essentially different classes of appropriators. For instance, water pollution represents an asymmetric externality where one set of appropriators exploits a lake as a sink for pollutants and another set of appropriators uses the lake as a source of drinking water or recreation. The economic activity of one party thus affects the utility of one or more other parties without a risk of reciprocation (*ibid.*). The Pareto-efficiency implications of an asymmetric externality, in this case an external cost, are illustrated in figure 3.2.

²⁰ For the sake of brevity, the word *externality* will hereafter be used as ‘shorthand’ for *Pareto-relevant externality*.

²¹ Reciprocal externalities are alternatively known as congestion externalities (Quiggin 2001).

Figure 3.2: Pareto-efficiency implications of an asymmetric externality

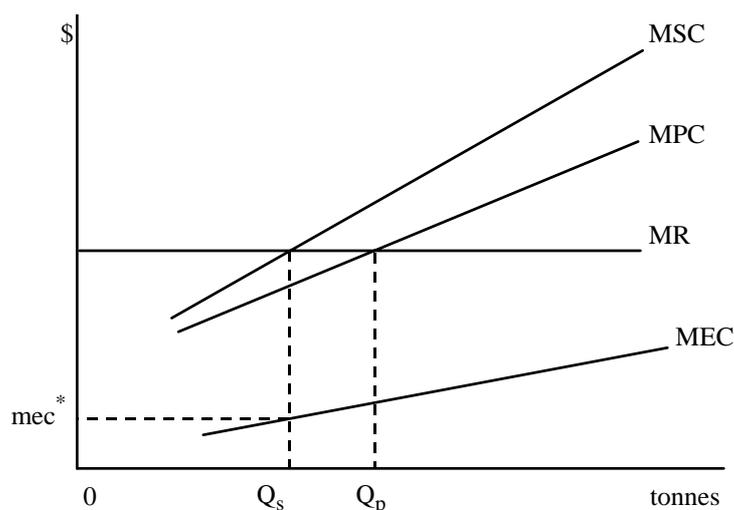


Figure 3.2 depicts the circumstances of, say, a wheat grower. The demand for wheat is assumed to be perfectly elastic, so the demand for wheat is depicted as a horizontal marginal revenue curve, denoted by MR . The private marginal cost to the grower of wheat is depicted as MPC . The farmer, assumed to be a profit-maximiser, would choose the output level Q_p at which MPC equals MR . However, non-symmetric external costs arise from environmental degradation (e.g., soil erosion causing downstream sedimentation) caused by growing wheat.

These external costs are relevant to society, even if they are not for our profit-maximising farmer. The marginal external cost curve is depicted as MEC . The social marginal cost curve, depicted as MSC , is obtained from the vertical summation of the MPC and MEC curves. The socially-efficient level of output is Q_s , where MSC is equal to MR . It is evident that the non-symmetric externality causes wheat production to exceed the socially-efficient level by Q_p minus Q_s tonnes. Notice that some external costs remain even if the socially efficient level of production is attained. The marginal cost of this Pareto-efficient level of externality is shown as mec^* .

3.3.3 *Pure public goods*

Aside from the excludability of goods, economists are also interested in the degree to which rivalry occurs in its appropriation. A good is said to be rival if appropriating units from it means that the amount that can be provided subsequently is less than would otherwise be the case (Tietenberg 1996). Nowadays, economists tend to refer to goods that are completely excludable and rival as ‘private goods’ and to all other goods as ‘public goods’.

Although Adam Smith acknowledged in the *Wealth of Nations* that markets would fail in providing certain types of public works because the profit to any individual would not repay the personal expense, Samuelson (1954; 1955) was the first to provide an economic theory of public goods. He defined a public good as a good which is completely non-rival and completely non-excludable. Such a good is now called a *pure* public good. A classic example is a lighthouse. Goods that are less than completely non-excludable or non-rival are generally referred to as *impure* public goods. This class of goods is considered further in section 3.3.4.

Provision of a good entails one or more of producing, restoring or maintaining it (Ostrom 1990). This is a trivial social problem in the case of private goods because, firstly, complete rivalry means that a potential for all benefits to be captured privately exists and, secondly, complete excludability allows this potential to be fully exploited. A possibility that external benefits from provision will cause market failure does not exist.

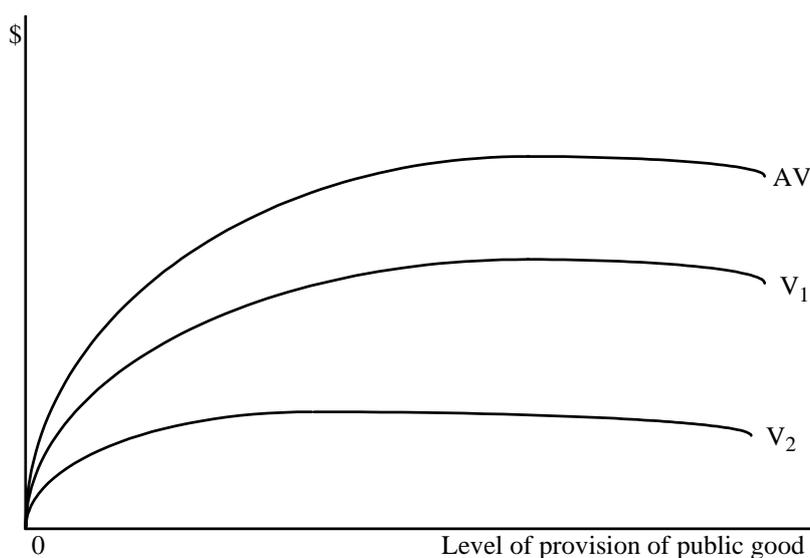
With a pure public good, in contrast, non-excludability and non-rivalry usually create a non-trivial social dilemma²². The reason is that non-rivalry makes it impossible for the provider of a good to appropriate all the units provided, and non-excludability makes it difficult to require non-providers to offer compensation for their appropriation of the surplus units. Any individual's contribution towards provision of a pure public good will therefore generate symmetric spillover benefits for others—which neoclassical economists typically presume to be externalities²³. Mueller (1989 p. 11) described the resulting social dilemma in terms of non-rivalry being “the carrot, making cooperative-collective decisions beneficial to all” and non-excludability being “the apple tempting individuals into independent noncooperative behavior”.

Following Randall (1981b pp. 180-184), the comparative statics of pure public good provision are illustrated in figures 3.3 and 3.4.

²² However, for some pure public goods (e.g., sunshine) there is no dilemma because they are provided automatically irrespective of what humans do. Nevertheless, in most instances, human intervention in some facet of public good provision is required. In the case of a wilderness area, for example, intervention is usually required to sustain the provision of the good (e.g., by protecting the area from human poaching of rare animals and from invasion by non-indigenous fauna).

²³ That is, neoclassical economists typically presume that rational self-interest precludes beneficiaries of symmetric spillovers spontaneously compensating the individuals responsible for them, for instance by reciprocating the favour.

Figure 3.3: Effect of provision on the value of a pure public good

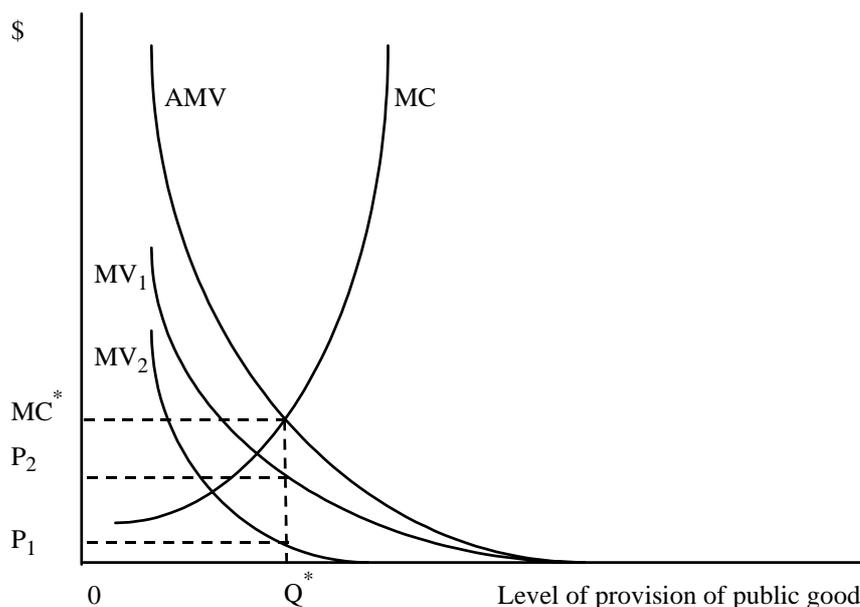


In the case of a pure public good, individuals are not confronted, as they are with a private good, with a choice of how many units to purchase at a given unit price. Consequently, the concept of a demand curve is not applicable. Instead, each prospective appropriator must decide how much he or she values each level of provision of the good. That is, the value of the utility that any individual receives from a pure public good is a function of how much of the good is provided in aggregate (Randall 1981b). Let us assume that only two individuals would obtain value from a particular pure public good. Their respective value curves are depicted in figure 3.3 as V_1 and V_2 . These curves indicate that the individuals obtain diminishing marginal utility from additional increments of the public good. The aggregate value obtained from any level of provision of the good is given by adding the value accruing to each individual. Hence the aggregate value curve, depicted as AV , is derived by vertical summation of the value curves of the two individuals.

Curves representing the marginal value of increments of provision can be derived for each individual by taking the first derivative of their respective value curves. These curves are depicted in figure 3.4 as MV_1 and MV_2 , respectively²⁴. The aggregate marginal value curve, depicted as AMV , can be derived either by vertical summation of the two individuals' marginal value curves or by taking the first derivative of the aggregate value curve. This aggregate marginal value curve can be considered as analogous to the industry demand

²⁴ The scales of the vertical axes for figures 3.2 and 3.3 obviously differ.

Figure 3.4: Efficient provision of a pure public good



curve for a private good. The difference is that an industry demand curve for a private good is derived by horizontal summation of individuals' marginal value curves.

The efficient level of provision of the pure public good is given by the intersection of the AMV curve with the curve, depicted as MC , representing the marginal cost of additional increments of provision. Thus the efficient level is Q^* , at which the marginal cost of provision is MC^* . However, this efficient level does not represent a Pareto-efficient equilibrium unless, for each individual, the marginal value and marginal cost of provision are equal. It is apparent from figure 3.4 that this is the case only if the first individual incurs the cost P_1 for her appropriation and the second incurs the cost P_2 for his appropriation. Pareto-efficiency in an economy therefore requires some way of ensuring that costs of providing all public goods are allocated among their respective appropriators according to this rule.

According to Olson's neoclassical logic outlined in section 3.2, this could only be achieved by organisation/s external to appropriator groups achieving this cost apportionment by means of imposing selective incentives. Again, Pigovians would presume that governments perform this function. Nevertheless, this kind of externally-imposed solution has generally proven to be infeasible. This is primarily because in practice governments, or any 'outsiders' for that matter, find it difficult to establish the position of each potential appropriator's MV curve and, thus, the AMV curve. This follows from appropriation of pure public goods being non-rivalrous. Thus "it is in the selfish interest of each person to give false signals, to pretend to

have less interest in a given collective consumption activity than he really has” (Samuelson 1954 pp. 388-389).

3.3.4 *Impure public goods*

Goods that fall between the extremes of private and purely public are known as impure public goods (Sandler 1992). These are partially rival and/or partially excludable. Olson’s term *collective goods* refers to pure and impure public goods. A two-by-two classification, adapted from Lichbach (1996), that helps to clarify distinctions between pure and impure public goods, and between these and private goods is presented in figure 3.5²⁵.

Figure 3.5: A typology of goods

		<i>Rivalness</i>	
		<i>None</i>	<i>Complete</i>
<i>Excludability</i>	<i>Low cost</i>	Joint goods	Private goods
	<i>High cost</i>	Pure public goods	Common-pool resources

Definitions of private and pure public goods have been provided previously. Joint goods are excludable at low cost but nonrival, and are known also as toll goods. Lichbach (ibid.) provided the example of a scrambled television program for which decoders are sold. Enjoyment of the program is exclusive to people with decoders, but the number of such people can be increased infinitely without rivalry arising. Club goods are variants of joint goods. They are excludable at low cost, although partially nonrival. At some point—once appropriation of a club good (e.g., national park) becomes sufficiently congested—accepting an additional ‘member’ increases the club’s marginal costs beyond its marginal benefits. Club goods are also known as local public goods.

3.3.5 *Common-pool resources*

The remaining class of goods—common-pool resources (CPRs)—is the one most often identified as responsible for environmental externality problems, and therefore has been the

²⁵ To allow continuity with the terminology used elsewhere in this dissertation, Lichbach’s reference to *public goods* has been replaced in the table by *pure public good*. Likewise, *common property goods* has been replaced by *common-pool resources*.

subject of considerable attention from neoclassical economists. Consequently, the focus of discussion here with respect to impure public goods is on this class of goods.

CPRs are resource systems that produce resource units (Oakerson 1992). Appropriation is rival because the supply of resource units is replenished, if at all, at a finite rate (Ostrom 1990). Moreover, as observed in the definition following, CPRs are difficult to provide exclusively: “A common-pool resource ... is a natural or man-made resource from which it is difficult to exclude or limit users once the resource is provided, and one person’s consumption of resource units makes those units unavailable to others” (Ostrom 1999 p. 497).

Examples of human-made CPRs are parking stations and irrigation systems. For some CPRs, like reservoirs, natural and human factors are both critical for provision. In some cases the most critical element of provision is natural, but this is becoming rarer with the growth of human populations and their needs—so that provision of CPRs is in general becoming affected more and more by human appropriation. Since, compared with human-made CPRs, the boundaries of natural CPRs (e.g., groundwater basins) are often more extensive and less certain, and there may also be more appropriation points to police, exclusion problems are often more challenging in these cases (Ostrom 1990).

The CPR exclusion problem is most often attributed to the available physical or institutional means being especially costly (Ostrom *et al.* 1999). However, cultural considerations, such as norms of fairness, can make some exclusion options costly in a political sense (e.g., privatising a beach or harbour foreshore) (Oakerson 1992). In addition there might be constitutional or other legal obstacles to restricting people from enjoying certain types of CPR (Ostrom *et al.* 1994c).

3.3.6 Comparative statics of open access

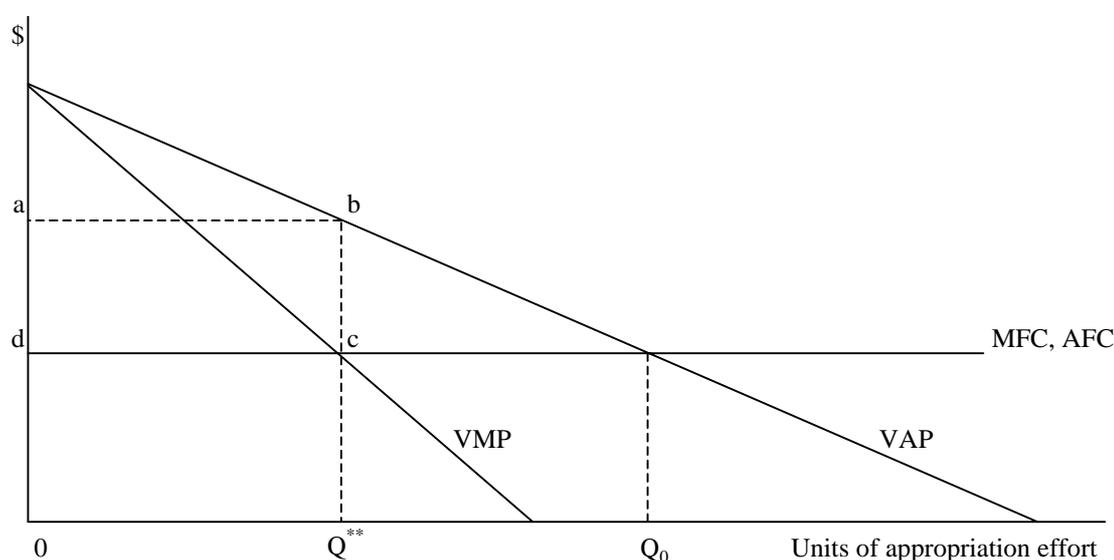
It has been common for economists, as suggested by Hardin (1968 p. 1244), to “picture a pasture open to all” when framing models of collective appropriation of CPRs. Consequently, neoclassical analysis of CPRs typically assumes zero exclusivity of appropriation, otherwise known as ‘open access’. A CPR subject to open access is *res nullius*, or an unowned resource system (Ciriacy-Wantrup 1971). Resource units supplied by an open-access CPR are ‘fugitive’ in the sense that they belong to no-one until they are ‘captured’ by any party with the necessary means (Bromley *et al.* 1989). According to

Gordon's (1977 p. 141)²⁶ characterisation following, this situation represents a social dilemma:

Wealth that is free for all is valued by no one because he who is foolhardy enough to wait for its proper time of use will only find that it has been taken by another. ... [T]he fish in the sea are valueless to the fisherman, because there is no assurance that they will be there for him tomorrow if they are left behind today.

The essentials of this kind of externality problem can be explained using a neoclassical framework similar to the one first formulated by Gordon (1954). His comparative-static analysis is illustrated in figure 3.6.

Figure 3.6: Comparative statics of open access to a common-pool resource



Assume that the open access problem involves appropriation of groundwater from a local aquifer. Hence the level of appropriation effort relates to the quantity of kilowatt-hours of pumping. In order to simplify exposition, it is assumed that diminishing returns do not apply. Consequently, the functional relationship between appropriation effort and appropriation (i.e., megalitres of groundwater pumped) is uniformly linear. The average physical product (i.e., megalitres of groundwater appropriated per kilowatt-hour of pumping) and marginal physical product functions are therefore also uniformly linear²⁷. If demand for the groundwater is assumed to be perfectly elastic, the average physical product and marginal physical product curves can be regarded as equivalent to the average value of product and

²⁶ Published originally as Gordon (1954).

marginal value of product curves, respectively. This latter pair of curves are denoted in the figure by *VAP* and *VMP*, respectively. Since diminishing returns do not apply, the linear decline in average physical product (and thus *VAP*) is solely due to the effect of appropriation on the remaining groundwater stock: higher pumping effort increases the depth of the groundwater surface and thereby reduces the subsequent yield from pumping. Unit cost of appropriation effort (i.e., per-litre cost of diesel) is assumed to be unaffected by the level of effort. Marginal factor cost and average factor cost are therefore identical and constant, as demonstrated by the curve *MFC, AFC*. These costs are assumed to include normal profit.

The efficient level of appropriation effort is where marginal cost equals marginal revenue. Given the above framework, this is the level of effort, Q^{**} , that coincides with the intersection of the *VMP* curve with the *MFC, AFC* curve. The area *abcd* is the level of economic rent²⁸ yielded by the groundwater resource. However, as indicated by the above quotation from Gordon, individual appropriators have no incentive to preserve this economic rent by restricting their effort if the resource is subject to open access. Rather, they would continue to increase their effort as long as average revenue exceeds average cost.

The open-access equilibrium level of effort, Q_o , is therefore given in this framework by the intersection of the *VAP* curve with the *MFC, AFC* curve. This level of effort is clearly exceeds the Pareto-efficient level since, at the margin, cost exceeds revenue. This finding that open access leads to excessive exploitation of a CPR is consistent with Hardin's (1968 p.1244) prognosis of unregulated access to a commons leading inescapably to "tragedy" (see section 1.2).

Although these analyses plausibly explain why there is no incentive for individuals to stint their efforts to appropriate units of an open-access CPR, they say nothing about the prospects of the individuals organising as a group to escape at least partially from their open-access 'tragedy' by introducing some exclusivity of appropriation. Gordon (1977 p. 140) was aware of this possibility, explaining the apparent rarity of open-access conditions in primitive cultures as follows:

Property rights in some form predominate by far, and, most important, their existence may be easily explained in terms of the necessity for orderly exploitation and conservation of the resource ... Private

²⁷ The relationship between the marginal physical product and average physical product functions is identical to that between the marginal revenue and average revenue functions in the theory of imperfect competition; thus *MPP* bisects the distance between the origin and the intersection of the horizontal axis by *APP*.

²⁸ The economic rent is the return from appropriating the resource over and above the minimum amount required to call forth the factors used to make the appropriation possible (Tisdell 1974).

or group land tenure accomplishes this end in an easily understandable fashion ... Speaking generally, we may say that stable primitive cultures appear to have discovered the dangers of [open-access²⁹] tenure and to have developed measures to protect their resources.

Nevertheless, after having acknowledged the historical importance of groups of appropriators organising to establish exclusive access to CPRs, Gordon (*ibid.* p. 141) concluded that economic rents could be gained from such resources “only by methods which make them private property or public (government) property, in either case subject to a unified directing power”. Hence it seems that the option of appropriator-group property was dismissed on the basis that the power of directing such a group would be shared among its members. No explicit reason was offered for emphasising the criterion of unified direction to this degree.

It might reasonably be supposed, nevertheless, that Gordon had in mind the costs of organising group co-ordination that Olson (1965), eleven years later, identified as a barrier to large groups self-reliantly resolving their social dilemmas. As shall be seen in section 3.5.2, the problem of organisational costs for group-property arrangements came to be treated more explicitly by Demsetz (1967). In any case, Gordon’s conclusion, as corroborated by Hardin, served to justify the presumption in the neoclassical market-failure approach that intervention was warranted to reform open-access CPR arrangements, and that governments should monopolise this intervention.

Both Gordon and Hardin assumed implicitly in their analyses of open-access CPRs that all the resulting externalities are symmetric. Although this assumption is reasonable for the purpose of demonstrating the ‘tragic’ rent-dissipation consequences of open access to CPRs, it misrepresents the complexity of most actual cases. Often there is considerable heterogeneity across appropriators in terms of their respective capacities to impart externalities on one another. The further landholders are located upstream, for instance, the less likely it is that downstream externalities from their appropriation of resource units from the stream (e.g., as a source of water and/or a sink for run-off containing pollutants) will be reciprocated. Thus appropriation from open-access CPRs usually results in a mix of symmetric and asymmetric externalities (Stevenson 1991).

²⁹ Gordon actually referred to open-access conditions as common-property tenure. His terminology has been replaced in this case because common property is nowadays regarded as a form of group ownership rather than open access (for instance, see Cornes *et al.* 1996; Ostrom 1990).

3.3.7 *The market-failure approach to government intervention*

In his *Economics of Welfare*, Pigou initiated the neoclassical market-failure approach of advocating that governments in the first instance try to ‘internalise’ externalities by imposing charges on economic agents that equate their private costs with the social costs resulting from their activity (Quiggin 1986). Accordingly, environmental and resource economists following the market-failure approach came to emphasise the Pigovian strategy of ‘price-mechanism’ interventions by governments when externalities were identified as responsible for market failure (Gustafsson 1998).

The price-mechanism strategy strives to set prices as if the missing market responsible for an externality existed, rather than actually attempting to establish the missing market. Thus the ideal is to levy a ‘Pigovian tax’ equal to the marginal external cost at the efficient aggregate level of appropriation (i.e., equal to mec^* in figure 3.2, where the Pareto-efficient level of appropriation is the minimum required to produce an output of Q_s).

Elaboration of this approach over time has generated a variety of possible price-mechanism instruments including emission and effluent charges, user charges for the treatment or disposal of waste, environmental taxes and levies, non-compliance fees, product charges, deposit refunds, charges for using environmental goods, and performance bonds (James 1997). Moreover, market-failure arguments have been used to justify other forms of government intervention in response to environmental externality problems. These have included governments providing public goods³⁰ (e.g., research and river dredging), ‘command-and-control’ regulations (e.g., waste emission standards), and subsidisation of economic agents to reduce externality-generating activities (Godden 1997).

3.4 *Neoclassical challenges to the Pigovian tradition*

The acceptance of the market-failure approach into mainstream economics provided significant support for arguments in favour of greater government intervention in advanced market economies. Although there were other forces at work, it is likely that this approach played a significant part in “the massive increase in government activity in recent times” (Wallis *et al.* 1999 p. 25). By the mid-1960’s questioning of this approach by economists,

³⁰ However, it is important to note the distinction between provision and production of a public good. Provision relates to resourcing the production of a good, including the preceding coordination and planning activities. Hence a government can provide a public good without being its producer (Musgrave *et al.* 1984).

political scientists and others had started. Critiques of this nature emerging from within neoclassical economics are considered in this section.

3.4.1 *The government-failure literature*

Four main strands of neoclassical criticism of the market-failure approach emerged (Wallis *et al.* 1999). Firstly, the assumption that governments could accurately assess the losses of welfare due to market failure was attacked. For instance, Hayek (1973 p. 14) derided this assumption as a “synoptic delusion” or “... the fiction that all the relevant facts are known to some one mind, and that it is possible to construct from this knowledge the particulars of a desirable social order”. Secondly, the ability of governments to intervene effectively in the public interest was questioned in some quarters. Accordingly, a range of factors inhibiting the capacity of governments to be responsive to the citizenry were identified.

Thirdly, some commentators rejected the presumption of altruistic behaviour in public affairs, preferring to assume that participants in these affairs are motivated as ‘rational egoists’. As Downs (1957 p. 136) argued: “Even if social welfare could be defined and methods of maximising it could be agreed upon, what reason is there to believe that the men who run the government would be motivated to maximise it?”. This prognosis echoed that following of John Stuart Mill (1977/1861 p. 505): “The very principle of constitutional government requires it to be assumed, that political power will be abused to promote the particular purposes of the holder”. Lastly, the theory of the ‘second best’ developed by Lipsey *et al.* (1956) demonstrated the difficulty of intervening to obtain a Pareto improvement even if policy-makers assess market failure accurately, intervene cost-effectively and choose among policy options altruistically³¹.

As a consequence of critiques of this nature, the influence of the market failure approach among policy analysts began to wane. A new, more sceptical, approach—highlighting the problems inherent in government intervention and emphasising the self-interested motivation behind such intervention—gained ground. Known generically as the *government-failure* approach, it set the costs of government failure against the benefits expected from interventions intended to mitigate market failure.

³¹ According to this theory, if government policy can alter the behaviour of only one sector of the economy, making that sector follow the perfectly competitive rule of price equals marginal cost will not necessarily raise the economy’s overall efficiency. The reason is that “the policy affects not only the behaviour of that sector but of all other sectors as well and in each of the other sectors, where perfect competition does not rule, the changes can improve or worsen efficiency” (Lipsey *et al.* 1985 p. 499).

The most influential theoretical response to the notion of government failure has been public choice theory³². This theory has been delineated by Mueller (1989 p. 1) as follows: “Public choice can be defined as the economic study of nonmarket decision making, or simply the application of economics to political science”. Public choice theorists denounce the ‘benevolent despot’ conception of government implicit in the market-failure approach, assuming instead that all participants in public processes—voters, politicians, bureaucrats and special interest groups—are motivated by rational egoism. This *homo economicus* conception of human motivation has dominated mainstream economics more generally, and assumes that individuals gain utility only from their own material (usually pecuniary) welfare³³.

Following from this assumption, various taxonomies of government failure have been developed. For instance, Dollery *et al.* (1997) identified a tripartite taxonomy. First, legislative failure refers to the “allocative inefficiency [which] arises from the excessive provision of public goods as politicians pursue strategies designed to maximise their chances of re-election rather than policies which would further the common good” (ibid. p. 360). Strategies of this kind are sometimes called ‘porkbarrelling’ or ‘logrolling’.

Second, “... even if socially beneficial policies were enacted, bureaucratic failure will ensure that these policies are not efficiently implemented ... [because] public servants lack sufficient incentives to carry out policies efficiently” (ibid. p. 360). For instance, Niskanen (1971) argued that bureaucrats seek to maximise the size of their budgets, since larger budgets imply that they are better off in terms of job security, salaries, power and prestige. They can do this, he reasoned, by oversupplying output, or by inefficiently supplying output, or both. This is possible because bureaucrats have greater per-capita incentives to increase expenditure than the corresponding incentives of taxpayers to decrease taxes. That this scepticism regarding bureaucratic motives is nothing new is demonstrated by the remark of Baron de Grimm quoted in section 2.2.2.

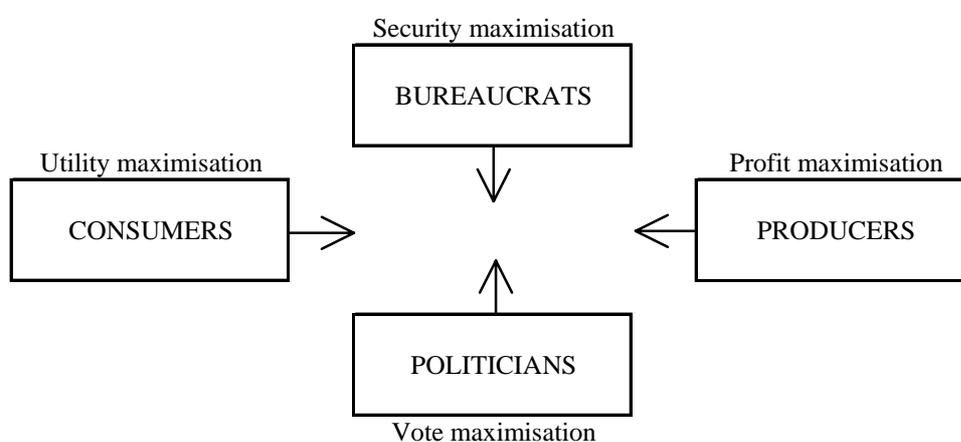
³² The ‘capture’ theory of regulation, developed by Stigler (1971) and extended by Peltzman (1976), has been another significant government-failure approach. As extended, the theory postulates, *inter alia*, that regulation is supplied by politicians seeking to maximise votes they accrue from responding to interest groups representing consumers or producers (Peltzman 1976). The lesser influence of capture theory, compared with public choice theory, seems to be at least partly due to its failure to systematically model the process with which it is primarily concerned—in this case the process of interaction between interest groups and regulators.

³³ However, outside of mainstream economics it is more often accepted that rational self-interest does not preclude self-interested altruism (or other forms of ‘other-regardingness’). Even so, it is normally presumed that altruism is not strong enough to fully reconcile one person’s interests with the interests of others. Axelrod (1984 p. 7) illustrated this point as follows: “If a sister is concerned for the welfare of her brother, the sister’s self-interest can be thought of as including

The final dimension of government failure, rent-seeking, relates to the ways in which citizens and special interest groups, from the population of consumers and producers, seek to use government intervention to create economic rents for themselves. This motive arises because government intervention nearly always creates wealth transfers and “people thus devote scarce resources which could have been employed in wealth creation towards redistributing existing wealth in their favour” (Dollery *et al.* 1997 p. 360). As succinctly expressed by Buchanan (1980 p. 4), “the term rent-seeking is designed to describe behavior in institutional settings where individual efforts to maximize value generate social waste rather than social surplus”.

In this taxonomy the body politic is assumed to comprise four main groups, namely: citizens or voters; elected officials or politicians; bureaucrats or public servants; and interest groups or individual lobbyists. The application of the rational egoist postulate to each of these groups allowed public choice theorists to reduce the complexities of political life in industrialised societies to essentially a political mechanism for allocating scarce resources that is analogous to the market mechanism (Wallis *et al.* 1999). A useful illustration of this type of political mechanism, developed by Mitchell *et al.* (1994), is presented in figure 3.7.

Figure 3.7: Public choice model of politics



Therefore, in contrast to the market-failure conception of governments intervening independently in order to benevolently promote the ‘public interest’, the public choice critique of this conception views government intervention as completely determined by the balance of egoistic outside pressures coming at it from all sides. As it gained influence,

(among many other things) this concern for the welfare of her brother. But this does not necessarily eliminate all potential conflict between sister and brother”.

therefore, the public choice characterisation of governments as propelled by greed rather than benevolence tended to make policy analysts more sceptical of recommending government intervention to correct market failure. Indeed, public choice theorists often concluded that the public interest would be better served by governments intervening only in so far as it allows the invisible hand of private interest to be harnessed a greater extent. This tendency was influenced significantly by Hayek's (1945 pp. 519-520) proposition that markets are superior to governments in dealing with "the economic problem of society ... [which is the] problem of utilization of knowledge not given to anyone in its totality"³⁴.

The public choice conception of political life has nevertheless attracted considerable criticism on a number of fronts (e.g., Self 2000; Stretton *et al.* 1994). Boston *et al.* (1996) regarded criticism of the rational egoist postulate as especially telling. They outlined this criticism as follows (*ibid.* p. 30):

In short, human beings are not merely economic beings, but also political, cultural, and moral beings who inhabit an economic system that is profoundly influenced by, and in a sense dependent upon, the attitudes, habits, beliefs, aspirations, ideals and ethical standards of its members. Any theory that downplays or ignores these broader contextual factors, social relations, and normative commitments is at best incomplete, and at worst misleading and damaging.

If the error in assuming that participants in public life are immutably selfish were recognised, they suggested, public choice theorists could usefully broaden their policy focus from concerns about the perverse effects on government of vested interests to a more constructive concern with lessening the disproportionate political influence of these interests by identifying ways of "ensuring that the decision-making arrangements are open, democratic and fair (i.e., that they provide an opportunity for all interests to be adequately represented)" (*ibid.* p. 32).

Indeed, public choice theory, together with other strands of the government failure literature, has served to stimulate interest in exploring the potential for correcting, or at least reducing, government failures. In turn, this has led to a general reassessment of the respective roles of government and other organisational mechanisms in solving the collective problems of society. Nevertheless, Wallis *et al.* (1999) have argued that this program remains too narrow, continuing as it does to emphasise markets and governments to the exclusion of other ways of achieving collective goals. In particular they suggested that useful theories of social

³⁴ In remarking on the information problems often encountered in relation to agri-environmental problems, for instance, Wills (1987 p. 48) concluded that "government may have a role in creating incentives for the production of such

organisation would need to pay greater explicit attention to cultural and ethical considerations.

3.4.2 *The Coasian tradition*

The most devastating neoclassical attack on the market-failure approach was launched by Ronald Coase (1960) who, in his seminal article *The Problem of Social Cost*, demonstrated that the Pigovian logic associating market failure with Pareto inefficiency was internally inconsistent. His argument started by observing that in the Pigovian conception of perfect competition all markets are ‘frictionless’; that is, all exchanges occur at zero cost. In an earlier seminal article, *The Nature of the Firm* (1937 p. 390), Coase emphasised that there *is* a “cost of using the pricing mechanism” provided by markets. He referred to these costs as ‘transactions costs’, although the term ‘transaction costs’ has since become more common. The costs include those of negotiating, drawing up contracts, making inspections, arranging dispute resolution, and so on³⁵.

Before proceeding with Coase’s argument, it is appropriate here to recognise that defining transaction costs unambiguously has been problematical (Wallis *et al.* 1999). Allen (1991 p. 2) has remarked accordingly that “the literature on transactions costs is replete with papers which use the term and provide examples, but which never pause to define the phrase”. However, there are now two generic ways of specifying this concept. The first follows Coase’s (1960) pathbreaking insight that markets do not actually exist to trade goods, as supposed previously by economists, but rather to trade property rights in relation to those goods.

Commons (1968) defined a property right as an enforceable authority to undertake particular actions related to a specific domain. In terms more familiar to neoclassical economists, property rights refer to the ability to exercise choices over a good (Allen 1991). These choices relate to transfer, excluding others and deriving income or utility from a good (Cheung 1970). From this perspective, transaction costs are the resources used to establish and maintain property rights (Allen 1991 p. 3) or, equivalently, the costs of arranging a

information, as distinct from having a clear advantage over the private sector in its use”.

³⁵ Although transaction costs are ultimately associated with the cost of acquiring information about exchange, they are distinct from information costs which arise irrespective of exchange, for instance in a Robinson Crusoe economy (Eggertsson 1990).

contract to exchange property rights *ex ante* and monitoring and enforcing the contract *ex post* (Matthews 1986).

The second way recognises that property rights are products of institutions or rules³⁶ and seeks to provide a definition that applies to the cause rather than the effect. From this more fundamental vantage, Furobotn *et al.* (1992 p. 8) regarded transaction costs as “... most easily understood as embracing all those costs that are connected with (i) the creation or change of an institution or organisation, and (ii) the use of the institution or organisation”. In the present context the property-rights-based definition is the more relevant, although the second definition comes into its own later in this thesis.

It is possible now to return to Coase’s argument. He started with Pigou’s implicit conception of perfect competition as a world of zero transaction costs. In such a world, he argued, all Pareto-relevant externalities would be eliminated spontaneously—the economic rent that otherwise would be dissipated represents a potential Pareto improvement that rational self-interested protagonists can share costlessly by negotiating a new property rights configuration that precludes these prospective externalities ever seeing the light of day. The same Pareto-efficient assignment of property rights will result regardless of the original assignment. Given perfect competition, therefore, the Pigovian rationale for government intervention is redundant. This critique was dubbed by others as the Coase Theorem, which Coase (1992) himself observed subsequently has become “infamous”. The reasons for his ambivalence are outlined in section 3.4.4.

In the actual world of positive transaction costs, furthermore, Coase (1960) demonstrated that negotiations over property rights still ensures that all Pareto-relevant externalities are internalised. It is just that the share of transaction costs that is Pareto relevant declines as transaction costs increase in magnitude. It follows from this extension of the Coase Theorem that the status-quo configuration of property rights is invariably Pareto efficient (Randall 1981b). In this case, too, there is no market-failure case for government intervention. When transaction costs are positive, nevertheless, the resulting Pareto-efficient assignment of property rights does depend on the initial assignment.

³⁶ Rather than equivalent to them as is frequently supposed. Thus “for every right an individual holds, rules exist that authorize or require particular actions in exercising that right” (Ostrom *et al.* 1996 p. 130). These rules not only confer property rights on certain parties, therefore; they also impose commensurate duties on others to observe those rights. That is, “the duty that an individual owes another defines the actions the individual may, must, or must not take in relation to another and that other’s property” (ibid. p. 130).

As Coase (1992) observed on the occasion of receiving a Nobel Prize in Economic Sciences, his intention was only to highlight the internal inconsistency of the market-failure approach . Although Pareto-efficiency is one conception of social welfare, there are others with which governments are legitimately concerned. When transaction costs are positive, for instance, Coase was aware that the equity repercussions of negotiations over property rights depend on how these rights are assigned originally. He commented accordingly that:

Of course, it does not imply, when transaction costs are positive, that government actions (such as government operation, regulation, or taxation, including subsidies) could not produce a better result than relying on negotiations between individuals in the market (Coase 1992).

Given that the Pigovian system of measuring the Pareto efficiency of an actual situation according to its compliance with a perfectly competitive ideal was no longer tenable, Coase (1960 p. 43) argued as follows for an approach that comes to terms with real-world complexity:

Economists who study problems of the firm habitually use an opportunity cost approach and compare the receipts obtained from a given combination of factors with alternative business arrangements. It would seem desirable to use a similar approach when dealing with questions of economic policy and to compare the total product yielded by alternative social arrangements. ... [This] approach would seem to be to start our analysis with a situation approximating that which actually exists, to examine the effects of a proposed policy change and to attempt to decide whether the new situation would be, in total, better or worse than the original one. In this way, conclusions for policy would have some relevance to the actual situation.

Demsetz (1969) essentially followed Coase's lead in advocating the primacy of opportunity cost as an economic benchmark. He referred to the preference of Pigovians for a theoretical ideal instead of the opportunity-cost principle as the "nirvana problem" (ibid. p. 1). Consistent with the opportunity-cost principle, he proposed that government intervention in markets be assessed according to a "comparative institutions approach" (ibid. p. 1). Similar to Coase's earlier proposal, this approach would "attempt to assess which alternative real institutional arrangement seems best able to cope with the economic problem ..." (ibid. p. 1).

When the comparative institutions approach is applied, evidence of market failure is not sufficient to justify government intervention on Paretian grounds. It is necessary in addition to specify the institutional arrangements proposed to replace the status quo and to realistically assess the likelihood of the proposed arrangements achieving a Pareto improvement. Hence the consequence of following the comparative institutions approach, like that of embracing the government failure approach, is a more sceptical view of

government intervention compared with that of the market-failure approach (Rutherford 1996).

3.4.3 *The market-mechanism approach*

As a result, Coasians and other economists swayed by government-failure arguments have tended to prefer ‘market-mechanism’ instruments to the price-mechanism instruments favoured in the Pigovian tradition. This preference has followed in part from a belief that market-mechanism instruments are largely quarantined from government failure, at least compared with price-mechanism instruments. The latter approach requires governments adjusting the Pigovian charge as economic conditions change over time.

This need for greater ongoing intervention by government, it is argued, makes the price-mechanism approach more prone to capture and distortion by rent-seeking groups (ibid.) and to the constraints imposed by “notoriously sluggish” bureaucratic procedures (Tietenberg 1996 p. 345). In contrast, proponents of market-mechanism instruments have argued that once these instruments are introduced the need for ongoing government intervention, and thus the potential for government failure, is considerably less than in the case of role of price-mechanism instruments.

Market-mechanism instruments seek to address the excludability problems that typically are responsible for markets not emerging to provide CPRs courtesy of the ‘invisible hand’. In general, these instruments involve ways of reducing exclusion costs sufficiently that individual-property rights to CPRs can be established, enforced and, at least ideally, transferred. The earliest proposal of this kind relating to environmental conservation was from Dales (1968).

For instance, a government might create a finite quantity of permits for the emission of a specified water pollutant and sell these permits through a type of auction³⁷. Subsequent exchange of these permits would establish a market and a market-clearing price signaling to polluters the opportunity costs of their emissions. With all polluters facing the same price for a permit, marginal costs of pollution abatement would be equalised among these polluters. Thus the target reduction of emissions would be achieved at least cost. Furthermore,

³⁷ However, it has more often been the case in practice that the initial assignment of permits is determined administratively; for instance, *pro rata* to some measure of individuals’ historical use of a CPR (James 1997).

provided that the individual permits are enforced, the government can be sure that its target appropriation level will be realised (Baumol *et al.* 1988).

3.4.4 *The Coase Theorem misrepresented*

Coase's ambivalence regarding the theorem named in his honour is attributable to its misrepresentation by some economists—labeled “hyper-Coasians” by Randall (1974 p. 53)—pursuing an ideological (i.e., *laissez-faire*) rather than a scientific agenda. In the hands of this group, Coase's logic was twisted in an attempt to amoralise externality problems. Since the status quo is invariably Pareto efficient, they tried to argue, the prevailing order of property rights is social-welfare-maximising. Thus, it was argued, government intervention in externality problems is *never* justified—because those harmed are free to negotiate a Pareto improvement with those causing the harm. Randall (1974 p. 53) noted how this led to “visions of criminals being bribed to desist and of little children being regarded as “hitting” automobiles in pedestrian crossings ...”.

Of course, this *laissez-faire* argument is inconsistent with the first fundamental theorem of welfare economics. According to this theorem, there is a distinct Pareto-efficient solution corresponding with each set of initial economic conditions (e.g., distribution of property rights), and these solutions are Pareto non-comparable. On the basis of Paretian logic, therefore, it is untenable to assert that initial conditions in the status quo are superior to any other set of initial conditions (Bromley 1997). There is accordingly no way of making welfare comparisons between alternative systems of initial conditions (e.g., allocation of property rights to polluter versus victims) without some “set of value judgements to provide a frame of reference, why one system is better than the other” (de Alessi 1990 p. 153).

3.5 *Relevant aspects of property-rights theory*

Coase's 1960 article *The Problem of Social Cost* spawned a rich literature concerned with economic analysis of alternative configurations of property rights. Aspects of this literature relevant to the subsequent discussion are considered in this section.

3.5.1 *Classifying property rights by exclusivity*

Four types of property system can be delineated in the context of environmental governance, as is evident from table 3.1.

Table 3.1: Property systems classified by exclusivity

Property system	Characteristics
Open access	Absence of enforced property rights
Group (common) property	Property rights held by a finite group of appropriators who can exclude others
Individual (private) property	Property rights held by individuals (or firms) who can exclude others
Government (state) property	Property rights held by a government that can be enforced

Source: Adapted from Ostrom *et al.* (1999).

Since the open access (non)system has been discussed previously, and the attributes of the individual-property system³⁸ are discussed in section 3.5.2, these shall not be discussed further at this stage. Ciriacy-Wantrup (1971) corrected a longstanding misapprehension that group (common) property is synonymous with open access³⁹. Group property is distinct from open access since it incorporates institutional arrangements for excluding non-owners and for allocating provision duties and appropriation rights among co-owners (Ciriacy-Wantrup *et al.* 1975). Although group-property systems often generate their own institutional arrangements (Bromley *et al.* 1989), some arrangements may be imposed from outside. These institutional arrangements need not all be formalised or explicit—sometimes, indeed, most are implicit or *de facto* (Stevenson 1991).

Although group property has been referred to as “corporate group property” (Bromley *et al.* 1989 p. 15) since the right to appropriate is exclusive to group members, a group-property system is distinct from a corporation which consists of two or more persons who found an enterprise to appropriate a resource by pooling their real and financial assets and skills in order to enjoy a common return. Group-property organisations may indeed pool some assets (e.g., buildings and equipment) but, unlike corporations, some inputs and/or outputs remain owned by individual members. Quiggin (2001 p. 80) remarked accordingly that: “A crucial observation about common property rights is that pure systems of common property are very

³⁸ In this dissertation the phrase *individual property* is preferred to *private property* to avoid the confusion that sometimes arises as a result of the latter phrase sometimes signifying group-level *and* individual-level property rights (e.g., Bromley 1998).

rare. Systems of agricultural property rights typically involve a mixture of private and common property ...”.

Rather than simply enjoying a common return, therefore, some element of competition remains in efforts by members of a group-property system to appropriate units from their jointly-owned resource. Appropriation by each member therefore imposes symmetric external costs on the remainder of the group. Thus “competing users under common [i.e., group] property come together to cooperate rather than to become corporate” (Stevenson 1991 p. 43). The foregoing considerations are encapsulated neatly in the following definition of a group-property system as:

... a form of resource management in which a well-delineated group of competing users participates in extraction or use of a jointly held, fugitive resource according to explicitly or implicitly understood rules about who may take how much of the resource (ibid. p. 46).

The actual corpus of this type of property system varies with circumstances, with two examples being cooperatives and unions (Brown 2000).

In the case of a government-property system, ownership of a resource is vested in “a national, regional, or local public agency that can forbid or allow use by individuals” (Ostrom *et al.* 1999 p. 279). However, if the administration of a government-property system is unable or unwilling to establish and enforce institutional arrangements to regulate use by individuals or groups—a not uncommon circumstance—introducing such a system *de jure* may achieve little more than legitimise *de facto* prevailing arrangements of open access (Ostrom 1990). Of course, this is the consequence too when attempts to introduce individual or group-property systems fail in practice to provide the designated owners (individuals or groups, respectively) with exclusive rights to appropriate the property of concern.

3.5.2 *Pareto-efficient exclusivity*

Despite the admonitions of Coase and Demsetz to compare ‘actual with actual’, some property rights theorists remained afflicted by a “nirvana problem” in so far as they merely translated the Pigovian theoretical ideal of perfect competition into one of perfect property rights. For this group, the ideal of all goods being owned by individuals (including firms) thus metamorphosed into one of all property rights being ‘non-attenuated’ (Randall 1981b). In this ‘renovated nirvana’, the structure of property rights in an economy would be universal

³⁹ The confusion originated with Gordon (1954) referring to *open access* to CPRs as *common property*. Since this confusion persists in some quarters, the term *group property* is preferred in this dissertation.

(all goods individually owned and all entitlements completely specified), exclusive (benefits and costs from owning and using goods would accrue only to the owner), transferable (all property rights would be transferable from one owner to another in voluntary exchange) and enforceable (security of property rights from involuntary seizure or encroachment by others) (Tietenberg 1996).

Proponents of this ideal held that its realisation would ensure Pareto-efficiency, thus failing to account for the transaction costs of achieving this result (Randall 1981b). However, as Coase and followers including Demsetz (1967), Cheung (1970) and Dahlman (1979) were well aware, the Pareto criterion requires that specification, transfer and enforcement of property rights be pursued only up to the point where, at the margin, the transaction costs of these activities equal their rent-capture benefits. Hence a universe of non-attenuated property rights, in which all property systems are individual-property systems, is consistent with Pareto efficiency only if it also happens to be a universe of zero transaction costs.

Nevertheless, despite their greater theoretical sophistication, for practical purposes Coasians tended to maintain the Pigovian tradition's simple conception of policy as fundamentally limited to choice between the 'visible hand' of governments (now government-property systems) and the 'invisible hand' of markets (now individual-property systems). More particularly, in a climate of scepticism about government intervention encouraged by their own reasoning as well as by the government-failure literature, Coasians tended generally to find individual-property systems preferable to government-property systems.

The tendency of Coasians to emphasise individual-property systems has been influenced at least as much by considerations of dynamic efficiency as by those of static—that is, allocative or Pareto—efficiency. Discussion of the dynamic considerations shall be deferred until chapter four. The static-efficiency reasons for preferring individual-property systems to group-property systems focused on the competition between co-owners that remains in the latter case. For instance, as demonstrated in his remark following, Demsetz (1967) was concerned about the transaction costs of co-ordinating co-owners to internalise the symmetric externalities that would arise due to this competition:

Negotiating costs will be large because it is difficult for many persons to reach a mutually satisfactory agreement, especially when each hold-out has the right to work the land as fast as he pleases. But even if an agreement among all can be reached, we must yet take account of the costs of policing the agreement, and these may be large also (*ibid.* pp. 354-355).

It is evident that Demsetz's position, at least in this respect, has much in common with Olson's (1965) conclusion that organisation costs are typically a fatal impediment to groups, especially large ones, successfully providing themselves with collective goods.

3.5.3 *An extended schema of property systems*

The early property-rights literature tended to focus on rights to appropriate units of a CPR, to the exclusion of other types of rights bearing upon CPR provision. Consequently, an impression was created that to resolve each open-access CPR problem only a single property system—chosen solely according to the circumstances of appropriation—is required. As Challen (2000) has observed, this under-developed characterisation of property arrangements led to significant conceptual confusion when trying to account for the subtleties of actual arrangements. A government may formally own a CPR, for instance, but other entities such as groups of appropriators and individual appropriators may be delegated some rights and responsibilities in respect of making decisions relating to the resource.

In any given CPR setting, in fact, it is common to find government-, group- and individual-property systems co-existing with each other, as well as with elements of open access. Failure to account for this real-world richness would clearly limit the explanatory power of the property-rights approach and, moreover, lead to misleading explanations to the extent that interdependence exists among co-existing property systems.

This early shortcoming has been ameliorated considerably by a line of research culminating in “a conceptual schema for arraying property regimes that distinguishes among diverse bundles of rights that may be held by the users of a resource system” (Schlager *et al.* 1992 p. 249). The roots of this schema are to be found particularly in the delineation by Kiser *et al.* (1982 p. 1) of “three worlds of action”. As individuals conduct their day-to-day activities, this perspective suggests, they organise these activities by partaking in operational, collective-choice and constitutional-choice levels of action.

Operational activities “are constrained and made predictable by operational-level rules regardless of the source of those rules” (Schlager *et al.* 1992 p. 250). The meaning of *rules* here is “generally agreed-upon and enforced prescriptions that require, forbid, or permit

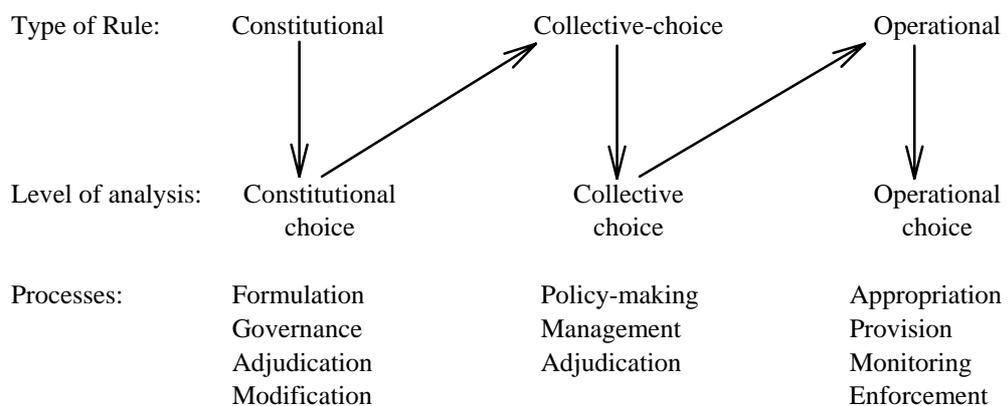
specific actions for more than a single individual” (ibid. p. 250). An operational rule for irrigators, for example, may restrict the crops to be irrigated, the irrigation technologies that can be applied, or the volume of water than can be diverted from a supply channel.

Operational rules change as a result of actions in the collective-choice arena. These actions are performed subject to a set of collective-choice rules that designate who may take part in changing operational rules and the level of agreement required to authorise a change. Changing the limit on the volume of water that an irrigator can divert is an example of a collective-choice action.

Collective-choice rules are changed by actions in the constitutional-choice arena. These are the rules that are applied—by appropriators, their representatives, or external authorities—in deciding upon operational rules (ibid.). Ultimately they influence operational choices, albeit indirectly. Constitutional-choice actions include establishing an organisation, or changing the process that must be followed in changing the operational rules of an organisation.

Appropriation, provision, monitoring, and enforcement thus occur at the operational level. Processes of policy-making, management, and adjudication of policy decisions occur at the collective-choice level. At the constitutional level, in contrast, constitutional decisions are formulated and processes of governance, adjudication, and modification of constitutional decisions also occur (Ostrom 1990). Linkages within this hierarchy of rules and the respective levels of analysis at which choices are made and actions are taken are illustrated in figure 3.8.

Figure 3.8: Linkages across the three worlds of action



Source: Ostrom (1990 figure 2.2).

To recapitulate, operational rules are determined according to a set of collective-choice rules which are determined according to a set of constitutional-choice rules. In turn, the constitutional rules for a given setting are affected by collective-choice and constitutional-choice rules for larger jurisdictions. Thus “all rules are nested in another set of rules that define how the first set of rules can be changed” (Ostrom 1990 p. 51).

The types of decision required at each level of analysis may occur in a range of arenas. Legislatures and courts lie at the more formal end of the spectrum of possible arenas, and kitchens and cafeterias at the less formal end. For instance, Schlager *et al.* (1992 p. 250) have remarked that “operational rules related to inshore fisheries are as apt to be devised in a local meeting place, even a tavern, as they are in a court, a legislature, or a government bureau”. This observation serves to reinforce the point that actions at a particular level do not necessarily affect rules in use. For instance, enacting a new law does not establish a new rule⁴⁰ unless it is enforced (Ostrom 1991).

It is now apparent that the limitations of the early property-rights literature were attributable to its focus only on the ‘shallowest’, and most exclusively focussed, level of analysis—the operational level. The development of a schema that can account simultaneously for multiple levels of analysis nested within each other has enabled property right systems to be studied with considerably greater flexibility and sophistication. For instance, this schema acknowledges that:

- changes in the rules used to co-ordinate action at one level are both constrained and enabled by a set of rules at a ‘deeper’, more inclusive, level that are fixed in the short term; and
- changes in rules are normally more costly to accomplish the deeper the level to which they apply.

Thus, at least typically, operational rules are easier to modify than collective-choice rules, and collective-choice rules are easier to change than constitutional choice rules (Ostrom 1990). Moreover, the schema makes it clear that shallower rules are subordinate to deeper rules—the deeper rule takes precedence in the event of inconsistency. Regardless of any operational rule that a tennis association may introduce to the contrary, normally “a tennis player cannot shoot and kill an opposing player, because he charges the net or otherwise

⁴⁰ Ostrom (1990 p. 51) referred to rules that are actually used when individuals choose how to act, and that are monitored and enforced, as “working rules”.

plays aggressively” (Kiser *et al.* 1982 p. 215). While the tennis association may indeed have a collective-choice right to determine the operational rules of play, this right is subordinate to deeper rules, inclusive of a broader range of settings, banning the killing of people.

In addition to its delineation of three levels of action, the schema developed by Schlager *et al.* (1992) and elaborated by Ostrom *et al.* (1996) identifies the types of rights commonly associated with each level, at least in the context of CPRs. The most relevant operational-level property rights they identified as ‘access’ and ‘withdrawal’⁴¹ rights, as defined below:

Access: The right to enter a defined physical property and enjoy nonrival benefits (e.g., hike).

Withdrawal: The right to obtain the resource units or ‘products’ of a resource (e.g., fish).

Individuals with access and withdrawal rights might, or might not, have more extensive rights allowing them to participate in collective-choice decisions. As Schlager *et al.* (1992 p. 251) remarked, as follows, this distinction between operational-level rights and collective-level rights is critical:

It is the difference between exercising a right and participating in the definition of future rights to be exercised. The authority to devise future operational-level rights is what makes collective-choice rights so powerful.

In respect of CPRs, collective-choice property rights include management, exclusion, and alienation. These are defined as:

Management: The right to regulate internal use patterns and transform the resource by making improvements.

Exclusion: The right to determine who will have an access right, and how that right might be exercised.

Alienation: The right to sell or lease either or both of the above collective-choice rights.

Hence the right of management authorises those holding it to devise the operational-level rules defining withdrawal rights. It provides “authority to determine how, when, and where harvesting of a CPR may occur, and whether and how the structure of a resource may be changed” (Schlager *et al.* 1992 p. 251). In contrast, those who hold rights of exclusion have authority to decide the qualifications that individuals must satisfy in order to access a CPR. Lastly, the right of alienation allows an individual to sell or lease the rights of management, exclusion, or both.

⁴¹ ‘Access’ and ‘withdrawal’ are thus two variants of ‘appropriation’.

Individuals or groups may hold property rights that do not include all five types of rights. Nevertheless, to hold some types of rights implies the possession of others. For instance, withdrawal rights are useless without access rights, and the right to alienate presumes that management or exclusion rights are held. Hence it is possible, as in table 3.2, to distinguish between five classes of rights holders according to the bundles of rights they hold.

Table 3.2: Bundle of rights corresponding with class of property-right holder

Type of right	Class of property-right holder				
	Owner	Proprietor	Claimant	Authorised user	Authorised entrant
Access	X	X	X	X	X
Withdrawal	X	X	X	X	
Management	X	X	X		
Exclusion	X	X			
Alienation	X				

Source: Adapted from Ostrom *et al.* (1996 table 7.1).

According to this schema, only ‘claimants’, ‘proprietors’ and ‘owners’ have any rights to self-organise. The focus in studying group-property systems in recent years has largely been on systems comprised of individuals with bundles of rights corresponding with the foregoing definition of proprietors (e.g., Bromley 1992; McCay *et al.* 1987; Ostrom 1990). Individuals within such systems have the right to participate in deciding who may access a CPR and how it may be utilised; however, they cannot alienate these collective-choice rights. Nevertheless, it is quite feasible to have group-property systems where the constituent individuals fit the above definition of owners. For instance, where an individual’s right to own a share of group property (e.g., an irrigation network) is tied to holding a certain type of individual property (e.g., land serviced by the network), transferring the rights to the land will concurrently alienate the rights in respect of the group property.

In addition to operational- and collective-choice rights, constituents of group-property systems often have rights to participate at deeper levels of decision making. For instance, group members may have rights to participate in deciding whether to change the group’s collective-choice rules relating to voting entitlements and procedures. If the group is formally organised along the lines of a ‘co-operative’, one might expect such constitutional-choice rights to be defined in the co-operative’s Articles of Association (i.e., constitutional rules). Group members may also have rights to participate in levels of decision making deeper than those relating to their group’s collective choice rules. Ultimately, in democracies all citizens can participate, albeit indirectly, in their society’s deepest, most inclusive levels of decision

making through their rights to vote for representatives in government legislatures.

3.5.4 *Implications for policy analysis*

Hence it is apparent that CPR problems can involve considerable interdependence between choices made with respect to the different types of rights, thus making for complex analysis. The early property-rights approach tended to abstract from this complexity by focussing on the short run within which all rules (and associated rights) except those at the operational level—governing appropriation (i.e., access and withdrawal)—are assumed to be fixed. However, since this assumption often is implicit it has not been uncommon for policy options associated with choice making at deeper levels to be unconsciously ignored, most seriously in analyses extending beyond the short run.

A possible consequence of this oversight is to misrepresent the decision maker's environment and thereby lessen the prospects of identifying the 'best' configuration of the various types of rights, whether according to Pareto-efficiency or some other criterion (Kiser *et al.* 1982). Even with proposals to intervene in open-access CPR problems by way of market-mechanism instruments—typically justified in part by a desire to minimise the potential for government failure—neoclassical economists have tended to overlook the possibility that some collective-choice rights for setting the market's operational rules might be appropriately assigned to the appropriator group for whom the market is intended.

This lack of sophistication seems all the more surprising given that that the performance of market-mechanism instruments has been less than their advocates expected (Gustafsson 1998; Lotspeich 1998; Tietenberg 2000). Part of the reason seems to be that instruments of this kind often are not as exempt from government failure as was anticipated. They do not necessarily prevent interest groups from attempting to rent-seek by way of influencing the accompanying rules—for instance, relating to the target level of aggregate appropriation or the initial assignment of individual-property rights—in their favour (Goldberg 1974). Furthermore, significant rent dissipation can occur in the process of governments defining and enforcing permits. Anderson *et al.* (1983 p. 443) observed accordingly that:

... rent dissipation can occur in the *process* of establishing private rights to [an open-access CPR]⁴² ... [which] can be every bit as large as the rent dissipation from exploitation of the resource under [open access] rules.

⁴² The term *common property* used in the original has been replaced by *open access* for reasons given earlier.

They suggested that rent dissipation in the process of intervention would be less if the collective-choice rights in respect of effecting the intervention were held by the ‘residual claimants’ of the rents—that is, by the CPR appropriators—rather than by government officials. Their reasoning was along the bureaucratic-failure lines outlined in section 3.4.1. Thus they reasoned that officials tend to be motivated by gaining or maintaining power within the bureaucracy. To the extent that bureaucratic power is positively related to utilisation of government resources in intervention, they proposed, officials have a reason to design intervention processes so that they utilise more resources than necessary.

The neoclassical predilection for regarding CPR situations as involving for practical purposes a choice only between government property and individual property has been criticised by Baland *et al.* (1996 p. 346) as “far too simplistic to serve as a useful guideline for policy-making”. To be useful, therefore, policy analyses need to account for the complementarities that exist not only between these types of property system but also between these and group-property systems. As Challen (2000) has found, such a conclusion is inescapable once preconceptions are put aside so that it becomes possible to appreciate the complexity and diversity of property arrangements now and in the past.

Consider the fairly simple case of land tenure in Australia. Only the Crown can own land in a strict legal sense. All other holders of land are either, directly or indirectly, ‘tenants’ of the Crown. Thus fee simple, which is normally regarded as constituting private ownership of land, legally signifies nothing more than a tenancy arrangement with the Crown. An individual-property system thus co-exists with a government-property system, albeit subject to the latter’s forbearance⁴³ (Sawer 1972).

Challen’s (2000) case study of regulation of surface water use by irrigators in Australia’s Murray-Darling Basin provides a richer illustration of the complexity and diversity that commonly occurs in actual property arrangements. Although all water for irrigation is ultimately appropriated within systems of individual property, he concluded that the term *individual property* fails to do justice to the complete set of property arrangements impinging upon this appropriation. His reasons were:

⁴³ That this forbearance varies over time is illustrated by individual rights to land having been progressively hedged by Australian governments. Whereas under Common Law those with individuals rights to land originally had rights to “the airspace above it up to heaven and the sub-surface earth down to hell”, today those airspace rights are qualified by rights given to aircraft and sub-soil rights are hedged by laws concerning mining (Sawer 1972 p. 180).

- The main forms of individual property (i.e., water entitlements of group-scheme irrigators, entitlements of private licensees, and entitlements of riparian landholders) differ considerably in respect of the rights attached to them; and
- Only a subset of all the rights ultimately affecting appropriation of water for irrigation are devolved to individual-property rights with respect to water. This subset includes rights to alienate withdrawal rights (by trading them) and to allocate appropriated water across the various irrigation activities that are possible. Moreover, these rights are subordinate to group-property rights shared by irrigators, to government-property rights held by the relevant Australian governments, as well as to rights assigned to the system of inter-governmental group property established subject to the Murray-Darling Basin Agreement of 1992 and other inter-state agreements.

On the basis of evidence of this kind, Baland *et al.* (1996) concluded that government-property and group-property systems of governance “can be combined in numerous and imaginative ways which open the door to many more solutions than the three standard approaches usually referred to in the literature”. A generic term for the kinds of property arrangements envisaged here, typified by multiple interdependent property systems nested within one another, is ‘distributed governance’ (Townsend *et al.* 1995).

3.6 *Concluding comments*

The advent of the comparative-institutions approach within neoclassical economics promises ultimately to lead to considerably greater sophistication in analysing the governance of the natural environment. However, at this stage this potential has been tapped only for the purposes of comparing governments and markets as alternative means of governance. The possibility that policy might enhance governance by promoting collective action by civilians remains largely overlooked in this tradition.

This neglect of prospects for collective action by civilians appears to be due in large part to neoclassical theory predicting that group-property systems provide CPRs less efficiently than government- or individual- property systems. Clearly this falls short of the ‘compare actual against actual’ requirement of the comparative-institutions approach. Ostrom *et al.* (1997 p. 36) signaled their frustration with this state of affairs as follows: “The choice that citizens face is not between an imperfect market and an all-powerful, all-knowing, and public-interest-seeking institution on the other. The choice is, rather, from an array of institutions—

all of which are subject to weaknesses and failures”.

The continuing lack of regard by most neoclassical economists for prospects of civil groups providing themselves with the selective-incentive mechanisms they require for efficient CPR appropriation can be attributed plausibly to the lingering hold of progressive ideology within this tradition. Nelson (1987 pp. 58, 64) observed in this vein that:

Mainstream economists do not exhibit the same buoyant optimism of the older progressives, but their beliefs still typically reflect many of the assumptions and values of that movement ... [including] a conviction that government should be actively used for achieving social goals—if preferably by manipulating the competitive market mechanism, rather than command and control methods. ... Instead of relying on government managers expert in administrative science, what is really needed are expert government economists who can manipulate the market for selected social purposes. Instead of the old progressive dichotomy of politics and administration, economists have proposed a new dichotomy of political definition of objectives, followed by expert achievement of these objectives through manipulation of the market mechanism.

Even proposals by neoclassical resource economists for creating markets for permits to appropriate from a CPR (see section 3.4.3) are typically grounded in this adaptation of progressive ideology. This is the case since these proposals normally have presumed that collective-choice rights for setting the rules by which the markets are created and operated will be assigned solely to government rather than shared with the group of appropriators⁴⁴.

It seems that progressivist scepticism within the neoclassical tradition regarding the ability of civil groups to help solve their collective-action problems runs sufficiently deep that it will give way only when real-world evidence of such ability can be explained as the result of rational choices by individuals. Without such an explanation it may remain too easy for successful CPR provision by group-property systems to be dismissed as the result of atypical irrational behaviour. In the following chapter, therefore, the search for a rational-choice explanation of spontaneous collective action continues. In this chapter the search was limited to explanations based on comparative-static methods of analysis. Given the impasse reached in this endeavour, in the next chapter the search is extended to include methods which model the dynamics of collective action more realistically.

⁴⁴ It is not the intention here to deny that price-mechanism and market-mechanism instruments can have important roles to play in contributing towards providing the selective incentives that are required if collective-action dilemmas associated with environmental governance are to be resolved successfully. The intention is to highlight how most neoclassical economists have presumed that governments should monopolise the rights to design and operationalise these instruments instead of sharing some of these rights with, or devolving them to, the relevant civil groups. The minority of economists disenchanted with the progressive approach to governance have mostly disregarded this ‘collaborative’ approach as a legitimate alternative, reverting instead to the *laissez faire* liberalism in reaction to which the progressive movement was formed (Nelson 1987).

4. 'SECOND-GENERATION' DEVELOPMENTS IN THE THEORY OF COLLECTIVE ACTION

4.1 *Introduction*

Comparative-static approaches to rational-choice analysis of collective action were reviewed in the previous chapter. Ostrom (1998a) called these 'first-generation' approaches. Their prognoses were found to be consistently pessimistic, leading to a conclusion that collective goods, including CPRs, will not be provided without government intervention— notwithstanding disagreements regarding the degree to which this market failure justifies such intervention. Nevertheless, as was noted briefly in section 3.5.4, group-property systems—which by their nature require spontaneous within-group collective action if they are to succeed—play important roles in contemporary Australian environmental governance. By itself this raises significant doubts about the validity of conclusions from comparative-static analyses. In section 4.2 doubts of this kind are explored further.

The remainder of the chapter is concerned with providing a survey and synthesis of progress since the 1980's toward rational-choice models of collective action able to account for spontaneous cooperation within large groups—labeled by Ostrom (*ibid.*) as 'second-generation' models. This survey starts in section 4.3 with a discussion of early advances emerging from the study of non-cooperative games. It is concluded there that collective-action problems are usefully analysed as problems of assurance.

The survey continues in section 4.4 with consideration of how the feedback needed to solve assurance problems might be provided within large groups whose members cannot communicate verbally with one another. In section 4.5 this discussion is extended to the case where there is scope for verbal communication between group members. Verbal communication is of course the foundation upon which collaboration typically relies. The challenge of developing second-generation models for specific collective-action settings is addressed in section 4.6. Finally, concluding comments are offered in section 4.7.

4.2 *Limitations of the comparative-static method*

The purpose in this section is to briefly review the reasons given in the literature for why the comparative-static method of economic analysis is inadequate to the task of predicting the ability of large groups to provide themselves with collective goods.

4.2.1 Accounting for non-zero provision

The zero contribution thesis emerging from comparative-static analyses of collective-action problems seems indeed to be contradicted in many aspects of everyday life. As Lichbach (1996 p. 6) remarked, there appear to be “innumerable counterexamples to the dilemma of [collective action]: people vote, interest groups exist, protest organizations form, and social movements organize ...”. These examples involve large groups that should remain latent according to Olson’s logic. Likewise, Ostrom (2000a p. 138) has commented that:

Extensive fieldwork has by now established that individuals in all walks of life and all parts of the world voluntarily organize themselves so as to gain the benefits of trade, to provide mutual protection against risk, and to create and enforce rules that protect natural resources.

Collective-action theorists have responded to this apparent gap between the predictions of their theory and everyday experience in two main ways. One kind of response (e.g., Tullock 1995) has been to argue that any spontaneous cooperation observed is attributable to irrational individuals who account for a small proportion of the population of potential participants, and to draw comfort from instances when only a small proportion of a group does cooperate. Others (e.g., Lichbach 1996) have countered that, regardless of whether cooperators are a minority or majority, the goal should be to understand why people cooperate. Adherents to this view envisage that this understanding would, when applied, enable collective goods to be provided with less need for government intervention (Sandler 1992). This was the stance adopted herein.

4.2.2 Logical incompleteness

Aside from the conclusions of comparative-static analyses often being contradicted empirically, these explanations have been exposed as logically incomplete. If large groups are unable to provide themselves with the organisational capacity required to achieve their collective goals, how is the selective-incentive solution that depends on external organisation supposed to be provided? Such organisations, including governments, are collective goods. To propose them as a solution to social dilemmas of collective action is, therefore, merely to relocate the theoretical problem to a deeper level. In the words of Elster (1989 p. 40): “To assume that there is a central authority offering incentives often requires another collective action problem to have been solved already”.

Consequently, rational-choice theorists have increasingly directed their efforts toward developing logically-complete explanations of social dilemma resolution that can account for

large groups frequently being able to resolve, at least somewhat, their social dilemmas spontaneously. A review and synthesis of these efforts begins in section 4.3, focussing on findings that allow a more realistic evaluation of the prospects for collaboration in Australian ICM programs promoting spontaneous cooperation during the implementation phase.

As these developments have largely sought to model the economic dynamics of collective action more realistically than previously achieved with comparative-static analyses, the review of theoretical developments begins in section 4.2.3 with a discussion of the weaknesses of comparative-static analyses in general. How these weaknesses have led to misrepresentation of the economic dynamics of spontaneous collective action becomes apparent as the chapter proceeds.

4.2.3 *Increasing returns*

In his *Essay on the Nature and Significance of Economic Science*, Lionel Robbins (1952/1932 p. 16) defined economics influentially as follows: “Economics is the science that studies human behaviour as a relationship between ends and scarce means which have alternative uses”. He emphasised that precision in this endeavour is challenged greatly by the time that necessarily passes in practice between employment of means and satisfaction of ends, since “the world of reality ... exhibits the appearance of incessant change ...” (ibid. p. 100). In such a world, he argued, the chief preoccupation of economists should be to understand “economic dynamics” or, equivalently, “the laws of change” (ibid. p. 103). The key postulate of such a theory of economic dynamics would be “the fact that we are not certain regarding future scarcities” (ibid. p. 79).

Similarly, Alfred Marshall (1920/1890 p. 92) referred earlier to time as “the source of many of the greatest difficulties in economics”. Seeking a manageable point of entry into developing a theory of economic dynamics, he proposed the following strategy:

The element of time ... makes it necessary for man with his limited powers to go step by step; breaking up a complex question, studying one bit at a time, and at last combining his partial solutions to a more or less complete solution of the whole riddle. In breaking it up, he segregates those disturbing causes, whose wanderings happen to be inconvenient, for the time in a pound called *Caeteris Paribus*. The study of some group of tendencies is isolated by the assumption *other things being equal*: the existence of other tendencies is not denied, but their disturbing effect is neglected for a time. The more the issue is thus narrowed, the more exactly can it be handled: but also the less closely does it correspond to real life (ibid. p. 304).

He suggested, as follows, that this strategy be pursued by means of a “statical” method:

By that method we fix our minds on some central point: we suppose it for the time to be reduced to a *stationary* state; and we then study in relation to it the forces that affect the things by which it is surrounded, and any tendency there may be to equilibrium of these forces. A number of these partial studies may lead the way towards a solution of problems too difficult to be grasped at one effort (ibid. pp. 306-307, original emphasis).

Robbins (1952/1932 p. 101) referred to this method as one of “comparative statics”. Although he considered that “it is difficult to see what other procedure could be adopted”, he was clear that “we study these statical problems not merely for their own sake, but in order to apply them to the explanation of change” (ibid. p. 103). Following his lead, the method of comparative statics is nowadays at the core of mainstream economics, applied most notably perhaps in the neoclassical theories of supply and demand. Indeed, it is the method by which Olson (1965) and Gordon (1954) conducted their analyses of collective-goods provision discussed previously (see sections 3.2.1 and 3.3.6, respectively). It is implicit too in the prisoner’s dilemma model of non-cooperative game theory that was considered in section 3.2.2.

As both Marshall and Robbins recognised, the neoclassical conception of each set of economic circumstances having a unique predictable equilibrium follows from the so-called law of diminishing returns. This ‘law’ proposes—based on the fact that different factors of production generally substitute for one another imperfectly—that “if increasing quantities of a variable factor are applied to given quantities of fixed factors, the marginal product and the average product of the variable factor will eventually decrease” (Lipsey *et al.* 1985 p. 230). If one producer is advantaged more than others by a disturbance to an existing equilibrium (e.g., if a change in the weather favours her enterprise more than others), therefore, the returns from exploiting the advantage by employing additional units of variable factors eventually disappear—at this stage the pattern of production settles into a new equilibrium. The eventual onset of diminishing marginal returns thus acts as a *negative*-feedback, or self-dampening, mechanism which, by eventually *stifling* ongoing efforts to exploit the initial competitive advantage, ensures that equilibrium returns in a new guise.

Despite the analytical tidiness of comparative statics, Marshall was emphatic in his concern that this method be used only temporarily, as a ‘stop-gap’, until economic dynamics could be modeled more satisfactorily⁴⁵. He reasoned as follows that the errors resulting from the comparative-static method would be especially serious in respect of long-term problems:

... [V]iolence is required for keeping broad forces in the pound of *Caeteris Paribus* during, say, a whole generation, on the ground that they have only an indirect bearing on the question at hand. For even indirect influences may produce great effects in the course of a generation, if they happen to act cumulatively; and it is not safe to ignore them even provisionally in a practical problem without special study. Thus the uses of the statical method in problems relating to very long periods are dangerous; care and forethought and self-restraint are needed at every step (Marshall 1920/1890 p. 315).

To the extent that the “law of increasing returns” is operative in respect of a problem, Marshall argued, the “difficulties and risks” of the comparative-static method “reach their highest point” (ibid. p. 265). He characterised this ‘law’ in the following terms: “An increase of labour and capital leads generally to improved organization, which increases the efficiency of the work of labour and capital” (ibid. p. 265). This efficiency increase, he proposed, is due to both internal and external economies that arise as a firm grows larger⁴⁶.

Marshall viewed the ‘laws’ of increasing and diminishing returns as opposing tendencies. Increasing returns to scale would be evident when the former tendency was dominant. As a generalisation, he suggested that “while the part which nature plays in production shows a tendency to diminishing return, the part which man plays shows a tendency to increasing return” (ibid. p. 265). Thus primary industries can be expected to demonstrate a tendency to diminishing returns, he reasoned, whereas service industries—in which raw material costs account for a small share of costs overall—are likely to tend toward increasing returns.

The tendency toward increasing returns to scale was illustrated by Marshall (ibid. p. 238), as follows, in the context of trades in which significant internal and external economies of scale are available:

⁴⁵ For instance, he commented: “The Statical theory of equilibrium is only an introduction to economic studies; and it is barely even an introduction to the study of progress and development of industries which show a tendency to increasing return. Its limitations are so constantly overlooked ... that there is a danger in throwing it into a definite form at all” (ibid. p. 382).

⁴⁶ Internal economies of scale were regarded by Marshall as dependent on the resources employed by firms and on the efficiency of their management. In contrast, external economies were characterised as dependent on the general development of the industry to which a firm belongs.

A new man, working his way up in such a trade, has to set his energy and flexibility, his industry and his care for small details, against the broader economies of his rivals with their larger capital, their higher specialization of machinery and labour, and their larger trade connection. If then he can double his production, and sell at anything like his old rate, he will have more than doubled his profits. This will raise his credit with bankers and other shrewd lenders; and will enable him to increase his business further, and to attain yet further economies, and yet higher profits ... and so on. It seems at first that no point is marked out at which he need stop. And it is true that, if, as his business increased, his faculties adapted themselves to his larger sphere, as they had done to his smaller; if he retained his originality, and versatility and power of initiation, his perseverance, his tact and his good luck for many years together; he might then gather into his hands the whole volume of production in his branch of trade for his district. And if his goods were not very difficult of transport, nor of marketing, he might extend this district very wide ...

Such a tendency toward increasing returns thus acts as a *positive-feedback*, or self-reinforcing, mechanism that serves to *amplify* the entrepreneur's initial competitive gain. However, the method of comparative statics implicitly assumes this tendency to be one of the inconveniences that can reasonably be held at bay within 'the pound of *ceteris paribus*'.

One of Marshall's reasons for regarding this method as fraught with 'difficulties and risks' is that it normally predicts a unique equilibrium when in fact, if there is in reality a tendency to increasing returns, there may be multiple equilibria "any one of which is equally consistent with the general circumstances of the market, and any one of which if once reached would be stable, until some great disturbance occurred" (*ibid.* p. 665). This possibility is demonstrated well by considering the conditionalities in Marshall's scenario of increasing returns to scale presented above. For instance, the eventual equilibrium will differ according to how much extra bankers lend to the entrepreneur once his production is doubled, or according to how well his faculties adapt to the challenges of an expanding business.

It is clear that precise analysis quickly becomes intractable once accounting for more than a few of the contingencies inherent in increasing-return problems is attempted. However, as Marshall emphasised, this is no justification for neglecting increasing returns altogether by failing to apply comparative statics without due 'care and forethought and self-restraint'. As he argued:

In this [dynamic] world therefore every plain and simple doctrine as to the relations between cost of production, demand and value is necessarily false: and the greater the appearance of lucidity which is given to it by skilful exposition, the more mischievous it is. A man is likely to be a better economist if he trusts to his common sense, and practical instincts, than if he professes to study the theory of value

and is resolved to find it easy (ibid. p. 306).

Nevertheless, as mentioned above, the method of comparative statics became the largely unquestioned core method of economics. It has been only in about the last decade and a half that economists, led by David (1985) and Arthur (1988; 1989), have come again to recognise the practical import of Marshall's concerns with this method. Robbins (1952/1932), for instance, discussed comparative statics with no reference to increasing returns and the risks of neglecting them. Thus it was without any caveat he proclaimed: "We study the laws of 'rest' in order to understand the laws of change" (ibid. p. 103). Perhaps he was unconvinced that the risks of neglecting increasing returns were as significant as had been suggested, due to what Samuelson (1947 p. 312) referred to as the "haziness" of Marshall's reasoning about this subject⁴⁷.

With the rigorous developments of Marshall's argument in recent years, focussing largely on the dynamics of technological adoption, awareness of the significance of increasing returns for economic dynamics has been spreading within mainstream economics. In particular, Arthur's (1989 p. 116) arguments of the kind following have been widely influential:

Modern, complex technologies often display increasing returns to adoption in that the more they are adopted, the more experience is gained with them, and the more they are improved. When two or more increasing-return technologies 'compete' then, for a 'market' of potential adopters, insignificant events may by chance give one of them an initial advantage in adoptions. This technology may then improve more than the others, so it may appeal to a wider proportion of potential adopters. It may therefore become further adopted and further improved. Thus a technology that by chance gains an early lead in adoption may eventually 'corner the market' of potential adopters, with the other technologies becoming locked out. Of course, under different 'insignificant events'—unexpected successes in the performance of prototypes, whims of early developers, political circumstances—a different technology might achieve sufficient adoption and improvement to come to dominate. Competitions between technologies may have multiple potential outcomes.

Even if comparative static analysis is able to locate the multiple equilibria associated with an increasing-return case like this, Arthur argued that such analysis cannot usually identify *which* one will occur. This is because "insignificant circumstances become magnified by positive feedbacks to 'tip' the system into the actual outcome 'selected'. The small events of

⁴⁷ Samuelson's (ibid.) discussion of comparative statics was similarly uninfluenced by Marshall's concerns regarding increasing returns (which Samuelson referred to as decreasing costs).

history become important” (ibid. p. 127). Since in comparative-static analysis these apparently small events are assumed simply not to occur, predictions from such analyses in respect of increasing-return technologies should sensibly be regarded with healthy scepticism. Indeed, in such circumstances it may be necessary to accept “that there may be theoretical limits, as well as practical ones, to the predictability of the economic future” (ibid. p. 128).

Thus, more recently, Arthur (1999 p. 107) has observed a nascent recognition in economics that increasing-return problems are often more usefully analysed as complex adaptive systems that “are ever changing, showing perpetually novel behavior and emergent phenomena” than as “equilibria—static patterns that call for no further behavioral adjustments”. In the approach of “complexity economics” the emphasis is thus on trying to understand how economic patterns evolve—so that they might be ‘guided’ iteratively as they unfold (regardless of whether this is toward an equilibrium)—rather than on how existing equilibrium patterns can be transformed by one-off interventions into others that are more preferred⁴⁸. As characterised by Arthur (ibid. p. 109), this approach “is bringing an awareness that policies succeed better by influencing the natural processes of formation of economic structures than by forcing static outcomes”. Hence, he concluded, government intervention should be viewed as: “Not a heavy hand, not an invisible hand, but a nudging hand” (ibid. p. 108).

4.3 *Insights from non-cooperative games*

Given these limitations of comparative-static theory—and the likelihood according to Marshall’s analysis that collective action (concerned as it is with ‘the part that man plays’ in economic activity) will be subject to increasing returns—there is an evident need for a logically-complete theory that allows for increasing returns from the provision of collective goods. Some insights from non-cooperative games that provided a basis for such a theory are discussed in this section.

⁴⁸ Similarly, Marshall (1920/1890 p. 382) argued that the proper task of economics is to study “society as an organism”, on the basis that “economic problems are imperfectly presented when they are treated as problems of statical equilibrium, and not of organic growth”.

4.3.1 *The possibility of large-group cooperation evolving*

In seminal research described in his book *The Evolution of Cooperation* (1984) the political scientist Robert Axelrod laid a way forward for understanding how collective action might emerge spontaneously through an evolutionary, or organic, process. Although he did not use the same terminology, his method of developing theory by trying to discover the conditions under which spontaneous cooperation unfolds most successfully is very much consistent with the approach of complexity economics advocated by Arthur (1999).

Axelrod's method was drawn from non-cooperative game theory—as has been the case for most subsequent research into the evolution of spontaneous cooperation. He started with the canonical prisoner's dilemma game, but had the insight that the prisoners might escape their dilemma if the game could be repeated. He hypothesised that their inability to communicate verbally could then be circumvented by communicating by means of their actions—more specifically by signaling their intentions by means of responding contingently to one another's actions. Thus he argued:

What makes it possible for cooperation to emerge is the fact that the players might meet again. This possibility means that the choice made today not only determines the outcome of this move, but can also influence the later choices of the players. The future can therefore cast a shadow back upon the present and thereby affect the current strategic situation (Axelrod 1984 p. 12).

The strength of this “shadow of the future”, he recognised, is inversely related to how much individuals discount the importance of possible future interactions relative to certain interactions in the present (ibid. p. 126). It can be conceived as the opportunity cost to a player of missing out on future rewards from the cooperation of others as a consequence of defecting in the present. This cost depends on a range of factors including the expected stream of rewards from continued cooperation, perceived risk of defection being detected, expected level of retaliation associated with detection, rate of risk aversion, and rate of time preference.

Axelrod thus set himself the task of discovering how cooperation might emerge among rational self-interested individuals. His method was to convene a tournament of computer-based contests in which various strategies for playing an indefinitely-repeated two-person prisoner's dilemma game were pitted against each other. Since indefinite repetition means that ‘players’ cannot be sure when their last interaction will occur, mutual defection is not necessarily—unlike when the number of plays is known in advance—a dominant-strategy equilibrium for each play (Luce *et al.* 1957). Thus scope remained to discover the

conditions, if any, that are necessary for the emergence of cooperation.

Thereby it was demonstrated that players following strategies of contingent cooperation can indeed, if the ‘shadow of the future’ is sufficiently strong, compete successfully with strategies of unconditional defection. Axelrod referred to contingent-cooperation strategies as ‘reciprocity’ strategies, although the kinds of conditional strategies with which he was concerned are sometimes known as strategies of ‘generalised reciprocity’⁴⁹. According to Putnam (1993 p. 172), a person adopting such a strategy enters “a continuing relationship of exchange that is at any time unrequited or unbalanced, but that involves mutual expectations that a benefit granted now should be repaid in the future”. In Axelrod’s (1984) game-theoretic terms, reciprocity involves cooperating unless the other player defects first, and in that case defecting *pro rata* to the other’s level of defection.

Axelrod attributed the success of reciprocity (or, more specifically, of its Tit-for-Tat⁵⁰ version) in the contests to a combination of being ‘nice’, ‘retaliatory’, ‘forgiving’ and ‘clear’. A strategy is nice if it is never the first to defect. Nice strategies do well because they cooperate with each other. A strategy is retaliatory if it immediately defects after an unprovoked defection by the other player. Retaliation is beneficial because it discourages the other player from persisting with defection. A strategy is forgiving to the extent that it is willing to cooperate in the moves after the other player has defected. Forgiveness is beneficial because it helps to restore mutual cooperation. A strategy is clear if it is easy to recognise once encountered. Clarity is beneficial in the case of a nice strategy because the other player can quickly recognise that defection is unprofitable.

The contests had started with a population of players in which strategies of reciprocity were already in play. Since the competitive advantage of strategies of this type arises from the cooperation that is reciprocated when they interact with each other, Axelrod still needed to determine whether they could survive their initial introduction into a population of strategies that do not reciprocate their niceness and indeed may seek to exploit it. In further contests he showed that a nice strategy cannot become established in an otherwise not-nice population if it is tried by individuals with no chance of interacting with each other.

⁴⁹ ‘Generalised reciprocity’ is distinct from ‘balanced reciprocity’, which refers to a simultaneous exchange of items of equivalent value (Putnam 1993). ‘Reciprocity’ is always used in this thesis with the meaning of ‘generalised reciprocity’.

⁵⁰ This strategy was the most successful of the strategies competing in the contests. A player following this strategy always cooperates in the first move and thereafter matches the move of the other player.

Nevertheless, Axelrod found that a nice strategy *can* establish itself even in a population of unconditional defectors if it is used by a *cluster* of newcomers to a population, if it is retaliatory, and if the shadow of the future is sufficiently strong. Because they do so well when they interact with each other, players using these strategies may not need to interact often among themselves to make their strategy more profitable than others. Once established, the population of players using reciprocity strategies may indeed continue to increase if conditions are favourable. This finding was summarised as follows:

... cooperation can get started by even a small cluster of individuals who are prepared to reciprocate cooperation, even in a world where no one else will reciprocate. The analysis also shows that the two key requisites for cooperation to thrive are that cooperation be based on reciprocity, and that the shadow of the future be important enough to make this reciprocity stable (ibid. p. 173).

Subsequent to Axelrod's contributions, other researchers have sought to explain how cooperation might evolve in more realistic settings. One concern was that inflexible strategies like Tit-for-Tat lead to cycles of mutual retaliation when players defect mistakenly as a result of remembering wrongly that other players defected in the preceding round. In a tournament that allowed for players to make mistakes stochastically, a more-forgiving strategy called Generous Tit-for-Tat was found to be effective at breaking such cycles of retaliation. This strategy forgives single defections with a probability of about one-third (Ridley 1996).

4.3.2 *The assurance problem*

As Axelrod envisaged, it is evident that elaborating the canonical single-play prisoner's dilemma game by allowing indefinitely repeated plays does allow them to escape this particular form of dilemma. In the transformed game players are no longer in a situation where they must formulate their choices independently of the choices that they expect others to make. The externalities they impose on one another are no longer unilateral, or asymmetric. Their choices are now interdependent because the possibility of reciprocation now casts onto current choices the shadow of the future (Runge 1981). Hence they face an assurance problem (Sen 1967) rather than a prisoner's dilemma. This problem arises from "uncertainty about the expected actions of others" and can be modeled as an assurance game (Runge 1981 p. 604). A payoff matrix for a two-player version of this game is shown in figure 4.1.

Figure 4.1: A payoff matrix for a two-player assurance game

		<i>Column Player</i>	
		<i>Cooperate</i>	<i>Defect</i>
<i>Row Player</i>	<i>Cooperate</i>	$R = 4, R = 4$ Rewards for mutual cooperation	$S = 1, T = 3$ Sucker's pay-off, and temptation to defect
	<i>Defect</i>	$T = 3, S = 1$ Temptation to defect, and sucker's pay-off	$P = 2, P = 2$ Punishments for mutual defection

Observe that, in contrast to a prisoner's dilemma payoff matrix, the reward for mutual cooperation in an assurance game exceeds the temptation to defect. Instead of the single dominant equilibrium of mutual defection in a prisoner's dilemma game, therefore, the two-player assurance game has two possible pure-strategy Nash equilibria—mutual cooperation or mutual defection (Sandler 1992). The one that actually results depends on whether or not the two players are able to assure—that is, demonstrate credible commitment to—one another that they will cooperate. If they are so able, then the Nash equilibrium associated with mutual cooperation will occur. Otherwise, the resulting Nash equilibrium will involve mutual defection.

Hence, as Axelrod's contests demonstrated, conversion of a prisoner's dilemma game into an assurance game only makes mutual cooperation *possible*. Realisation of this possibility requires prior resolution of the problem of providing assurance. As assurance is a public good, its provision constitutes a deeper social dilemma. Chong (1991 p. 118) accordingly identified the risk that "everyone will stand around waiting for others to pay the heavy start-up costs need to initiate the process [of establishing assurance]". The Nash equilibria selected in the assurance game therefore depends on how this problem of assurance provision is resolved.

In terms of Runge's (1981 p. 601) conception of the assurance problem, strategies of reciprocity can be regarded as "endogenous responses to the uncertainty of social and economic interaction" that provide "security of expectation, or assurance". However, as observed by Sugden (1986), players following reciprocity strategies are 'brave' in the sense that they are ready to cooperate before there is any evidence that others will reciprocate. They

are vulnerable, and accordingly their adoption of such strategies depends on trust in others (Newton 1997).

Trust has been defined as the expectation of one person about the actions of others that affects the first person's choice, when an action must be taken before the actions of others are known (Dasgupta 1997). It is apparent therefore that trust, at least in this sense, is equivalent to Runge's notion of assurance. Thus Hardin's (1993 p. 516) characterisation of the trust one person has for another as "just the expected probability of the dependency working out well" echoes Runge's (1981 p. 602) suggestion that assurance "be expressed in terms of the parameters describing—for each individual—the moments of a subjective probability density function over others' contribution to a public good".

Strategies of reciprocity are thus subject to their own problems of assurance. It is rational to adopt such strategies only to the extent that one is assured, or trusts, that cooperation now will later be reciprocated. How then was it possible for cooperation to emerge in Axelrod's tournaments? In answering this question it helps to begin by hypothesising that each individual assesses the probability function corresponding with trust or assurance in any instance on the basis of the perceived reputations of others with whom they seek to cooperate. This subjective assessment is reassessed progressively in the light of unfolding experience (Ostrom 1998a). This process can be viewed as a commonsense, or instinctive, form of Bayesian learning (Hardin 1993).

In Axelrod's tournaments, the task for 'players' of progressively reassessing one another's reputations was simplified greatly by each game being limited to two players and by assuming that all players remember perfectly their past interactions. In such circumstances, each player can infer with certainty the past moves of the other player because they know the outcomes and what their own moves have been. With games of three or more players (known as *n*-person games), this is no longer the case. Unless efforts are made to monitor all players, those responsible for an observed deficit in collective-good provision cannot be identified (Ostrom *et al.* 1994b). However, any mitigation of such a deficit that results from monitoring and associated sanctioning is itself a collective good. Consequently, it seems that establishing the preconditions for practising reciprocity represents a further, second-order, social dilemma. As Elster (1989 pp. 40-41) remarked with respect to the negative (i.e., defect following another's defection) aspect of reciprocity:

Punishment almost invariably is costly to the punisher⁵¹, while the benefits of punishment are diffusely distributed over the members ... To provide it, one would need second-order selective incentives which would, however, run into a third-order free-rider problem.

Ostrom (1998a) has cast the assurance problem as one in which trust and reciprocity mutually reinforce one another through positive feedbacks. Thus, as observed by Betts (1997 p. 2), “a group can become engaged in a virtuous circle of reciprocal exchanges where trust and collaboration beget more trust and collaboration, or a vicious circle where defection and betrayal lead to more of the same”.

More technically, once an individual perceives that adoption of reciprocity has increased, Bayesian learning increases her trust that others will reciprocate cooperation in the future. This strengthens the shadow of the future by raising the payoff expected from cooperating, thus augmenting her incentive to practise reciprocity. This in turn enhances her reputation for trustworthiness, thereby increasing others’ trust in her and thus their preparedness to practise reciprocity with her. Conversely, perceptions that adoption of reciprocity has declined weakens trust that future cooperation will be reciprocated, thereby further lessening adoption.

Consequently, the capacity of reciprocity strategies to foster the evolution of spontaneous cooperation depends on the extent to which these positive feedbacks link trust and reciprocity ‘virtuously’ (i.e., as an ascending spiral) rather than ‘viciously’ (i.e., as a descending spiral). Even more fundamentally, it depends on these feedbacks occurring. This brings us back to the second-order social dilemma of providing monitoring.

The foregoing discussion suggests that reciprocity strategies are analogues to the “complex technologies [that] often display increasing returns to adoption” that Arthur (1999 p. 116) referred to in his account (outlined in section 4.2.3) of the economics of complexity. In this case the relevant increasing returns arise from adoption of reciprocity strategies, in so far as the first-round effect of this adoption on cooperation—and thus on collective-good provision—is reinforced by also influencing the internal and external economies associated with providing the trust on which adoption decisions in the subsequent round will depend.

The comparative-static models of collective action reviewed in chapter three overlook increasing-return dynamics of this kind. For instance, Gordon’s (1977) neoclassical model of

⁵¹ Even if the cost is limited mainly to psychological stress resulting from provoking resentment from the punishee.

CPR appropriation (see section 3.3.6) does not allow for the possibility that attempts by individual appropriators to initiate cooperative action to conserve the commons—by stinting in their own appropriation—might erode the trust deficit discouraging others from joining such action on the basis of reciprocity and/or increase others’ incentives to establish the trustworthy reputations they require to be accepted into such an action⁵². It is notable too that Arthur’s (1999) conclusion that the appropriate role of external intervention in respect of increasing-return problems is to complement organic (i.e., endogenous) processes parallels closely Runge’s (1981 pp. 603-604) finding that:

... the lesson of the assurance game is to let individuals have full freedom to innovate self-binding rules which best serve their needs before enforcing rules from outside.

4.4 Providing large-group assurance without verbal communication

Although assurance can provide a way out of large-group social dilemmas, we have seen that its provision constitutes a further social dilemma. Evidence that large-group collective action does sometimes occur spontaneously indicates that this second-order social dilemma is not necessarily insurmountable. How then do large groups sometimes overcome this problem? An attempt to answer this question is made in this section and the next. In this section the focus is on explaining how some level of assurance might emerge in a large group even without verbal communication. The focus in section 4.5 is on the added contribution that verbal communication can make to establishing large-group assurance.

4.4.1 Insights from the natural sciences

The problem of infinite regress that remains in rational-choice explanations of spontaneous collective action is attributable to an assumption that rationality in humans involves us seeking to maximise our self interest. However, this assumption has no foundation in biology or scientific psychology. According to Wilson (1999 p. 203), it is a product of “folk psychology, the grasp of human nature by common sense—defined (by Einstein) as everything learned to the age of eighteen—shot through with misconceptions ...”. In order to arrive at a more realistic conception of human rationality, Wilson argued, it is imperative to recognise that the human brain is almost universally regarded by biologists to have evolved through natural selection.

⁵² Olson’s (1965) *Logic of Collective Action* and Hardin’s (1968) ‘tragedy of the commons’ are similarly limited.

The idea of natural selection was developed independently by Charles Darwin and Alfred Russel Wallace as the chief mechanism of biological evolution—most famously in the former’s book *The Origin of Species* (Darwin 1890/1859). Gardner *et al.* (1996 p. 179) summarised this idea as follows:

The basic idea is that the genes of a species change, and new species evolve, through an interplay between: 1) genetic variability that occurs within all species, and 2) the characteristics of the species’ environment. More specifically, those members of a species having genetic traits that are adaptive in the species’ environment survive (they are ‘selected by the environment’), and their traits eventually become predominant in the species’ gene pool.

According to this interpretation of how biological evolution occurs:

The human brain bears the stamp of 400 million years of trial and error, traceable by fossils and molecular homology in nearly unbroken sequence from fish to amphibian to reptile to primitive mammal to our immediate primate forerunners. In the final step the brain was catapulted to a radically new level, equipped for language and culture. Because of its ancient pedigree, however, it could not be planted like a new computer into an empty cranial space. The old brain had been planted there as a vehicle of instinct, and remained vital from one heartbeat to the next as new parts were added. The new brain had to be jury-rigged in steps within and around the old brain. Otherwise the organism could not have survived generation by generation. The result was human nature animated with animal craftiness and emotion, combining the passion of politics and art with rationality, to create a new instrument of survival (Wilson 1999 p. 116).

By this account the human brain “is a stone-age organ ... only recently thrust into the alien environment of industrialized society” (ibid. p. 230). Accordingly, it is commonplace in modern industrialized societies for citizens to exhibit preliterate traits including the following: “opaque to logical abstraction or arrays of the hypothetically possible, prone to use language for social interaction rather than as a conceptual tool, limited in quantification mostly to rough images of frequency and rarity ...” (ibid. p. 230).

Genes prescribe epigenetic rules which comprise the complete range of inherited regularities of development in anatomy, physiology, cognition and behaviour. According to Wilson and others contributing to the disciplines of human sociobiology and evolutionary psychology, the behaviour of animals and humans is constrained by a subset of epigenetic rules that govern their ‘prepared learning’. In other words, animals and humans are innately prepared to learn certain behaviours, and innately predisposed against learning other behaviours. Thus “the mind grows from birth to death by absorbing parts of the existing culture available to it, with selections guided through epigenetic rules inherited by the individual brain” (ibid. p. 139). From this standpoint, prepared learning of behaviour, like other epigenetic rules, is the

result of natural selection. Thus Wilson (*ibid.* pp. 139-140) has argued that some individuals inherit epigenetic rules for prepared learning that enable them:

... to survive and reproduce better in the surrounding environment and culture than individuals who lack those rules, or at least possess them in weaker valence. By this means, over many generations, the more successful epigenetic rules have spread through the population along with the genes that prescribe the rules. As a consequence the human species has evolved genetically by natural selection in behavior, just as it has in the anatomy and physiology of the brain.

Given the evolutionary history of humanity it seems reasonable to suppose that epigenetic rules making individuals innately prepared to learn cooperative behaviours remain an important ingredient of human nature. Drawing from the work of Barkow *et al.* (1992), Ostrom (2000a p. 143) presented this view as follows:

Human evolution occurred mostly during the long Pleistocene era that lasted for about 3 million years, up to about 10,000 years ago. During this era, humans roamed the earth in small bands of hunter-gatherers who were dependent on each other for mutual protection, sharing food, and providing for the young. Survival was dependent not only on aggressively seeking individual returns but also on solving many day-to-day collective action problems. Those of our ancestors who solved these problems most effectively, and learned how to recognize who was deceitful and who was a trustworthy reciprocator, had a selective advantage over those who did not.

Given this history, Cosmides *et al.* (1992 p. 163) have reasoned that “humans should have evolved a constellation of cognitive adaptations to social life ... To behave adaptively, they not only needed to construct a spatial map of the objects disclosed to them by their retina, but a social map of the persons, relationships, motives, interactions, emotions, and intentions that made up their social world”. Given that the ecological conditions of hunter-gathering would seldom have provided opportunities when two parties concurrently had value to offer one another, they argued, individuals with an advantage in engaging in reciprocity would have outreproduced others. It is plausible then to suppose that humans today have inherited epigenetic rules predisposing us to learn and apply reciprocity strategies, as well as other strategies that help individuals to cope with social dilemmas. Indeed, considerable evidence has been accumulated in support of this argument (*ibid.*).

4.4.2 *Emotions and rationality*

Frank (1990) argued that emotions evolved biologically as a means for humans to escape the above-mentioned problem of infinite regress that confronts them in assurance problems if they are perceived to be completely rational in the sense of following the strategy that is self-interest maximising. According to Elster (1998a), emotions differ from other ‘visceral factors’ such as pain, hunger and drowsiness in so far as they are triggered by beliefs. The more something is believed, therefore, the more emotionally will it tend to be expressed or followed. A list of emotions includes: anger, hatred, guilt, shame, pride, pridefulness, admiration, liking, regret, rejoicing, disappointment, elation, fear, hope, joy, grief, envy, malice, indignation, jealousy, contempt, disgust, romantic love, surprise, boredom, interest, sexual desire, enjoyment, worry, and frustration (ibid.).

In Frank’s account, emotions have arisen because commitments (e.g., promises or threats) that would not have been credible if made by an individual thought to be self-interest maximising *can* be credible if made by an individual thought—by virtue of displaying emotion—to be willing to place such commitments above his or her desire to maximise self-interest. Hence he postulated a commitment model based on “the notion that seemingly irrational behavior is sometimes explained by emotional predispositions that help solve commitment problems” (Frank 1990 p. 80). Hence it appears that inherited emotional predispositions can reduce the *n*th-order assurance problems associated with providing the reputation-related feedback needed if first-order assurance problems are to be resolved by virtuous circles of reciprocity and trust.

Consistent with this position, Fehr *et al.* (1998) have concluded that accumulated evidence from ‘laboratory experiments’ with human players—that a large fraction of people are willing to pay for rewarding cooperation and punishing defection despite the collective-good outcomes of such behaviour—is most plausibly explained by humans having biologically inherited an emotional predisposition to practise reciprocity. More particularly, they argued that the evidence suggests that deviations from reciprocity are interpreted as hostile acts that deserve to be punished, and indeed that this resentment can constitute an emotional impulse that can allow threats to be credible. In turn these threats play on others’ fears of being punished. This argument is consistent with the findings of ground-breaking psychological experiments conducted by Cosmides *et al.* (1992), which Wilson (1999 p. 190) has interpreted as follows:

More than error, more than good deeds, and more even than the margin of profit, the possibility of cheating by others attracts attention. It excites emotion and serves as the principal source of hostile gossip and moralistic aggression by which the integrity of the political economy is maintained.

These views are consistent with the finding of brain science that “passion is inseverably linked to reason. Emotion is not just a perturbation of reason but a vital part of it” (ibid. p. 116). It is subject to epigenetic rules of behaviour. Rational thought thus “emerges from continuous exchanges between body and brain through nerve discharges and blood-borne flow of hormones, influenced in turn by emotional controls that regulate mental set, attention and the selection of goals” (ibid. p. 135). It is evident therefore that the self “does not makes decisions solely by conscious, purely rational choice. Much of the computation in decision making is unconscious—strings dancing the puppet ego. ... Before the curtain is drawn and the play unfolds, the stage has already been partly set and much of the script written” (ibid. p. 131).

4.4.3 *Bounded rationality*

The developments discussed in sections 4.4.1 and 4.4.2 above complement an older literature arguing that human rationality is bounded by cognitive constraints (Hayek 1945; 1960; Simon 1955; 1957). In this view, people are incapable of solving complex problems optimally even if they have complete information. For instance, March *et al.* (1958 p. 11) described a human being as “a choosing, decision-making, problem-solving organism that can do only one or a few things at a time, and that can attend to only a small part of the information recorded in its memory and presented by the environment”.

Viewing rationality as bounded in this way leads to recognition that it is important to distinguish between the world as it ‘really’ is and how people perceive it and reason about it (Simon 1986). Simon called a person’s subjective perception of the decision problem a ‘frame’. Based on this concept, North (1990 p. 23) highlighted the role of “ideology, based upon subjective perceptions of reality [as] playing a major part in human beings’ choices”. For Denzau *et al.* (1994 p. 4):

... [I]deologies are the shared framework of mental models that groups of individuals possess that provide both an interpretation of the environment and a prescription as to how the environment should be structured. ... The mental models are the internal representations that individual cognitive systems create to interpret the environment ...

North (1990 p. 23) regarded ideologies as “providing integrated explanations of the past and present, such as communism or religions ...”⁵³ (ibid. p. 23). They bring “into play the complexity and incompleteness of our information and the fumbling efforts we make to decipher it” (ibid. p. 23). Individuals’ mental models were also called belief systems. Microlevel models for guiding day-to-day activity were referred to as heuristics or ‘rules of thumb’⁵⁴. These are ‘shorthand’ strategies people learn that tend to give them good outcomes in particular kinds of decision problems (Ostrom 1998a), and are “used because our reason is insufficient to master the full detail of complex reality” (Hayek 1960 p. 66).

The role of heuristics in economising on the constrained capacity of the human mind to process information is well illustrated by the following comment from Frank (1987 p. 23):

Anyone who tried to make fully-informed, rational choices would make only a handful of decisions each week, leaving hundreds of important matters unattended. With this difficulty in mind, most of us rely on habits and rules of thumb for routine decisions.

With types of problems that are encountered repeatedly and fairly frequently it is possible for individuals to steadily learn heuristics that give them progressively better outcomes (Ostrom 1998a). However, this takes time and does not necessarily, or even usually, result in heuristics that approximate decisions that individuals capable of complete rationality would make (Rutherford 1996).

Although adherence to heuristics means that individuals do not maximise their self-interest on a case-by-case basis, attempts have nevertheless been made to explain adoption of these decision-making ‘short-cuts’ in terms of maximising rationality. For instance, Ault *et al.* (1988 pp. 438-439) have suggested that “individuals choose habits as a response to a particular cost-benefit situation in order to maximize expected welfare with respect to both consumption and production decisions”. This implies that individuals adopt the habit which is expected to equate, at the margin, the loss of welfare from departing from case-by-case maximisation with the associated saving in information and decision-making costs.

However, identifying the ‘efficient heuristic’ is itself a complex decision requiring costly information. Maximising-rationality explanations of adoption of heuristics are thus beset with a problem of infinite regress. There is accordingly a need when explaining heuristics to accept that it is rational at some level to set an arbitrary limit on the range of possibilities

⁵³ A further example is the ideology of modernity, as discussed in section 2.2.1.

⁵⁴ Heuristics are regarded here as including habits.

explored, and thereby to ‘satisfice’ rather than maximise self-interest (Winter 1964). Elster (1998a) has argued, referring to the passage following, that people make the jump from maximising to satisficing when required by drawing on their emotions:

[The] role of emotion is to supply the insufficiency of reason ... For a variable but always limited time, an emotion limits the range of information that an organism will take into account, the inferences actually drawn from a potential infinity, and the set of live options from which it will choose (de Sousa 1987 p. 195).

4.4.4 *Reciprocity strategies as heuristics*

Given the typical complexity of large-group social dilemmas, Ostrom *et al.* (1994b) proposed that individuals in these settings use heuristics as a satisficing approach to learning about the decision situation. Lacking both the information and cognitive capacity to calculate all future contingencies and decide once and for all on a single strategy, they argued that individuals adapt their heuristics sequentially as they learn about the decision situation, including about the other people sharing the dilemma.

These propositions have since gained strong support from ‘laboratory experiments’ designed to study how humans actually behave when faced with social dilemmas (Ostrom 1999). Moreover, the accumulated evidence from experiments of this nature indicates that a substantial proportion of the population drawn upon in these experiments use a heuristic of reciprocity when facing social dilemmas, even when these experiments are in the form of single-play games with isolated anonymous players—notwithstanding the fact that individuals do vary considerably in their propensities to use reciprocity (Ostrom 1998a).

Consistent with the argument of Cosmides *et al.* (1992 p. 163) that humans inherit only a capacity to learn and apply reciprocity, Ostrom (1998a pp. 10-11) suggested as follows that the variation in actual adoption of such heuristics is explained by differences in individuals’ cultural experiences:

The process of growing up in any culture provides thousands of incidents (learning trials) whereby parents, siblings, friends and teachers provide the specific content of the type of mutual expectations prevalent in that culture ... Parents reward and punish [children] until cooperation is a learned response. In the contemporary setting, corporate managers strive for a trustworthy corporate reputation by continuously reiterating and rewarding the use of key principles or norms by corporate employees.

Hence the capacity to trust on which adoption of reciprocity relies has been regarded as:

... very much the by-product of experiences over which the individual may have had little control ...
For instance, you may have a great capacity to trust because you grew up in a wonderfully

supportive family and because your later life has been in a society where optimistic trust pays off handsomely. You are accountable for little or none of your capacity, you are merely its beneficiary (Hardin 1993 p. 525).

The importance of cultural milieu for the learning of heuristics of reciprocity has been highlighted by findings from cross-cultural laboratory experiments reported by Henrich *et al.* (1999). They found that, compared with the people from modern industrialised societies usually used as subjects in laboratory experiments (i.e., undergraduate university students), much smaller proportions of subjects from the traditional cultures they studied (i.e., the Machiguenga of Peru and the Mapuche of Chile) seemed to be following heuristics of reciprocity. Thus the Machiguenga demonstrated little propensity to punish or expectation of being punished, while the Mapuche tended to expect punishment despite revealing little propensity for administering it. Hence they concluded that considerable caution is warranted in generalising from laboratory experiments using subjects from any particular culture—specifically presuming that findings from experiments using subjects from modern industrialised cultures apply to other cultures (see section 4.4.2). Accordingly, they argued that if “universal propensities for reciprocation and punishment exist at all, they are highly plastic and subject to substantial cultural input” (*ibid.* p. 2).

Given a cognitive predisposition to learning and applying reciprocity heuristics, it is reasonable to expect such heuristics in use to be adapted according to the availability of the feedback that individuals require to use them. In large-group problems where individuals cannot observe the contributions of most other individuals to providing a collective good, for instance, a heuristic may be used that relies only on feedback in terms of observable contributions in aggregate from segments of the group, or indeed from the rest of the group (Shilony 2000).

Individuals might alternatively use evidence of collective provision as feedback regarding the degree to which others are practising reciprocity. For instance, Ostrom (1999) reported evidence from laboratory experiments concerned with CPR appropriation which suggested that individuals had used a simple heuristic. That is, they increased their appropriation from the CPR until there was a strong reduction in yield, at which time they tended to reduce their appropriation levels. As the yield again went up, they repeated the cycle. Aggregate appropriation thus followed a strong pulsing pattern.

A further adaptation in response to the problem of obtaining feedback in large groups, at

least where a collective good is divisible (e.g., where irrigation networks for small groups of neighbouring farms can substitute for a whole-of-district network) is to practise reciprocity only with subgroups of individuals regarded as having trustworthy reputations—either on the basis of past interactions or of judgements based on heuristics relating to visual or other cues. Laboratory experiments have demonstrated that strangers put in a room together for half an hour can predict—with a success rate significantly better than chance—which fellow subjects would cooperate and which would defect in a single-play prisoner’s dilemma game (Frank *et al.* 1993).

As Ridley (1996 p. 82) has observed, as follows, this makes sense: “We spend a good deal of our lives assessing the trustworthiness of others, and we make instant judgements with some confidence”. The idea that people use heuristics to assess reputations is consistent with Axelrod’s (1984) suggestion that individuals use ‘labels’ and ‘stereotypes’ as cues to infer that a stranger will behave like others sharing the same observable characteristics—and with Hardin’s (1993 p. 516) argument that one person’s trust in another can be based on generalising from experience with other people.

Hence it is possible for people to follow reciprocity selectively, simply by refusing to play with—that is, by ostracising—others they suspect would defect. By limiting themselves to social dilemmas shared by people they trust, they provide implicit feedback to the others while avoiding the costs associated with exposing their ‘niceness’ to an unacceptably high risk of exploitation. The onus is on these others to earn reputations for trustworthiness if they want to be accepted into cooperative relationships (Betts 1998).

4.4.5 *Evolution of social norms of reciprocity*

If conditions are supportive of adoption of reciprocity strategies escalating endogenously by means of a positively-reinforcing relationship with trust formation, then reciprocity may become common enough eventually to acquire the status of a social norm. This is consistent with Runge’s (1992) observation that search for ‘co-ordination norms’ is an endogenous adaptive response in an assurance problem to the demand for scarce information about the likely behaviour of others. Thus Posner *et al.* (1999 p. 370) have commented that social norms are often not promulgated but rather “result from (and crystallize) the gradual emergence of a consensus”.

A social norm is a shared understanding about actions that are obligatory, permitted or forbidden (Crawford *et al.* 1995). More specifically, it is “a rule that is neither promulgated by an official source, such as a court or legislature, nor enforced by the threat of legal sanctions, yet is regularly complied with ...” (Posner 1997 p. 365). Hence social norms are unplanned and informal, at least in so far as government is not directly involved in their promulgation or enforcement.

As Fehr *et al.* (1998) have observed, social norms are ubiquitous. They include table manners, etiquette, rules of grammar, customs, rules of voluntary associations and codes of personal conduct. There are norms against cheating, stealing and lying, norms of belonging to peer groups, clubs and unions, of conspicuous consumption, of standard business practice, voting norms, norms that restrict production under piece rate regimes and against overusing CPRs (Fehr *et al.* 1998; Posner *et al.* 1999). Although reciprocity can itself attain the status of a social norm, its most important function may be to motivate enforcement of other social norms such as those just listed (Fehr *et al.* 1998).

The social norms learned by individuals depend on their cultural milieu. This explains why norms in use vary considerably across cultures, across individuals and families within a culture, within individuals across different types of situations, and across time within any particular situation (Ostrom 1998a). For instance, Henrich *et al.* (1999 pp. 26-27) offered the following explanation for why propensities for following heuristics of reciprocity seem to be greater in modern market-based cultures than elsewhere:

Market societies are filled with opportunities to ‘cheat’, such that, if most people took advantage of these loopholes, our systems would rapidly crumble. Presumably, these systems persist with a combination of trust, a notion of what’s ‘fair’ and a fear of potential punishment. For example, ... a New York City cab driver takes a passenger to his destination before he is paid for his service. The passenger could easily exit the cab at his destination and disappear into the crowd without paying his fare ... Although it would be easy to stiff the cabby, most passengers don’t do this either because they think it is wrong or because they fear their driver may be the one crazy cabby who will hunt them down. People do lots of things because they believe it’s the right thing to do, they think its fair or because they fear that they will be punished by irrational social sanctions and ostracism ... The point is, no market-oriented industrial center can exist without trust, notions of ‘fairness’ and some fear of irrational punishment that apply to a wide range of circumstances and situations. We should expect people participating in market-contexts to evolve similar, although not identical, norms of fairness and punishment for a wide range of contexts in order to facilitate anonymous, large-group, and often one-time, transactions.

4.4.6 *Reciprocity as fairness*

As the foregoing passage implies, heuristics or social norms based on reciprocity correspond with a particular notion of fairness. Suranovic (2000) has in fact distinguished, as follows, seven principles of fairness: (i) non-discrimination fairness; (ii) distributional fairness; (iii) Golden-Rule fairness; (iv) positive-reciprocity fairness; (v) negative-reciprocity fairness; (vi) privacy fairness; and (vii) maximum-benefit fairness.

In contrast to the Golden-Rule principle which says ‘do unto others as you would have them do unto you’, reciprocity (based on both the positive-reciprocity principle and the negative-reciprocity principles) recommends ‘do unto others as they do unto you’. One manifestation of positive-reciprocity fairness is loyalty. Loyal behaviour involves actions that confer positive benefits on other individuals or groups who have taken actions beneficial to you (e.g., parents, one’s country). Conversely, betrayal occurs when positive benefits conferred are reciprocated with actions causing harm. Betrayal is commonly regarded as unfair or unjust because of the inequality of the effects (*ibid.*).

According to the negative-reciprocity principle, if someone harms you then it is fair to do something harmful to them. Suranovic (*ibid.*) has observed that actions with negative effects are most commonly justified by evoking this principle. Thus he observed that if someone violates the law and causes injury to you then, according to this principle, you are justified to reciprocate with equivalent actions. However, he pointed out that nowadays negative-reciprocal actions in response to law infringements are generally carried out by governments *on behalf of* the individuals who are harmed.

Before proceeding, it is pertinent here to observe that Suranovic (*ibid.*) classified the Pareto-efficiency criterion of neoclassical welfare economics as a variant of the maximum-benefit principle of fairness. This principle he defined as follows: If there is a set of available actions of which only one subset can be chosen, then one should choose that subset of actions such that the aggregate value of some (conceptually measurable) attribute is maximised. This principle is at work in the fairness criterion that the most qualified applicant for a job—expected accordingly to provide the greatest future benefit to the hiring firm—most deserves the job. In contrast, the positive-reciprocity principle of fairness would rank the applicants in some positive relationship to the benefits they provided to the firm in the past.

4.4.7 *Institutions*

Social norms are known otherwise as informal institutions. Recall that institutions were described in section 3.5.3 as “generally agreed-upon and enforced prescriptions that require, forbid, or permit specific actions for more than a single individual” (Schlager *et al.* 1992 p. 250). This definition accords with Schmid’s (1972 p. 893) description of institutions as “sets of ordered relationships among people which define their rights, exposures to the rights of others, privileges, and responsibilities”.

The major role of institutions is to reduce uncertainty by establishing a stable structure to everyday human interaction. That is, they “are a guide to human interaction, so that when we wish to greet friends on the street, drive an automobile, buy oranges, borrow money, form a business, bury our dead, or whatever, we know (or can learn easily) how to perform these tasks” (North 1990 pp. 3-4). This is consistent with Runge’s (1981 p. 602) view that the function of institutions in respect of assurance problems is “to parameterize expectations of the likely behavior of others”.

Perhaps most influentially, North (1990 pp. 3-4) has regarded institutions as “humanly devised constraints that shape human interaction” which are “perfectly analogous to the rules of the game in competitive team sport”. However, to the extent that ‘constraint’ has a negative connotation, neglecting the positive consequences of the constraint makes this definition less balanced than it might otherwise be. As Bromley (2000 p. 1, original emphasis) has argued in relation to environmental issues: “If I am *restrained* from harming or destroying parts of nature then those previously harmed by my actions are *liberated* by the enactment of new institutional arrangements that restrain my field of action—my choices—with respect to nature”.

4.5 *Providing large-group assurance with verbal communication*

The discussion until now has proceeded on the assumption—introduced first when discussing the prisoner’s dilemma game—that players facing an assurance problem together are unable to communicate verbally with one another. This assumption is clearly unrealistic for many assurance problems. Usually there is scope for each player to communicate verbally with at least some other players. Ways that verbal communication helps to lessen the social dilemma of providing large-group assurance are explored in the remainder of this section.

4.5.1 *Benefits from communication*

The proposition that spontaneous collective action can be promoted by enhancing feedback through allowing communication between players indeed has gained strong empirical support from laboratory experiments. For instance, Sally (1995) found from a meta-analysis of more than 100 such experiments that opportunities for face-to-face communication in single-play social-dilemma experiments raised the cooperation rate on average by 45 percentage points. In experiments where subjects were allowed to talk face-to-face before each round of plays in repeated-play social dilemmas, the cooperation rate was on average 40 percentage points higher than in equivalent experiments without that opportunity. More recent experiments reported by Ostrom *et al.* (1994b) showed similar effects. Other experimental studies have consistently demonstrated that communication increases cooperation levels to a much greater extent if it is face-to-face (e.g., Isaac *et al.* 1991; Rocco *et al.* 1995; Sell *et al.* 1991).

A number of reasons have been given for why communication consistently increases cooperation levels within assurance problems. The first reason is that communication may be necessary before individuals achieve a shared understanding that they are facing such a problem and that it is consequently possible to do better for themselves by cooperating than by acting independently (Gifford *et al.* 1997; Hine *et al.* 1997).

Indeed, Bazerman (1986), based on his research, characterised human decision making as subject to the ‘myth of the fixed pie’. That is, individuals tend to assume that their interests are in direct conflict with those of others even when win-win solutions involving cooperation are possible. Communication can allow them to overcome this bias in their mental models, as indicated in the following remarks from Innes *et al.* (2000 p. 7):

At first some stakeholders may not be aware of their interdependence. In particular they may not know what others can provide that they need or what they can offer that others want. ... Typically however, if stakeholders are at the table together, they begin to learn about their interdependencies when participants explain their own situations and needs.

In the real world, Wondolleck *et al.* (2000 p. 50) have claimed in fact that “rarely are situations in resource management truly zero-sum. Solutions can be found that bridge disparate interests, settlements can be linked to future decisions, and issues on the table can be linked to issues off the table”. These solutions can go beyond parties trading off only the concessions that were already apparent prior to communication. “Typically in such a [collaborative problem-solving] process”, observed Innes *et al.* (2000 p. 9), “players

discover they can make modifications in their behavior which may be of little cost or importance to them, but great benefit to another player. They learn that they can get other players to similarly modify their actions or positions”.

Communication can thereby significantly reduce the costs of group members cooperating in respect of a particular problem, and thus increase their respective incentives to do so. Furthermore, they may gain a broader vision of the benefits that may flow to them in other cooperation problems from acting cooperatively in the present. The shadow of the future may be strengthened, in other words, so that group members act more cooperatively as a consequence of perceiving that their opportunity costs of acting otherwise have become greater.

Secondly, communication is typically required to form a common understanding of what constitutes cooperation for each group member and what constitutes defection. If group members practising reciprocity differ in their conceptions of what one another’s cooperation entails, then the feedback between them will be at cross-purposes and difficult to interpret. Thus communication, by allowing negotiation of a mutually-agreed specification of what cooperation entails for all individuals, serves a vital role in allowing individuals to coordinate their expectations of each other more effectively than would otherwise be possible (Ostrom 1998a).

Unless a formal sanctioning mechanism is in place such agreements in laboratory settings typically involve each individual promising to contribute a specified level of resources to providing a collective good on the condition that a minimum number of others also contribute. Reaching an agreement of this kind is facilitated by individuals drawing on heuristics in respect of fairness that they have learned already, such as ‘share and share alike’, ‘first in time, first in right’, ‘to each according to need’, and ‘let’s toss for it’ (Ostrom *et al.* 1994a).

A third reason is that promising to abide by an agreement increases the incentive to cooperate in so far as individuals have internalised a social norm for promise-keeping. The fourth reason is that, when repeated, communication provides opportunities to praise cooperators and chastise defectors—even if they are anonymous—thereby increasing the external incentive for cooperation that an agreement exerts as a social norm. The final of these reasons is that communication, at least when it can be repeated, provides scope to revise an agreement if, despite the above factors, it proves to be unworkable in its existing

form (Ostrom 1998a).

4.5.2 *Advantages of communicating face to face*

Ostrom (1998a) offered, again on the basis of observed behaviour in laboratory experiments, two explanations for why cooperation levels are considerably higher when communication occurs face-to-face rather than via other media including telephone, writing and electronic mail. The first was that face-to-face communication enhances individuals' ability to assess others' reputations as well as establish their own reputations. Face-to-face interaction makes it easier to use heuristics to assess other' reputations by highlighting emotion-related and other cues that otherwise would be missed. Consider the following account by Wilson (1999 p. 174) of the capacity of humans to communicate non-verbally:

If all verbal communication were stripped away, we would still be left with a rich paralanguage that communicates most of our basic needs: body odors, blushing and other telltale reflexes, facial expressions, postures, gesticulations, and nonverbal vocalizations, all of which, in various combinations and often without conscious intent, compose a veritable dictionary of mood and intention. They are our primate heritage, having likely persisted with little change since before the origin of language. Although the signals differ in detail from one culture to the next, they contain invariant elements that reveal their ancient genetic origin.

Frank (1988) argued accordingly that there are physical 'tell tale signs' of an individual's trustworthiness. Among these are pitch and cadence of the voice, facial expressions, blushing, and perspiration (Ekman 1992). To these may be added posture, dress, personal adornment, grooming, and manners. For instance, humans have used personal adornment (e.g., beads) since some 33,000 years ago to demonstrate non-verbally to one another their prowess in hunting and their social status (Pfeiffer 1982).

The second reason was that chastising ('tongue-lashing') defectors and praising cooperators, which becomes possible in repeated-play experiments with communication allowed after each round, has added emotional force when exercised face-to-face. The efficacy of sanctioning through social approval and disapproval thus is increased—even when compliance with an agreement can be monitored only for the group in aggregate rather than individually for each of its members. Ostrom *et al.* (1994d p. 160) remarked accordingly that, in many cases, statements like "some scumbucket is investing more than we agreed upon" were sufficient to change the behaviour of defectors. Moreover, the fact that individuals believe that face-to-face communication is useful in promoting cooperation is highlighted by Ostrom *et al.* (1994b p. 197) commenting that: "Once individuals have made an agreement in

the lab, much of the time spent communicating is devoted to establishing trust and verbally chastising unknown individuals if agreements are broken”.

A further explanation, again based on behaviour observed in laboratory experiments, is that face-to-face communication can promote ‘group identity’ and thereby make group members sufficiently more regarding of each other’s welfare that they become more likely to cooperate with each other (Dawes *et al.* 1990). Consistent with this finding, Gächter *et al.* (1999) found from their experiments that opportunities to express social approval had an insignificant effect on cooperation when players previously had been complete strangers. However, they found that if the players had some minimal social familiarity with each other, such opportunities resulted in strong increases in cooperation levels. They summarised their findings as follows:

[I]f the social distance between subjects is somewhat reduced by allowing the creation of a group identity ... [then] approval incentives give rise to a large and significant reduction in free-riding. It seems that group identity is like a ‘lubricant’ that makes social exchange effective (ibid. p. 362).

Frank (1988 p. 224) earlier alluded to this phenomenon as follows:

To cheat a stranger and to cheat someone you have met personally amount to precisely the same thing in rational terms. Yet in emotional terms, they are clearly very different. Face-to-face discussion, even if not directly relevant to the game itself, transforms the other players from mere strangers into real people.

Similarly, Prugh *et al.* (2000 p. 112, original emphasis) observed how:

To work with one’s neighbors on solving a neighborhood problem, or a problem that affects all neighborhoods, is to come to know those neighbors as more than the acquaintances in the house next door. ... This process helps to forge the *we* of community, whether the encounters are cordial or not.

4.5.3 *Multiplex relationships*

In reality each person faces a steady succession of assurance problems. At least in smaller communities, therefore, it is likely that any given individual will share a variety of such problems with a common group of others. In his study of the governance of cattle trespass problems in a county of California, for instance, Ellickson (1991) noted that farmers typically deal with one another on a variety of fronts, including water supply, controlled burns, fence repairs, social events and staffing the volunteer fire brigade. He referred to such relationships as ‘multiplex’, in contrast to ‘simplex’ relationships between people who interact on a single front only. “Where population densities are low”, he observed, “each neighbor looms larger” (ibid. p. 55).

An advantage of communities characterised by multiplex relationships, or ‘dense networks’, is that individuals are likely to have more ‘repeat plays of assurance games’ with one another than would be the case if most relationships were simplex. This advantage has a number of aspects (Putnam 1993). Firstly, the greater interconnectedness of games strengthens the shadow of the future for individuals, because defection in any single play of one game puts at risk benefits not only from others cooperating with them in future plays of that particular ‘game’ but in other games as well.

Secondly, the greater frequency of repeat plays increases the feedback required for individuals to establish and maintain reputations for themselves and to assess the trustworthiness of others on the basis of *their* reputations. Indeed, since it complicates one’s reputation in a dense network to follow different norms in different games, Hoffman *et al.* (1996) suggested that we should expect individuals to follow the same norm in all games unless they discover in the process of participating in particular games that this norm disadvantages them inordinately compared with norms followed by others.

Thirdly, since trust is strengthened the more it is used (Gambetta 1993), the greater number of reinforcing encounters in dense networks tends to make norms of reciprocity more robust. Finally, denser networks allow greater flexibility in practising reciprocity—people can more easily reciprocate favours according to comparative advantage rather than on a strict ‘like for like’ basis. Ellickson (1991 p. 56) observed accordingly:

A person in a multiplex relationship can keep a rough mental account of the outstanding credits and debits in each aspect of that relationship. Should the aggregate account fall out of balance, tension may mount ... But as long as the aggregate account is in balance, neither party need be concerned that particular subaccounts are not.

Coleman (1988) argued that multiplex relationships are a particularly important ingredient of ‘social capital’ (discussed further in section 4.5.7). Dense social networks made up of multiplex interpersonal relationships thus offer improved prospects for building trust of the kind that ‘what goes around comes around’ referred to implicitly in the passage following:

Where social capital is high people contribute to the school library, even though it will not be finished before their child leaves. Where it is low a parent would be a soft-headed fool to do such a thing. Where it is high people join a working-bee to care for a local park. Where it is low they dump their household rubbish in it. In societies with high social capital children may be sent on errands in safety, elderly people can use public transport and, if a car breaks down, other drivers stop and help. In societies with low social capital vulnerable family members stay at home behind locked security doors and motorists who seem to be in distress are really bandits hoping to rob us (Betts 1997 pp. 1-2).

4.5.4 *Leadership*

Communication can also reduce the challenge of feedback within large groups by strengthening the contribution that leadership can play in this respect. Leadership is distinct from authority in the sense that following a leader is a voluntary, rather than coerced, activity of the followers (Hermalin 1998). Indeed, Wondolleck *et al.* (2000) have identified leadership as vital for success in collaborative environmental governance. A leader has been defined as someone “whose energy and vision mobilizes others to participate” (Selin *et al.* 1995 p. 191). For Bennis *et al.* (1997 p. 200), “the leader is often a good steward, keeping the others focused, eliminating distractions, keeping hope alive in the face of setbacks and stress”.

The aforementioned leadership concerns of hope and vision were integrated by Wallis *et al.* (1995 p. 41) in their proposition that the essential function of leaders is to facilitate “the convergence of the hopes of their followers into a ‘vision’ which they can share in common”. Hope is a type of emotion, as observed in section 4.4.2, and as such it is triggered by belief. In this case the belief relates to a “person’s image of what his or her own life, and the community in which this life is situated, could become” through participating in a collective quest (*ibid.* p. 39). This belief, and the emotions it evokes, allows individuals to savour in advance the realisation of a shared vision.

By being able to articulate a vision for a group that is consonant with its members’ hopes, leaders can simplify greatly the feedback between members necessary to achieve agreement that there is a need to cooperate and that cooperation should take a certain form. This potential for leadership to lessen the difficulties of achieving and sustaining large-group cooperation in respect of natural resource management is highlighted in the following comment of Baland *et al.* (1996 p. 345):

Good leaders are essential to perform several critical functions: to help people become aware of the real challenges confronting them; to convince them that they can ultimately benefit from concerted action; to show others the good example; to mobilize a sufficient number of them for enterprises requiring co-ordinated efforts; and to ensure impartiality and fairness in designing and enforcing of rules and sanction mechanisms.

4.5.5 *Feedback as by-product*

The foregoing discussion has implicitly represented the activity of providing feedback within a group as involving only costs. However, this is misleading in so far as humans, as social beings, often regard monitoring one another and exchanging what they see and hear as enjoyable. It might plausibly be supposed that this is an emotional aspect of humans' biologically-evolved cognitive adaptations to social life that assist us in mapping our social world (see section 4.4.1).

Therefore, to the extent that circumstances are such that parties facing an assurance problem are already interacting for other purposes, resolving the problem by exchanging feedback is lessened. Social, or informal, norms can play a vital role in this respect, as highlighted by Nee's (1998 p. 87) comment that:

... [I]nformal norms ... are reinforced by means of ongoing social relationships ... Unlike formal rules, the monitoring of informal norms is intrinsic to the social relationship, and enforcement occurs informally as a by-product of social interaction ... The cost of social rewards to achieve conformity to norms is low because it is produced spontaneously in the course of social interaction in networks of personal interactions.

In other words, transaction costs of collective action are reduced to the extent that “conformance is obtained as a joint product from the cultural and social fabric that often clothes a small community” (Brown 2000 p. 901). In her classic book *The Death and Life of Great American Cities*, Jane Jacobs (1992/1961 p. 56) captured this phenomenon vividly in the passage following:

The trust of a city street is formed over time from many, many little sidewalk contacts. It grows out of people stopping by at the bar for a beer, getting advice from the grocer and giving advice to the newsstand man, comparing opinions with other customers at the bakery and nodding hello to the two boys drinking pop on the stoop, eyeing the girls while being called for dinner, admonishing the children, hearing about a job from the hardware man and borrowing a dollar from the druggist, admiring the new babies and sympathizing over the way a coat faded. Customs vary: in some neighborhoods people compare notes on their dogs; in others they compare notes on their landlords. Most of it is ostensibly utterly trivial but the sum is not trivial at all. The sum of such casual, public contact at a local level—most of it fortuitous, most of it associated with errands, all of it metered by the person concerned and not thrust upon him by anyone—is a feeling for the public identity of people, a web of public respect and trust, and a resource in time of personal or neighborhood need.

Sturges (1997b p. 65) characterised this spontaneous feedback as “the endless ‘chatter’ that goes on in a successful community, the continuous shuttling back and forth of small bits of information about expectations and performance”. It allows us to attribute reputations to individuals or groups with whom we have not had experience first-hand. Posner *et al.* (1999 p. 381) have remarked accordingly that: “Gossip is an important facilitator of sanctions for violating norms”. As Putnam (1993 p. 169) has observed, feedback of this kind enables trust to become transitive: “I trust you, because I trust her and she assures me that she trusts you”. Granovetter (1973 p. 1374) commented on the importance of this phenomenon particularly for leadership of large groups as follows:

I would propose that whether a person trusts a given leader depends heavily on whether there exist intermediary personal contacts who can, from their own knowledge, assure him that the leader is trustworthy, and who can, if necessary, intercede with the leader or his lieutenants on his behalf.

Nevertheless, it is obvious that feedback-exchange is not always accomplished so spontaneously. Jacobs explained that the success in the case she described arose from the neighbourhood being structured in such a way that there were, firstly, concrete reasons for using, and looking at, the sidewalks. These reasons arose from the “intricacy of sidewalk use ... The ballet of the good city sidewalk never repeats itself from place to place, and in any one place is always replete with new improvisations” (*ibid.* p. 50). Thus large numbers of people were entertaining themselves by watching street life. Secondly, the buildings along the streets happened to be arranged in such a way that the people living and working in them, who Jacobs (*ibid.* p. 35) termed the “natural proprietors of the street”, could easily take advantage of this entertainment.

Thirdly, there were numerous opportunities for casual interaction on the streets. These opportunities are vital, Jacobs observed, because it makes it:

... possible in a city street neighborhood to know all kinds of people without unwelcome entanglements, without boredom, necessity of excuses, explanations ... and all such paraphernalia of obligations ... Such relationships ... form precisely because they are by-the-way to people’s normal public sorties (*ibid.* p. 62).

In this way such a neighbourhood:

... achieves a marvel of balance between its people’s determination to have essential privacy and their simultaneous wishes for differing degrees of contact, enjoyment or help from the people around. The balance is made up of small, sensitively managed details, practised and accepted so casually that they are normally taken for granted (*ibid.* p. 59).

The final reason Jacobs gave for the success of such neighbourhoods is the existence of a cast of “self-appointed public characters”. Such a person:

... is anyone who is in frequent contact with a wide circle of people and who is sufficiently interested to make himself a public character ... His main qualification is that he *is* public, that he talks to lots of different people. In this way news travels that is of sidewalk interest ... Not only do public characters spread the news and learn the news at retail, so to speak. They connect with each other and thus spread word wholesale, in effect (ibid. pp. 68, 70).

Although these insights are drawn from an inner-city context, they clearly have parallels in the context of providing collective goods, such as conservation of the natural environment, in rural contexts.

People facing an assurance problem often have scope to reduce the costs of providing the feedback they require by influencing one or more of these conditions of their wider social situation. For instance, Ostrom (1990) observed that successful group-property systems often have reduced their monitoring costs by designing operational rules that place the actors most concerned with defection in direct contact with one another as part of their appropriation activities (e.g., in many irrigation-rotation systems). Hence there is no need to invest additional resources in monitoring activities.

Moreover, advances in communication technologies are making it easier to casually exchange observations from informal monitoring. For instance, Singleton (1998) found that most inshore fishers in the Pacific Northwest of the USA now use short-wave radios routinely in their day-to-day operations, allowing other fishers to be instantly informed of rule breaches. She quoted a fisheries manager for an Indian tribe in that region as reporting:

... that it is not uncommon to hear messages such as ‘Did you see so-and-so flying all that net?’ over the short-wave frequency—a clear reference to a violation of specified gear limits. Since all fishermen listen to their short-wave radios constantly, such publicity is tantamount to erecting a flashing neon sign over the boat of the offender (ibid. p. 132).

4.5.6 *The strength of weak ties*

The foregoing discussion of Jacobs’ observations of inner-city street life serves to highlight an insight now usually attributed to Granovetter’s (1973) well-known article *The strength of weak ties*. He observed that ‘strong’ interpersonal ties tend to be less important than ‘weak’ ties in sustaining community cohesion and collective action. Strong, or enduring, ties generally occur among people who share common bonds such as profession, ethnicity, kin,

status or recreational interest. These ties are often characterised by some emotional intimacy.

In contrast, weak ties tend to be more instrumental and less emotional. They enable the building of ‘social bridges’ between groups that less obviously share common bonds. Granovetter observed accordingly that weak ties are indispensable to the integration of individuals into their wider communities. He illustrated his argument as follows:

Imagine ... a community completely partitioned into cliques, such that each person is tied to every other in his clique and to none outside. Community organization would be severely inhibited ... Enthusiasm for an organization in one clique, then, would not spread to others but would have to develop independently in *each one* to insure success (ibid. p. 1374, original emphasis).

After describing how weak ties can generate trust sufficient for a neighbourhood of strangers to function effectively as a community, Jacobs went on to describe how such ties can also enable social cohesion to emerge endogenously at the higher level of districts. For this to occur, she observed as follows, a particular type of weak ties must develop:

... [T]hese are working relationships among people, usually leaders, who enlarge their local public life beyond the neighborhoods of streets and specific organizations or institutions and form relationships with people whose roots and backgrounds are in entirely different constituencies, so to speak ... It takes surprisingly few [of these] hop-skip people, relative to a whole population, to weld a district into a real Thing. A hundred or so people do it in a population a thousand times their size. But these people must have time to find each other, time to try expedient cooperation (Jacobs 1992/1961 p. 134).

It seems therefore that leaders have an important role beyond facilitating a common vision for their groups (see section 4.5.3)—namely helping their followers to establish the trust in other groups that they require to enter into mutually-rewarding cooperation with them.

4.5.7 *Social capital*

The foregoing discussion has highlighted how communication, and the inter-personal networks that become established and are maintained as a result, plays a crucial role in providing the feedback without which the trust needed to resolve assurance problems could not develop. Jacobs (1992/1961 p. 138) acknowledged the importance of such networks in city neighbourhoods by referring to them as “a city’s irreplaceable social capital. Whenever the capital is lost, from whatever the cause, the income from it disappears, never to return until and unless new capital is slowly and chancily accumulated”.

Once Coleman (1990), a sociologist, rediscovered the term ‘social capital’, it was soon applied across the social sciences to all sorts of issues. He regarded social capital as inhering in the structure of inter-personal relations, yielding value by enhancing individuals’ abilities to further their interests. It is created, he proposed, when a structure of inter-personal relations is changed in ways that allow individuals within that structure to more effectively pursue their interests.

Social capital is similar to other types of capital in so far as, firstly, once it is created it yields an ongoing stream of benefits. Secondly, it can usually be appropriated for a variety of uses. Putnam (1993) noted accordingly that collective action for different purposes often draws on a common stock of social capital. For instance, “success in starting small-scale initial institutions enables a group of individuals to build on the social capital thus created to solve larger problems with larger and more complex institutional arrangements” (ibid. p. 169).

Moreover, social capital can be substituted for other productive inputs, and *vice versa*. This includes substitution for physical or human capital. For instance, Schmid *et al.* (1995) commented that trust can substitute for police surveillance and legal services. Coleman (1990) gave a further example where social capital within a farming community, by underpinning trust, allowed extensive borrowing and lending of tools and equipment and thus allowed each farmer’s work to be done with less investment in physical capital.

Most forms of social capital have an important public good component (ibid.). Putnam (1993 p. 170) illustrated this vital point as follows:

[M]y reputation for trustworthiness benefits you as well as me, since it enables us both to engage in mutually rewarding cooperation. But I discount the benefits to you of my being trustworthy (or the costs to you of my being untrustworthy) and thus I underinvest in trust formation.

Due to these public good characteristics, Coleman (1990) recognised that provision of social capital is usually less than the Pareto-efficient level. Thus, he reasoned, the social capital that does exist is mostly an unintended by-product of individuals pursuing their self-interest. This phenomenon is well illustrated by Jacobs’ (1992/1961 p. 119) account of how human curiosity and by-the-way affability in city neighbourhoods can lead to “networks of small-scale, everyday public life and thus of trust and social control”. Social capital is only likely to be intentionally created, he argued, when it is an input to the production of private goods—like where a group of workers is sent on a ‘retreat’ to forge group identity in order to become more useful to their employer.

Nevertheless, characterising social capital as a public good is misleading, thus running the risk of leading to misguided policy prescriptions, in so far as the public-good attribute of nonrivalrousness inadequately describes the relationship between the appropriation of social capital and its provision. Although the description is true in that appropriation does not reduce provision, it disregards the fact that appropriation of social capital usually *increases* its provision as a result of positive feedbacks or increasing returns. This point has been illustrated by Cox (1998) likening social capital to the Magic Pudding (Lindsay 1918), an Australian storybook character that increases in size as it is eaten. Like some forms of human capital, such as knowledge, social capital actually becomes depleted unless it is put to regular use (Putnam 1993).

The social capital concept has now been applied in numerous empirical studies, with Putnam's (ibid.) attempt to use it to explain differences in the performances of Italian regional governments among the earliest and best known. Economists have also adopted the concept for theoretical (e.g., Robison 1997) and empirical analyses (e.g., Schmid *et al.* 1995; Terry *et al.* 1997). Although Baron *et al.* (1994) doubted whether the term 'capital' appropriately describes the concept, Castle (1998) has countered that economists should consider social relations as capital because of empirical evidence (e.g., from Knack *et al.* 1997) that these relations affect economic performance.

As for any type of capital, the value of social capital depends on the use to which it is put, as well as on one's preferences and circumstances. Its value can therefore be positive to one person and negative to another. For instance, the advantages obtained by one group from its inter-personal relations may disadvantage other groups. Thus Adam Smith (quoted in Granovetter 1985) remarked how when "people of the same trade" meet "even for merriment and diversion" the outcome is typically "a conspiracy against the public". Likewise, Olson (1982) concluded that longstanding civic groups may impede economic growth by securing a disproportionate share of their society's resources. For example, Granovetter (1985) remarked upon the use of social capital in developing cartels and in restricting access to markets.

Moreover, as highlighted by Portes *et al.* (1996), a group's social capital that once had a positive value may come to acquire a 'downside' by placing heavy personal obligations on members that make it difficult for them to benefit from cooperating in broader groups. Woolcock (1998 p. 158) illustrated this point as follows:

... [E]ntry into a given community—say, Koreans in south central Los Angeles ...—gives the new arrival access to financial and personal support so that a small business can be started. Lacking material assets (physical capital), recognized skills and fluency in English (human capital), the immigrant is able to call upon her social capital to launch a new life. If the business is successful, however, there will likely come a time when the ethnic community is neither large enough nor heterogeneous enough to provide the product and factor markets necessary for more complex economic exchange ... Access to new networks extending beyond the ethnic community are therefore required, but this will be very difficult if intra-community obligations are highly demanding.

Although opportunities to communicate face to face, and the social capital that accumulates therefrom, can contribute significantly to providing the trust needed to overcome assurance problems, the fact remains that the growing size, fragmentation, complexity and speed of change in most contemporary societies is making it progressively more difficult to rely on this form of communication as a source of trust (Newton 1997). More abstract, or less personal, sources of trust—especially mass media and education systems—are therefore likely to increase progressively in importance (ibid.). Nevertheless, personal ties are likely to remain crucial as complements to these less personal sources of trust. As Granovetter (1973 p. 1374, original emphasis) observed:

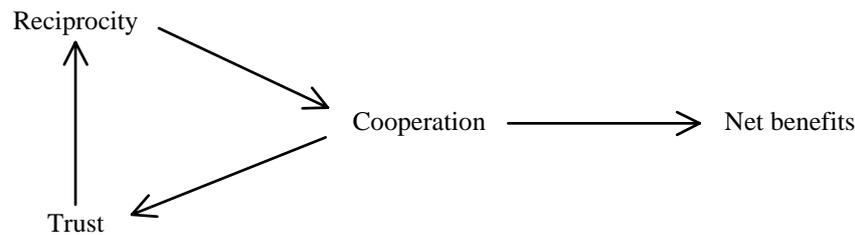
... [S]tudies of technology diffusion and mass communication have shown that people rarely *act* on mass-media information unless it is also transmitted through personal ties ...; otherwise one has no particular reason to think that an advertised product or an organization should be taken seriously.

4.6 *Constructing second-generation models of collective action*

As discussed in section 4.3.2, the second-generation approach to rational-choice analysis of collective action reviewed in this chapter has at its core a set of mutually-reinforcing relationships between trust, reciprocity and cooperation. The level of cooperation in turn affects the net benefits accruing from collective action. This core model is illustrated in figure 4.2.

These core relationships are each subject to the influence of numerous so-called structural variables. The discussion in sections 4.4 and 4.5 was concerned with some of these structural variables. These included: opportunities for communication (verbal—including face-to-face—and non-verbal); opportunities and incentives one's culture provides to learn heuristics/norms of reciprocity; leadership; and social capital. However, many other

Figure 4.2: Core relationships in a second-generation model of collective action



Source: Adapted from Ostrom (1998a p. 13, figure 2)

structural variables influence these relationships. A far from exhaustive list includes: group size; symmetry of interests/endowments among group members; salience of the collective-action problem; members' discount rates; social norms (e.g., promise-keeping, honesty, etc.) within the group; formal institutions; opportunity costs of members' time spent in developing a plan; and members' capacities to mediate conflicts and negotiate agreements.

As Ostrom (1998a p. 16) has observed, it is not feasible to relate all the relevant structural variables in a single rational-choice theory of collective action "given that they are so numerous and that many of them depend for their effect on the values of other variables". For instance, it becomes apparent in chapter five that the effect on the success of collective action of introducing a new formal institution depends on the extent to which the introduction accords with the social norms extant within a group.

In such circumstances, a way forward is to develop:

... coherent, cumulative, theoretical scenarios that start with relatively simple baseline models and then proceed to change one variable at a time ... From such scenarios, one can proceed to formal models and empirical testing in field and laboratory settings (ibid. p. 16).

An illustration of this method was provided by Ostrom (ibid.). Structural variables relevant to a particular setting were incorporated into the core model sequentially, with the predicted effect on cooperation and net benefit revised at each step. She recognised that the resulting theoretical propositions will typically be conditional, so that rarely will it be possible to state that one structural variable is always positively or negatively related to net benefit.

Hence the theoretical models that emerge will be unavoidably messy, signifying that "the scholars' love of tidiness must be resisted" if they are to contribute to developing second-generation models of rational-choice collective action (Ostrom 1999 p. 530). This plea echoes Alfred Marshall's (1920/1890 p. viii) warning from more than a century earlier that: "Nature's action is complex: and nothing is gained by pretending that it is simple, and trying

to describe it in a series of elementary propositions”.

4.7 *Concluding comments*

Assurance, or trust, was identified in this chapter as pivotal to large groups self-reliantly overcoming their collective-action problems. Although ‘first-party’ provision (i.e., horizontally between group members) of the feedback required to establish assurance is often likely itself to represent a social dilemma, it seems that humans are adapted biologically (e.g., cognitively and emotionally) in various ways that help us in turn to adapt culturally (e.g., by learning from experimentation with heuristics and norms) so that we become capable of handling spontaneously at least part of the challenge this problem presents us with.

For instance, face-to-face communication—upon which collaborative environmental governance has primarily been founded—seems to be a particularly powerful medium of feedback exchange. Aside from allowing exchange of factual verbal messages it also permits emotional feedback to work to maximum effect. At the same time the social dilemma of providing first-party feedback through face-to-face communication is often lessened considerably by human emotions predisposing us to gain personal satisfaction from much of the social interaction this entails.

It was evident too in this chapter that it is not possible to explain spontaneous emergence of large-group collective action without appreciating that this activity is subject to increasing returns (such that positive feedbacks reinforce efforts to provide assurance). Of course, none of the above suggests that large groups can or should do without outside help in solving their collective-action problems. The rationale for groups seeking or accepting such help is considered in the following chapter.

5. HIERARCHY, CULTURE AND SUSTAINABLE DEVELOPMENT

5.1 *Introduction*

In the previous chapter an explanation of how it is possible for members of large groups to undertake at least some collective action spontaneously was offered. However, this does not preclude an important role for formal organisation, otherwise known as hierarchy, in providing selective incentives that allow a still-greater level of collective action to occur. Nevertheless, it does suggest that the cost hurdle faced by large groups in organising hierarchically to administer selective incentives is not necessarily as prohibitive as Olson (1965) concluded it to be (see section 3.2.1).

The purpose of this chapter is accordingly to explore the role of hierarchical organisation in solving problems of collective action faced by large groups. This requires consideration of the appropriate relationship between the system of organisation within a group and the system of higher-level organisation outside of it. It requires consideration too of the appropriate role of government in the overall scheme of a society's hierarchical organisation. These issues are addressed in section 5.2. The prospect of intervening to influence a society's hierarchical organisation raises questions of efficiency which are discussed in section 5.3. This involves consideration of the path dependency of institutional choice and thus of how culture evolves more generally. It is argued that the appropriate concept of efficiency given this path dependency is adaptive efficiency.

In section 5.4, a coevolutionary perspective on path dependency and adaptive efficiency in respect of cultural evolution is presented. The intention is to highlight limitations of the modern approach to democratic governance in respect of a goal of sustainable development. Use of the subsidiarity principle as a heuristic to guide institutional choice in respect of hierarchical organisation according to the criterion of adaptive efficiency is discussed in section 5.5. Finally, concluding comments are offered in section 5.6.

5.2 *The role of hierarchy and government*

In this section the contribution of hierarchical organisation, including government, to resolution of collective-action problems is explored.

5.2.1 *The possibility of hierarchy emerging endogenously*

Systems of selective incentives provided hierarchically are typically needed in large-group situations to bolster the shadow of the future—by increasing the likelihood of defections being identified and punished—sufficiently that the defection rate does not exceed a threshold over which trust and conditional cooperation begins to unravel in a vicious circle. This complementarity of internal (or ‘horizontal’) and hierarchical (or ‘vertical’) sources of assurance was recognised by Buchanan (1988 p. 342) in the following terms:

Viable social order depends on both those institutions that embody reciprocally cooperative behavior on the parts of interacting individuals and those institutions that reflect constructed constraints that effectively prevent noncooperating deviants from exploiting those who do adhere to the social norms.

This does not necessarily entail large groups depending entirely on external actors to provide them with selective-incentive mechanisms. Indeed, there is now considerable empirical evidence that large groups can sometimes, with little or no external intervention, provide themselves with a hierarchical system of organisation capable of designing, implementing, monitoring and enforcing selective-incentive mechanisms. Perhaps the most impressive evidence of this kind has come from field research of cases where appropriators of CPRs have attempted to develop and maintain organisations to resolve their assurance problems. The seminal work of this kind is Elinor Ostrom’s (1990) *Governing the Commons*. Her cases were focussed on small-scale CPRs (e.g., forests, irrigation systems, groundwater basins, and inshore fisheries) in a variety of countries involving groups of up to 15,000 persons—that Olson would have considered to be large and thus incapable of successfully providing themselves with formal organisation.

A centrepiece of this work of Ostrom’s was the identification of a set of ‘design principles’ for enduring, self-governing CPR organisations—seven that apply to all such organisations, plus an eighth principle that applies to larger, more complex cases. By ‘design principle’ is meant an essential element or condition that helps to account for the success of these organisations in sustaining the CPRs and gaining the compliance of generation after generation of appropriators to the selective-incentive mechanisms, or rules or institutions, in use. The design principles Ostrom identified are listed in table 5.1.

These design principles can be viewed as necessary (although usually not sufficient) conditions to be met for the transaction costs of CPR appropriators providing themselves

Table 5.1: Design principles illustrated by long-enduring CPR organisations

1.	Clearly defined boundaries. Individuals or households who have rights to withdraw resource units from the CPR must be clearly defined, as must the boundaries of the CPR itself.
2.	Congruence between appropriation and provision rules and local conditions. Appropriation rules restricting time, place, technology, and/or quantity of resource units are related to local conditions and to provision rules requiring labour, material, and/or money.
3.	Collective-choice arrangements. Most individuals affected by the operational rules can participate in modifying the operational rules.
4.	Monitors. Monitors, who actively audit CPR conditions and appropriator behaviour, are accountable to the appropriators or are the appropriators.
5.	Graduated sanctions. Appropriators who violate operational rules are likely to be assessed graduated sanctions (depending on the seriousness and the context of the offence) by other appropriators, by official accountable to these appropriators, or by both.
6.	Conflict-resolution mechanisms. Appropriators and their officials have rapid access to low-cost local arenas to resolve conflicts among appropriators or between appropriators and officials.
7.	Minimal recognition of rights to organise. The rights of appropriators the devise their own institutions are not challenged by external government authorities.
<i>For CPRs that are part of larger systems:</i>	
8.	Nested enterprises. Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organised in multiple layers of nested enterprises.

Source: Ostrom (ibid. p. 90)

with selective-incentive instruments to be low enough that the associated assurance problem becomes tractable. For instance, clearly-defined boundaries lower exclusion costs by making it easier to identify instances of unauthorised appropriation. Most of the other principles relate to the advantages of exploiting local knowledge to lower the costs of devising, modifying and enforcing such instruments—not only biophysical knowledge but also the social knowledge (e.g., of relevant norms, networks, and reputations) that is vital if the interpersonal dynamics of building and maintaining spontaneous cooperation are to be exploited successfully.

The eighth design principle has in particular attracted considerable interest, especially from scholars and policy analysts concerned with promoting self-organisation of large groups in complex, industrialised societies. This principle recognises that complex CPR problems, for which self-organisation in a single step typically involves prohibitive transaction costs, are often decomposable into sequences of smaller problems—and that the transaction costs of self-organised solutions to some of these smaller problems may not present intractable assurance problems.

Once an organisational base (consisting of physical, human and social capital) is established for smaller problems, the opportunity to build on it to address an assurance problem that is slightly more challenging may allow this problem to be resolved endogenously when otherwise the transaction-cost hurdle would be prohibitive. This way endogenous organisational capacity can accumulate through “the incremental self-transformations that frequently are involved in the process of supplying institutions” (Ostrom 1990 p. 190).

Thus an elaborate hierarchy of nested enterprises can be the eventual result of larger organisational units emerging from, and then ‘nesting’—in the sense of supporting and nurturing—smaller units that managed to self-organise sooner. Smaller organisations thus become a part of a larger, more inclusive system without giving up their essential autonomy⁵⁵. Jacobs’ (1992/1961) account of how neighbourhood leaders with ‘hop-skip’ weak ties can effectively establish a real sense of community at the district level gives some idea of how this might occur in practice (see section 4.5.6). Wells *et al.* (2000 p. 137) have observed that Ostrom’s explanation of hierarchical organisation emerging through an organic bottom-up process is:

... a model of the kind of grass-roots democracy which those theorists who have stressed the importance of a strong and vigorous ‘civil society’ for democratic life more generally have always looked to.

This perspective portrays the various levels of government as higher layers of the hierarchy of nested enterprises relevant to any first-order assurance problem, such as mitigating the rent dissipation associated with a particular CPR currently subject to open access. In the case of the Spanish *huertas*, for instance, “irrigators are organised on the basis of three or four nested levels, all of which are then also nested in local, regional, and national governmental jurisdictions” (Ostrom 1990 p. 102).

Moreover, it suggests a solution to the logical incompleteness of the neoclassical tradition prescribing government—itsself a large-group collective good—as an answer to the inability of large groups of civilians to provide themselves with collective goods (see section 4.2.2). That is, effective government is possible only to the extent that the assurance problems involved in its provision are mostly already solved at lower levels of a society’s hierarchy of organisation.

⁵⁵ This is consistent with Olson’s (1965) suggestion that a large group’s inability to provide itself with a collective good might be overcome if the group were structured as a federation of smaller groups (see section 3.2.1)—although his comparative-static reasoning overlooked the positive-feedback considerations emphasised by Ostrom.

It follows that a government needs to complement, rather than displace, the self-governing capacities at simpler levels of social organisation if it is to be effective. Arrow (1974 p. 72) remarked accordingly that: “Control mechanisms are, after all, costly. If the obedience to authority were solely due to potential control, the control apparatus would be so expensive in terms of resources used as to offset the advantages of authority”. Similarly, Ostrom (1998a p. 16) observed that:

No police force and court system on earth can monitor and enforce all the needed rules on its own. Nor would most of us want to live in a society in which police were really the thin blue line enforcing all rules.

Moreover, the so-called law of diminishing returns suggests that government will become less competitive as an input to producing the organisation needed for assurance as the reliance on it *vis-a-vis* other sources of social organisation increases. Thus Gambetta (1988) commented: “Societies which rely heavily on the use of force are likely to be less efficient, more costly, and more unpleasant than those whose trust is maintained by other means”.

Empirical evidence for this proposition has come from field research which has often found that when CPR appropriators organise themselves to set and enforce their own rules, they tend to be more successful in sustaining the CPR than when rules are imposed on them from the outside (e.g., Baland *et al.* 1996; Blomquist 1992; Lam 1998; Singleton 1998; Tang 1992). For instance, Tang (1992) and Lam (1998) each found that large-scale government irrigation systems tend not to perform as effectively as farmer-managed, smaller-scale systems based on strong, locally-devised rules that complement local social norms.

5.2.2 Rethinking the social contract

By no means does this deny a vital role for governments in facilitating the provision of large-group collective goods. As North (1990 p. 58) has argued:

The more complex the exchange in time and space, the more complex and costly are the institutions necessary to achieve cooperative outcomes. Quite complex exchange can be realized by creating third-party enforcement via voluntary institutions that lower transaction costs about the other party; ultimately, however, viable impersonal exchange that would realise the gains from trade inherent in the technologies of modern interdependent economies requires institutions that can enforce agreements by the threat of coercion. The transaction costs of a purely voluntary system of third-party enforcement in such an environment would be prohibitive. In contrast there are immense scale economies in policing and enforcing agreements by a polity that acts as a third party and uses coercion to enforce agreements.

Aside from the challenges modernisation presents for civil self-organisation through promoting social complexity via the division of labour, it presents challenges too by tending to increase the material income of societies and their members. To the extent that education levels increase with income (because education is a superior good⁵⁶), norms may be weakened by giving people tools to use in creating their own moral principles (Posner *et al.* 1999). By exposing people to more of the diversity of norms held across a society, education may also encourage “‘norm shopping’, whereby an individual can opt into the system of norms that constrains his own behavior the least” (Posner 1997 p. 367). He suggested that the reduced scope for norm shopping in rural areas compared with cities partly explains the moral differences between the two.

In addition, Posner *et al.* (1999 p. 381) observed as follows that privacy, also a superior good, becomes increasingly protected by law as incomes rise:

... [P]rivacy reduces the efficacy of norms by depriving neighbors, acquaintances, gossips, and scandal sheets of the information needed for shame, informational, and multilateral sanctions.

The efficacy of shaming as a way of sanctioning norms can also be expected to fall as incomes rise:

... because in a wealthy society the individual is less dependent on the good will of his particular community (either because he is wealthy himself or he has a social safety net under him) ... (Posner 1997 p. 367).

However, it does not follow from social norms weakening as a result of modernisation that governments should start from ‘ground zero’ when designing third-party interventions. For Posner *et al.* (1999 p. 382) the appropriate response by governments to this trend is to focus on “supplementing and regulating rather than supplanting norm sanctions ...”. They listed the following six ways of doing so:

- Providing supplemental punishment if the informal sanction for violating a norm is inadequate. This is especially important for people who “lack guilt and shame, do not mind ostracism ..., or have no reputation to lose ...” (ibid. p. 380).
- Providing information. For instance, governments can publicise violations of norms so that their sanctioning through shaming is more effective.
- Being careful about interfering with norm sanctions. For instance, he commented that: “If bilateral sanctions such as shotgun marriages are to work, the law has to relax its

⁵⁶ The amount demanded of a superior (or normal) good has a positive relationship with the level of income (Kamerschen *et al.* 1977).

monopoly on force” (ibid. p. 381). Observe the consistency of this point with Ostrom’s (1990) seventh design principle for enduring CPR organisations (see section 5.2.1).

- Providing incentives for administering private sanctions for violating a norm.
- Fostering the creation of norms. When norms are sanctioned by guilt and shame, he observed, governments can help to instill these through educational programs.
- Combating ‘bad’ norms, by (a) diminishing the benefits of compliance with such norms by creating effective legal remedies for deliberate injuries (thus reducing the benefit of a vengeance norm such as based on personal honour), or (b) increasing the cost of complying with a bad norm, for instance by affixing a legal penalty (e.g., making ‘drink-driving’ a crime).

The coercive powers of governments can complement civil self-organisation in a variety of other ways. In CPR contexts, for instance, they can be useful for bringing parties together when there has been a history of conflict between them, legitimising agreements reached voluntarily, and for raising the resources required to provide the information needed to understand the problem and develop solutions (Ostrom *et al.* 1999).

As observed by Baland *et al.* (1996 p. 347), such perspectives regarding the role of government point to the value of a “co-management” approach to governance wherein policy interventions are concerned with helping governments and communities to shore up one another’s weaknesses. From this perspective, government-based and community-based means of providing assurance “can be combined in numerous and imaginative ways which open the door to many more solutions than the three standard approaches [government-property, group-property and individual-property systems] usually referred to in the literature” (ibid. p. 346).

Wells *et al.* (2000) have suggested that Ostrom’s concept of nested enterprises gives substance to Locke’s idea of a social contract (see section 2.2.2). They were concerned that “it can easily seem that by itself the mere idea of a ‘social contract’ is too abstract, too disconnected from the realities of ‘really existing’ governance’, to take us much beyond the merely platitudinous ...” (ibid. p. 128). In particular, they saw the idea of nested enterprises as giving explicit shape to the notion of civil society central to the Lockean social contract, and helping to clarify the role of the state as the protector of this realm. From this standpoint, they argued:

The state is simply the most inclusive social commons regime around. It has no special, and no unique powers. Sovereignty is often pointed to here as the mark of such uniqueness and interpreted in

authoritarian terms, but in the Lockean framework, not the Hobbesian, this is a mistaken identification. Sovereignty means rather, first, that the state should function as a ‘final court of appeal’, and second, that it defends and furthers the formation of those social commons regimes necessary to deal with our emerging environmental problems (ibid. p. 133).

5.2.3 *The assurance problem revisited*

Hierarchical solutions to large-group assurance problems involve creating a specific position responsible for supplementing the spontaneous emergence of assurance from the interaction of group members. Such a position may be filled from within the group. For instance, group members rotate into this position in some group-property regimes for resource management. In other cases, all group members contribute resources and they hire a third party jointly (Ostrom 2000a).

In any event, the occupant of such a position is regarded as a ‘third party’ in the sense that she or he is supposed to treat all group members impartially while providing monitoring and enforcement services. Appointing a third party means that “a resource regime does not have to rely only on willing punishers to impose personal costs on those who break a rule. The community legitimates a position” (ibid. p. 151).

A third party may help a large group solve its assurance problems in various ways, including by (a) acting as a leader, helping group members to converge on a common vision and thus on agreed group rules; (b) facilitating the ‘hop-skip’ weak ties among constituent groups necessary for the large group to act cohesively; and (c) providing formal monitoring and enforcement of compliance with the group’s rules. However, by introducing a third party to help solve an existing assurance problem, a group creates for itself a new assurance problem. Its ‘horizontal’ assurance problem may be solved more successfully, but not without introducing a ‘vertical’ assurance problem between itself and the third party. This is what happens when civilians collectively establish a government, according to a Lockean social contract, to assist them protect their ‘natural rights’. Putnam (1993 p. 165) commented on the new problem as follows: “For third-party enforcement to work, the third party must itself be trustworthy, but what power could ensure that the sovereign would not ‘defect’?”.

The consequences of the third party—government in particular—defecting were referred to in section 3.4.1 as ‘government failure’. Even if those who rule at the highest level are determined that government not defect, the difficulty remains of getting those at lower levels within government to cooperate with them. As Arrow (1974 p. 72) observed: “The control

mechanisms are themselves organizations, composed of people. Their use to enforce authority is itself an exercise of authority”. This kind of problem with hierarchical organisation is known as the ‘agency problem’, characterised by Wallis *et al.* (1999 p. 69) as follows:

A principal-agent relationship comes into being whenever a principal delegates authority to an agent whose behaviour has an impact on the principal’s welfare ... By delegating authority to an agent, the principal economises on scarce resources by adopting an informed and able agent, but simultaneously takes on the risk that, since the interests of the principal and agent will never be identical, the agent may fail to maximise the wealth of the principal ... [I]n a typical agency relationship agents almost always possess more information about the task assigned and the relative efficacy of their own performance. Agents often take advantage of this asymmetry of information by engaging in shirking or opportunistic behaviour inimical to the interests of principals ...

Thus a social contract can be understood to entail civilians, as the principals, engaging governments, as their agents, to help them resolve their assurance problems. They delegate to governments various powers on the condition that they be used for this purpose only. However, this inevitably provides considerable scope for these powers to be used for unauthorised purposes of the kind detailed in the government-failure literature (see section 3.4.1). The assurance problems of civilians are therefore lessened only to the extent that they trust governments not to fail them. Moreover, if this trust is lacking then civilians will judge it less in their self interest to cooperate with efforts by government to help them to cooperate with one another. The amount of government coercion to exact a given level of civil cooperation will be so much the greater. Lichbach (1996 pp. 216-217) encapsulated the implications of this as follows:

Force is therefore never sufficient to maintain social order because if enough people disobey orders, the orders become too costly to enforce. The use of force, in other words, presumes that force will not always be necessary.

5.2.4 *Declining trust in governments*

Governments have become increasingly aware that the trust that civilians have in them cannot be taken for granted. Thus Randall (1999 p. 32) asserted recently that “faith in the legitimacy and efficacy of scientific government has declined precipitously ...”. Berger *et al.* (1977) earlier explained this phenomenon in terms of modernisation having distanced public and private life to a degree that is historically unprecedented. This has brought with it a

political crisis, they argued, because governments have “come to be devoid of personal meaning and are therefore viewed as unreal or even malignant” (ibid. p. 3).

According to Owens (2000), an important facet of this distancing in respect of environmental policy has been the adherence conventionally by governments to a progressive, ‘information deficit’ model of engaging the public in the process of decision making. In this model it is presumed that lay people are ignorant of environmental science and irrational in how they respond to risks. Thus civilians are engaged only to make them better informed and thus more ‘objective’.

In this view, the role of governments is not to lead civilians in the sense of facilitating the convergence of the hopes of their followers into a common vision, but rather to impose upon them their own ‘rational’ and ‘objective’ vision. The consequences of this stance for civil trust in government she characterised as follows:

There could hardly be a clearer demonstration of the flaws of the information deficit model than the persistent refusal of the public to have their allegedly irrational conceptions of risk ‘corrected’ by providing them with more information. ... Many studies ... have shown the futility of top-down information predicated upon constructions of risk that are simply not shared by those at whom this enlightenment is directed. ... Lay people may not understand the complexities of science ... but they are aware of the commercial imperatives, sceptical about politics, and distrustful of the competence and impartiality of regulatory frameworks. ... It is ‘epistemological trust’ ... that is missing, rather than information per se ... (ibid. p. 1142)

The relevance of this observation to the subject matter of this thesis is highlighted by a comment in the *Report of the Inquiry into Catchment Management* (CoA 2000a p. 63) that “[d]eveloping and implementing policies and programs for the ecologically sustainable use of Australia’s catchment systems faces a high level of suspicion about government and government-sponsored information”. Moreover, “given that many communities are suspicious of government motivations, particularly in rural areas, the information needs to come from people that communities can relate to and feel that they can trust” (ibid. p. 119). For Baland *et al.* (1996 p. 347), countering the loss of trust in governments more generally requires a reshaping of environmental governance in order to:

... end those unproductive situations where [administration and resource users] are pitted against each other as antagonistic actors in the process of resource regulation. Enough evidence has indeed been accumulated to show that, when rural inhabitants come to view state agents with hostility and distrust, all state efforts are doomed to yield disappointing results.

Inglehart (1999) has suggested that modernisation has contributed to declining trust in governments for reasons in addition to a growing distance between the public and private spheres of society. These reasons are associated with the increased wealth that has been delivered by modernisation. Due to this increased wealth, Inglehart argued, civilians have come to (i) emphasise less the goals of economic and physical security that historically have favoured strong authority, and (ii) be better educated and more confident politically, so that “in the long run, industrialized societies of both East and West must cope with long-term changes that are making their publics less amenable to doing as they are told ...” (ibid. p. 251).

Evidence in support of concerns regarding declining trust in governments has strengthened considerably in recent years. For instance, Papadakis (1999) found that between 1983 and 1995 the share of Australian respondents claiming to have confidence (either a ‘great deal’ or ‘quite a lot’) in their federal government declined from 55 per cent to 26 per cent. Likewise, on the basis of data from *World Value* surveys carried out in 1981-3, 1990-3 and 1995-7, Norris (1999b) concluded that public confidence in the core institutions of representative government—including parties, parliaments, and governments—had fallen in most established and newer democracies. The economic repercussions of these trends—in terms of declining trust in governments increasing their transaction costs of leading and coercing cooperation—are highlighted by the finding of Norris (1999a p. 264) that trust in government is positively associated with willingness to obey the law voluntarily⁵⁷.

According to Berger *et al.* (1977), the crisis of declining trust in governments—or at least that part of it due to the distancing of public and private life—can be mitigated by policy makers recognising the vital contribution of the ‘mediating structures’ of civil society to making individuals “more ‘at home’ in society, and the political order ... more ‘meaningful’” (ibid. p. 3). This would follow from these structures—they were thinking specifically of neighbourhood, family, church, and voluntary association—having both a private face and a public face. In terms of Ostrom’s (1990) conceptualisation of governance as a nested hierarchy, these mediating structures can be viewed as nesting individuals’ enterprises while themselves being nested by government enterprises. Finally, it is pertinent to observe that the idea of promoting the role of mediating structures closely parallels that of Granovetter (1973)

⁵⁷ This finding was based on analysis of data from all countries covered in the *World Values* survey 1995-97.

(see section 4.5.5) in respect of how intermediary personal contacts help to establish and maintain trust in leaders.

5.2.5 *Accommodating culture*

The discussion in section 5.2.4 indicates that an important cause of the problem of declining trust in governments is that their modern, ‘rational’ approach to policy is often at odds with how the lay public ‘sees things’. In other words, ‘epistemological trust’ in governments is diminished to the extent that government policy interventions are the result of interpretations of reality that are ‘foreign’ to the predominant traditions, or ‘culture’, of a society. Boyd *et al.* (1985 p. 2) defined culture as the “transmission from one generation to the next, via teaching and imitation, of knowledge and values, and other factors that influence behavior”.

For North (1990 p. 37), culture “provides a language-based conceptual framework for encoding and interpreting the information that the senses are presenting to the brain”. Humans inherit a language instinct that innately prepares us to invent and learn languages. This instinct “consists of precise mimicry, compulsive loquacity, near-automatic mastery of syntax, and the swift acquisition of a large vocabulary. The instinct is a diagnostic and evidently human trait, based on a mental power beyond the reach of any animal species, and is the precondition for true culture” (Wilson 1999 p. 146).

The theory of how culture evolves is still in its infancy. It derives from the idea of natural selection (see section 4.4.1). Extending this idea to the cultural domain, Skinner (1971 p. 137) proposed that: “A given culture evolves as new practices arise ... and are selected by their contribution to the strength of the culture as it ‘competes’ with the physical environment and with other cultures”. Although biological evolution is slow, requiring many generations to significantly affect biological characteristics, cultural evolution can be faster (Heinen *et al.* 1992). There are three reasons for this (Gardner *et al.* 1996):

- Each generation can, through innovation, add totally new items to the store of knowledge. These can be passed on to succeeding generations, so that total knowledge accumulates.
- Any innovation often has more uses than the innovator anticipated, and tends also to allow further innovations, which in turn may each spawn further innovations.
- The more items of knowledge that exist, the more new ones can be created by combining old ones.

Nevertheless, it seems that until about 40,000 years ago the evolution of human artifacts and social organisation remained nearly static (Wilson 1999). Hence there was sufficient time for genes and epigenetic rules to evolve in tandem with culture. Thereafter the pace of cultural evolution quickened to an extent that the theory of population genetics indicates was mostly too rapid to be tracked by genetic evolution. This meant only that the connection between genes and culture loosened rather than disappeared (ibid.). That is, the epigenetic rules:

... stayed in place and continued to prescribe the foundational rules of human nature. If they could not keep up with culture, neither could culture expunge them. For better or worse they carried human nature into the chaos of modern history (ibid. p. 185).

Even so, as a result of the strong effect of learning on contemporary behaviour, these inherited rules “leave open the potential generation of an immense array of cultural variations and combinations” (ibid. p. 214).

An important aspect of a culture is its informal institutions, also known as social norms (see section 4.4.5) or informal constraints (North 1990). Even though the theory of cultural evolution is in its early days, one important point can be made about social norms: they take longer to change than do formal institutions. As argued by North (ibid.), the social norms prevailing at any time have evolved gradually as extensions of previous formal institutions. He observed that, usually, the norms that have evolved to complement formal institutions persist in periods of stability, but get overturned by deliberate introduction of new formal institutions during periods of change. Nevertheless:

While the rules may be changed overnight, the informal norms usually change only gradually. Since it is the norms that provide ‘legitimacy’ to a set of rules, revolutionary change is never as revolutionary as its supporters desire, and performance will be different than anticipated (North 1994 p. 366).

Nee (1998 p. 88) has observed accordingly that behaviour by the members of a group frequently bears little semblance to that stipulated by its formal institutions. He explained this as a result of the “decoupling” of formal and informal institutions: “Compliance with formal rules may be largely ceremonial, with informal norms guiding the day-to-day business of the organization”. Indeed, to the extent that the informal norms that formal institutions are intended to overturn still resonate with the hopes of a group’s members, the norms may survive such an intervention as “opposition norms”, thus increasing the transaction costs of enforcing the formal institutions considerably (ibid. p. 88).

It has not been uncommon for third parties to introduce formal institutions without a clear appreciation of the social norms that already exist and their usefulness. These norms often have not been consciously designed and are usually not documented—they typically emerge through an ‘invisible-hand’ evolutionary process that relies on individuals pursuing their private concerns (Coleman 1990). Hence they are easily taken for granted, elusive to identify, and thus susceptible to being overridden carelessly by formal institutions.

Moreover, until recently at least, the theory underpinning policy has typically been unable to account for groups self-organising to provide themselves with collective goods—whether by social norms or any other institutional arrangement. Thus policy in respect of CPRs has been influenced strongly by neoclassical and prisoner’s dilemma models (see chapter three) predicting that all commons dilemmas (i.e., social dilemmas associated with CPR provision) will end ‘tragically’ unless institutional arrangements are imposed from the outside—and, by implication, that any pre-existing institutional arrangements should be swept aside.

Nevertheless, as has been demonstrated, social norms are a vital ingredient in the institutional mix which makes it possible for any large group to obtain the collective goods its members desire. Before introducing formal institutions to promote provision of a particular collective good, therefore, it can be important to determine whether pre-existing social norms are already contributing towards this objective. If such a contribution is taking place, then it is important that any formal institutions introduced be—and be seen by group members to be—complementary to these social norms. As Day (1998 p. 97) has argued:

... both individuals and corporations will succeed best when they find themselves running with the grain of the social and cultural relationships which surround them; when they are sustained and propelled by the whole rather than rubbing against it. The trick, of course, is to identify the direction of the social and cultural forces and find ways of working with, rather than against, them. This argues for more effort to be exerted to understand what it is that binds local populations together, and gives them energy, so that development can build on the positive strengths they have, rather than appearing as a challenge and a threat.

Similarly, Nee (1998 p. 88) has argued that formal institutions should be made consonant with informal norms where they exist, so that “informal processes of social control largely subsume the cost of monitoring and enforcement”. When this is achieved, he claimed, “it is often difficult to demarcate the boundaries between informal and formal social control” (ibid. p. 87).

This is not to presume that it is easy to know which way the grain of informal culture runs in particular settings. This knowledge typically comes only with considerable perceptiveness and experience. Indeed, local social norms and beliefs may make a community deeply suspicious of any external intervention, no matter how well-intended. However, simply losing patience and denying the validity of a community's own institutions, beliefs and hopes is likely to reduce its members' trust in government or whichever third party is responsible for intervention. Any formal institutions that are imposed may then be cooperated with only 'ceremonially' while day-to-day behaviour continues to be governed mostly by the community's pre-existing social norms.

5.2.6 *Conserving social capital*

Another important aspect of culture is the social capital which reduces the transaction costs of the feedback between individuals that is vital for the emergence, as well as monitoring and enforcement, of social norms. When third-party interventions substitute for, instead of build on, the goods provided as a result of local norms, the social capital generating the feedback required for those norms to function can be expected to depreciate. This follows from social capital tending to accumulate the more it is used (see section 4.5.7). The less it is used, conversely, the lower its subsequent supply.

Social capital, like norms, typically arises as a by-product of individuals pursuing their private concerns. It is therefore equally susceptible to being overlooked and taken for granted in the process of third-party intervention. Hence it has not been uncommon for governments and other third parties to intervene in the affairs of particular groups without due regard for the likely negative consequences for their ongoing stock of social capital. As a result of this oversight, third-party intervention likely has been justified more often than would have been the case if its costs had been analysed more thoroughly. This is particularly of concern once it is recognised, firstly, that a single stock of social capital is typically put to work toward a whole variety of collective ends (see section 4.5.7) and, secondly, that social capital is slow to develop but quick to be destroyed (Ostrom *et al.* 1994a).

Interventions of the type that commercialise provision activities previously performed voluntarily can thus inadvertently and irreversibly undermine social capital that is relied on for a range of other activities. This is because the goods desired can then simply be purchased, thus avoiding the assurance problem of engaging in interpersonal relations

involving reciprocal exchanges of obligations (e.g., where emergency assistance is obtained from government agencies when it could otherwise have been obtained from neighbours) (Coleman 1990).

Communities can be worse off as a result of such interventions if the gain from commercialisation, in terms of improved provision of the particular goods concerned, is more than offset by provision of other goods falling because the motive for individuals to interact with one another, and thus maintain the social capital on which this provision depends, has been lessened. Schmid (2000 p. 164) discussed this issue as follows, focussing on the choice of whether local community services should be staffed by volunteers or paid professionals:

... [P]articipation in a volunteer fire or ambulance service builds an affinity and bond among its members and with the community. Suppose a study shows that volunteer services are not as effective in putting out fires as a hired professional force. Should the volunteer service be replaced? It depends on the amount and value of the social capital that would be lost. If a community without any volunteer fire services is more likely to also be unable to mount any kind of community effort, the nominally better professional service may be a poor bargain.

More generally, such considerations are germane in respect of all choices between individual-property systems and group-property systems. As noted in section 3.5.2, the former option has generally been preferred in the neoclassical tradition of economics because it avoids the transaction costs in the latter associated with co-owners dealing with their symmetric externality problem. Setting the boundaries of property ownership around group members individually rather than collectively indeed allows them to escape from the uncertainties of depending on one another in that particular context. However, against this advantage needs to be set the consequent reduced contributions by members to maintaining the social capital on which they still depend collectively for provision of other goods. Betts (1997 p. 7) remarked accordingly that “[t]he more narrowly we draw the boundaries, the more we limit the growth of social capital”.

Unless third-party intervention in the affairs of a group attends to its informal culture and its wider needs and hopes, therefore, “it is easy, almost inadvertently, to destroy social arrangements which represent substantial past investments with enormous potential” (Day 1998 p. 103). Lack of such regard often results in a “dependency deadlock. Local people become entirely dependent on external agencies and actors to provide solutions to their local problems” (Pretty 1998 p. 226). For both Pretty (ibid.) and Day (1998), avoiding this costly

outcome in the context of rural community development requires a shift from ‘exogenous’ to ‘endogenous’ strategies of third-party intervention. Day (ibid. p. 97) characterised this shift as follows:

Instead of local cultures being seen as an obstacle to development, or as a legacy to be swept away, or at best mummified and celebrated as a ‘heritage’, in this approach local and regional cultures figure as a vital potential resource and vehicle for development, since genuine development seems most likely, and most capable of being sustained, when economic arrangements are properly embedded in local social and institutional patterns.

The best source of knowledge about the culture and aspirations of a group is its members. The call for endogenous approaches to intervention by governments and other third parties thus brings us back to the idea of collective goods being provided through collaborative or co-management strategies under which rights and responsibilities for collective-good provision are apportioned according to the comparative advantages in each particular setting of civic groups and governments (see section 5.2.2). It returns us also to Ostrom’s (1990) third design principle: that usually in long-enduring CPR organisations most individuals affected by the operational rules are able to participate in modifying those rules (see section 5.2.1).

This is one perspective from which current attempts by Australian governments to engage civil stakeholders collaboratively in designing interventions into environmental problems might usefully be viewed. That is, public participation in these deliberations may increase the prospects of finding solutions that resonate more strongly with the cultures and aspirations of the civil stakeholders expected to implement them. If this is the case, and the solutions found thereby come to acquire greater personal meaning for these people, the apparently worsening trust problem in respect of government intervention may be mitigated. Compliance with the solutions might thus be expected to occur more spontaneously, lowering the transaction costs of moving forward in this area.

5.2.7 *Fairness*

Social norms of fairness have been identified above (see sections 4.4.5 and 4.4.6) as a pivotal aspect of how a group’s culture affects its collective-good provision. The importance of fairness is indicated too by a number of Ostrom’s (1990) design principles for long-enduring CPR organisations (see section 5.2.1)—perhaps most obviously by the third principle involving “congruence between appropriation and provision rules ...” (ibid. p. 90). In other

words: “How to relate user inputs to the benefits they obtain is a crucial element of establishing a fair system ... If some users get all the benefits and pay few of the costs, others become unwilling to follow rules over time” (Ostrom 2000a p. 150).

Fairness of this kind is known as distributive fairness, concerned with how costs and benefits are distributed within a group. This perspective is closely aligned with the mainstream economic concept of equity. Ostrom’s fifth design principle—concerned with sanctioning rule violations according to their seriousness as well as their context—indicates that norms of distributive fairness play an important part also in the design of successful sanctioning mechanisms. Graduated sanctioning systems of the type referred to by this principle appear to be based on distributive fairness norms that accept that “[e]veryone can make an error or can face difficult problems leading them to break a rule” (Ostrom 2000a p. 151).

Such a system has been documented by Ellickson (1991 p. 53). He found that the initial response from graziers in Shasta County, California, to discovery of a stray animal was usually a phone call “usually couched not as a complaint but rather as a service to the animal owner, who, after all, has a valuable animal on the loose”. Where breaches continued, the culprits were disciplined through an escalating scale of sanctions almost exclusively self-administered rather than by officials. Putnam (1993 p. 171) provided the following example in relation to his neighbourhood’s norm of keeping lawns leaf-free:

This norm is not actually taught in local schools, but neighbors mention it when newcomers move in, and they reinforce it in frequent autumnal chats, as well as by obsessive raking of their own yards. Non-rakers risk being shunned at neighborhood events, and non-raking is rare.

A further illustration from NSW inshore fisheries follows:

At the lowest level, a fisher breaching local rules would be ‘spoken to’, whether informally on the water or more formally following a meeting between the fishers from the affected area. ... [W]here the offending behaviour persists, the fisher will be ostracised, perhaps finding access to a lake blocked by the cars of other commercial fishers, or being denied access to a private coolroom ... While there is a general reluctance on the part of commercial fishers to complain to fisheries inspectors, this remedy will also be pursued from time to time, particularly where the offenders come from outside the local region and normal methods of ‘education’ or shaming are likely to be ineffective (Sturgess 1997a p. 17).

Aside from the influence of norms of distributive fairness on the success of a process of collective-good provision, norms of procedural fairness (or procedural justice) seem also to be important. These are concerned with how fairly the decisions involved in the process of provision are carried out, irrespective of their distributional consequences. As argued by

Syme *et al.* (1991 p. 1793) in the context of regional water-allocation planning: “It may be just as important from the point of view of the public to feel that the decision was arrived at ‘fairly’ as for them to approve all aspects of the final plan”.

Research into this possibility has focussed on evaluating the hypothesis that “if procedural justice is demonstrated in a decision-making process the outcome is more likely to be accepted” (Syme *et al.* 1999 p. 53). After reviewing results of this research from water-policy contexts, these authors concluded that: “Fair decision-making processes are of paramount importance to community acceptance of water allocation decisions” (*ibid.* p. 67).

This point is supported too by Ostrom’s design principles (see section 5.2.1). For instance, her third principle relates to giving the members of a group a ‘fair say’ in the design of its operational rules. Moreover, her sixth design principle—indicating the importance of low-cost local arenas for resolving conflicts over whether operational rules have been breached—relates also to procedural fairness in so far as “[r]ules, unlike physical constraints, have to be understood to be effective. There are always situations in which participants can interpret a rule that they have jointly made in different ways” (Ostrom 2000a p. 152). Local conflict-resolution arenas make it more likely that differences in rule interpretation will be dealt with according to local norms of procedural fairness. This is of course entirely consistent with endogenous strategies of third-party intervention discussed in section 5.2.6.

5.3 *Governance and adaptivity*

The discussion in section 5.2 regarding the role of hierarchy and government in collective action skirted around the issue of efficiency. This issue is addressed here.

5.3.1 *Competitive selection and efficiency*

Proposals that governments shift from exogenous to endogenous strategies of third-party intervention—and thus interact with civil enterprises more on a collaborative basis (e.g., Salamon 1989)—anticipate a devolution of certain property rights in respect of the collective-choice and constitutional-choice levels of action (see section 3.5.3) from government-property systems to less centralised property systems. This implies that the status-quo allocation of property rights is somehow inefficient.

From the point of view of neoclassical economics such an idea is untenable. This is because any status-quo configuration of property rights is necessarily efficient in the Paretian sense

that is of over-riding consequence in this tradition (see section 3.4.2). Nevertheless, economists more generally have recognised that Pareto efficiency (and allocative efficiency in general), as a comparative-static version of efficiency, may not always be a reliable yardstick for guiding choices the dynamic considerations of which are captured inadequately by the neoclassical method of comparative statics (see section 4.2.3). As North (1990 p. 133) remarked: “Neoclassical theory does not directly deal with the issues of growth itself”.

In particular, many neoclassical economists have come to presume that efficiency is best promoted by modifying property-right arrangements—namely by introducing individual-property systems—to foster social organisation through markets wherever this is not already the case (see section 3.5.2). Even where group-property or government-property systems are extant and therefore Pareto efficient, therefore, many mainstream economists are in favour of government intervention which helps to replace such systems with individual-property systems.

The evolutionary theory of economics put forward by Alchian (1950) has been influential in this respect. He started by acknowledging that economic actors ordinarily make choices subject to limited information and bounded rationality. Rather than surveying all feasible alternatives and then calculating the choice which achieves maximally an objective, therefore, each actor typically satisfices with a limited search. Hence the more uncertain the decision environment, the more likely it is that efficient choices will be located by the members of a group conducting decentralised boundedly-rational searches than by a more centralised search. In his words: “What really counts is the various actions actually tried, for it is from these that ‘success’ is selected, not from some set of perfect actions” (ibid. p. 220).

This proposition he elaborated as follows:

Realized positive profits, not *maximum* profits, are the mark of success and viability ... This is the criterion by which the economic system selects survivors: those who realize *positive profits* are the survivors; those who suffer losses disappear ... [T]he greater the uncertainties of the world, the greater is the possibility that profits would go to the venturesome and lucky rather than to logical, careful, fact-gathering individuals (ibid. p. 213, original emphasis).

Based on reasoning of this kind, other economists (e.g., Friedman 1953) concluded that efficiency in a complex dynamic world requires the creation of markets based on individual-property systems. Such markets maximise the number of searches, as well as maximise the competition between the actors performing the searches—ensuring that inefficient choices are ‘weeded out’ so that only the most efficient ones survive. These ideas became influential

in the traditions of natural-resource economics and environment economics, especially within the subtradition variously labeled the ‘new resource economics’ (Anderson 1982) or ‘free-market environmentalism’ (Anderson *et al.* 1991). For instance, Anderson *et al.* (ibid. p. 171) emphasised “the importance of human institutions that facilitate rather than discourage the evolution of individual rights”.

Although the notion that competitive selection leads to efficient results became conventional in mainstream economics, it does not bear close scrutiny (Rutherford 1996). Indeed, three years prior to Alchian’s article was published, Schumpeter (1947 p. 83) had remarked:

A system that at every given point in time fully utilizes its possibilities to the best advantage may yet in the long run be inferior to a system that does so at no given point in time, because the latter’s condition to do so may be a condition for the level and speed of long-run performance.

5.3.2 Path dependency

Nevertheless, doubts regarding the conventional wisdom did not begin to permeate mainstream economics until they were formalised by the pioneering theoretical research of David (1985) and Arthur (1989; 1990) on path dependency. This literature relates directly to the discussion in section 4.2.3 regarding the significance for economic analysis of tendencies to increasing returns. According to Altman (2000 pp. 128-129) the fundamental argument in the path dependency literature:

... is that the free market typically generates suboptimal long run equilibrium solutions to a variety of economic problems and the probability of suboptimal equilibrium outcomes increases where increasing returns (positive feedbacks) prevail. ... This argument is couched in a discussion of there being possible multiple equilibrium solutions to identical economic problems with suboptimal solutions being among a larger set of solutions. A random shock to an economic system, be it large or small, will have a determining impact on which equilibrium solution becomes the dominant one, where the dominant solution can be the suboptimal one. Whichever solution is, in effect, chosen by the random event, this solution might be locked-in or become a permanent or a stable equilibrium. It is even possible for efficient and inefficient (suboptimal) solutions to prevail simultaneously ... For this reason, one cannot expect the free market to force the economy to converge to unique equilibrium solutions to economic problems. ... More specifically, one cannot predict that the eventual stable equilibrium solution will be the optimal one, even under conditions of competitive markets.

Hence increasing returns provide a first-mover advantage to solutions that are chosen first, and this advantage increases over time. Newcomers face a competitive disadvantage

compared to the first movers which precludes them from beginning the process of catch-up. This is the case even if the efficiency of the newcomers would eventually exceed that of the first mover and this were known to them⁵⁸. Inefficiencies that persist as a consequence of path dependency can be understood as a result of market failure. First movers impose externalities on newcomers by choosing solutions to suit only themselves (ibid.). Given increasing returns, therefore:

Where we observe the predominance of one technology or one economic outcome over its competitors we should thus be cautious of any exercise that seeks the means by which the winner's innate 'superiority' came to be translated into adoption (Arthur 1989 p. 127).

5.3.3 Path dependency and efficient institutional choice

From its beginnings focussing primarily on the operational-choice level of action (primarily choice of production technology), path-dependency theory has now been extended to the deeper levels of action (collective-choice and constitutional-choice) where institutional arrangements are determined. The seminal work in this area has been Douglass North's (1990) *Institutions, Institutional Change and Economic Performance*⁵⁹. Efficiency indicated for him "a condition where the existing set of constraints will produce economic growth" (ibid. p. 92).

Continuing his sports analogy (see section 4.4.7), North emphasised in the following manner the importance of distinguishing institutions ("the rules of the game") from organisations ("the teams"):

The purpose of the rules is to define the way the game is played. But the objective of the team within that set of rules is to win the game—by a combination of skills, strategy, and coordination; by fair means and sometimes foul means. Modeling the strategies and skills of the team as it develops is a separate process from modeling the creation, evolution, and consequences of the rules (ibid. p. 5).

In more formal terms, organisations:

... are made up of groups of individuals bound together by some common purpose to achieve certain objectives. ... The organizations that come into existence will reflect the opportunities provided by the institutional matrix. That is, if the institutional framework rewards privacy then piratical organizations will come into existence; and if the institutional framework rewards productive activities then organizations—firms—will come into existence to engage in productive activities (North 1994 p. 361).

⁵⁸ This conclusion has been strongly criticised, most notably by Liebowitz *et al.* (1990). However, Altman (2000 p. 139) has shown their critique to be flawed.

⁵⁹ This book was instrumental in North in 1993 being awarded the Alfred Nobel Memorial Prize in Economic Sciences.

North was primarily interested in accounting for the divergent paths of economic performance across societies. He was perplexed because standard neoclassical and international trade theory implies that the performance of different economies would gradually converge as they traded goods, services and factors of production. He was aware too that “[t]he rationality assumption of neoclassical theory would suggest that political entrepreneurs of stagnating economies could simply alter the rules and change the direction of failed economies” (ibid. p. 365). This proposition is consistent too with Alchian’s (1950) evolutionary argument that implies that “over time inefficient institutions are weeded out, efficient ones survive, and thus there is a gradual evolution of more efficient forms of economic, political, and social organisation” (North 1990 p. 92). However, in contrast to these predictions, North (ibid. p. 6) commented that “the gap between rich and poor nations, between developed and undeveloped nations, is as wide today as it ever was and perhaps a great deal wider than ever before”.

North’s (ibid.) explanation of how disparities in economic performance persist or widen begins with institutions, and more particularly with a recognition that institutions typically change incrementally rather than discontinuously (ibid.). Change to a new institutional framework is characterised by increasing returns which, as Marshall (1920/1890) earlier observed (see section 4.2.3), are a consequence of the internal and external economies associated with a change.

The internal economies associated with an institutional change come primarily through the effect of the change on learning by doing within an organisation (North 1990). These arise because “[t]he kinds of knowledge, skills, and learning that the members of an organization will acquire will reflect the payoff—the incentives—imbedded in the institutional constraints” (ibid. p. 74). In turn, “[t]he way in which knowledge develops influences the perceptions people have about the world around them and hence the way they rationalize, explain, and justify that world ...” (ibid. p. 76). An institutional change thus influences how mental models (including heuristics), and thus ideologies, evolve over time.

Finally, the mental models and ideologies that result will influence “the perceptions of the entrepreneurs in political and economic organizations that they could do better by altering the existing institutional framework at some margin” (ibid. p. 8). The direction that

institutional change takes at one juncture thus generates internal economies that affect the direction of institutional change at subsequent junctures.

The external economies associated with an institutional change arise from “the dependence of the resultant organizations on that institutional framework and the consequent network externalities that arise” (ibid. pp. 7-8). These network externalities follow from the organisations structuring themselves in line with the new incentives and thus acquiring a further incentive to preserve the new institutions, including by attempting to influence the polity towards this end. As Dixit (1996 p. 26) has observed: “Policy acts shape the future environment by creating constituencies that gain from the policy, who will then fiercely resist any changes that take away these gains”.

These sources of increasing returns were integrated by North (1990 p. 99) in his characterisation following of path-dependent institutional evolution: “Once a development path is set on a particular course, the network externalities, the learning process of organizations, and the historically-derived subjective modeling of the issues reinforce the course”. Put more simply: “Path dependence means that history matters” (ibid. p. 100). As with technological path-dependency, therefore, typically there are multiple equilibria solutions to any given institutional or organisational problem, and there is no guarantee that the equilibrium solution eventually ‘selected’ will be the efficient one.

It follows that status-quo institutional (including property-right) frameworks, and how governance is organised in response to the incentives they provide, are not necessarily the most efficient in realising contemporary socio-economic goals for the longer term. A particular concern given the focus of this thesis is the possibility that the institutions (both formal and informal) and organisational structures of progressive governance remain locked-in (at least *de facto*) although they are ill-adapted to rebuilding the trust between governments and civil stakeholders upon which the collaborative vision for environmental governance—seeking greater spontaneity of cooperation in these relationships—relies for its successful realisation.

5.3.4 *Adaptive efficiency*

Given the need for humans to satisfice when choosing between institutional alternatives at any juncture, identifying the efficient solution at the outset is highly improbable. Thus: “In a world of uncertainty, no one knows the correct answer to the problems we confront ...” (ibid.

p. 81). In consequence, North (ibid. p. 80) proposed that the prospects of eventually locating and being able to shift to the efficient development path would be improved if the yardstick for choice were what he called “adaptive efficiency”. He recognised that “allocative efficiency and adaptive efficiency may not always be consistent” (ibid. p. 81). In his view adaptive efficiency:

... is concerned with the kinds of rules that shape the way an economy evolves through time. It is also concerned with the willingness of a society to acquire knowledge and learning, to induce innovation, to undertake risk and creative activity of all sorts, as well as to resolve problems and bottlenecks of the society through time. ...

Adaptive efficiency, therefore, provides the incentives to encourage the development of decentralized decision-making processes that allow societies to maximise the efforts required to explore alternative ways of solving problems. We must also learn from failures, so that change will consist of the generation of organizational trials and the elimination of organizational errors. There is nothing simple about this process, because organizational errors may not only be probabilistic, but also systematic, due to ideologies that may give people preferences for the kinds of solutions that are not oriented to adaptive efficiency (ibid. pp. 80-81).

For North (1994 p. 367) adaptive efficiency is exemplified by those successful political and economic systems that “have evolved flexible institutional structures that can survive the shocks and changes that are part of successful evolution”. Nevertheless, he acknowledged that “these systems have been a product of long gestation. We do not know how to create adaptive efficiency in the short run” (ibid. p. 367). Even so, increasing recognition of the importance of this notion is evident in the emerging consensus that the appropriate policy-making framework given complexity is adaptive management, as discussed in section 2.5.6 with regard to environmental issues. Policy development within this framework is an emergent process, wherein interventions are regarded as tentative experiments to be learned from. In turn, this trend is consistent with Arthur’s (1999 p. 108) advice that policy makers dealing with complexity adopt the subtle yet demanding role of “nudging hand” (see section 4.2.3).

5.3.5 *Adaptive efficiency and CPR governance*

Although she did not use the term, Ostrom (1999) has presented a powerful case for focussing on adaptive efficiency when making choices about the institutional arrangements that underpin how CPR governance is organised. She began by distinguishing seven clusters of rules, or institutions, that have been found to be of use in changing the structure of the

decision problem CPR appropriators face:

1. Boundary rules that affect the types of participants with whom others interact.
2. Position rules that differentially affect the capabilities and responsibilities of those in positions.
3. Authority rules that affect the actions that participants in positions may, must, or must not do.
4. Scope rules that affect the outcomes that are allowed, mandated, or forbidden.
5. Aggregation rules that affect how individual actions are transformed into final outcomes.
6. Information rules that affect the kind of information present or absent in a situation.
7. Payoff rules that affect the costs and benefits that are assigned to actions and outcomes.

Typically within a given setting there is a number of variables with which rules in any cluster might usefully be concerned. In the case of boundary rules, for instance, 27 variables have been identified as being used in at least one CPR somewhere in the world. In many cases two or three of these variables are used in combination in the definition of a boundary rule. These variables are shown in table 5.2.

Table 5.2: Variables used in boundary rules to define who is authorised to appropriate from a common-pool resource

Residency or membership	Personal characteristics	Relationship with resource
National	Ascribed	Continued use of resource
Regional	Age	Long-term rights based on: Ownership of a proportion of annual flow of resource units Ownership of land Ownership of non-land asset (e.g., boat berth) Ownership of shares in a private organisation Ownership of a share of the resource system
Local community	Caste	
Organisation (e.g., co-op)	Clan	
	Class	
	Ethnicity	
	Gender	
	Race	
	Acquired	
	Education level	
	Skill test	
		Temporary use-rights acquired through: Auction Per-use fee Licenses Lottery Registration Seasonal fees
		Use of specified technology

Source: Ostrom (1999, table 1, p. 510)

Ostrom (*ibid.* p. 519) observed that once it is recognised that a similar richness of choice prevails for all seven clusters of rules⁶⁰, it becomes “obvious that the search for rules that improve the outcomes obtained in commons dilemmas is an incredibly complex task involving a potentially infinite combination of rules that could be adopted”. She illustrated this by pointing out that if only five changes in rules per cluster were considered, there would be 5^7 , or 75,525, different situations to analyse and compare. Thus:

No set of policy analysts (or even all of the game theorists in the world today) could ever have the time or resources to analyze over 75,000 combinations of rule changes and resulting situations, let alone all of the variance in these situations due to biophysical differences. ...

Instead of assuming that designing rules that approach optimality, or even improve performance, is a relatively simple task that can be undertaken by distant, objective analysts, we need to understand the policy design process as involving an effort to tinker with a large number of component parts. Those who tinker with any tools—including rules—are trying to find combinations that work together more effectively than other combinations. ... Whenever individuals agree to add a rule, change a rule, or adopt someone else’s proposed rule set, they are conducting a policy experiment. Further, the complexity of the ever-changing biophysical world combined with the complexity of rule systems means that any proposed change of rules faces a nontrivial probability of error (*ibid.* pp. 519-520).

When governance is organised centrally, the reductionist bent of modern policy makers (see section 2.2.2) leads them to experiment simultaneously with all the CPRs within their jurisdiction—their intent being to find the set of rules that works best across that entire jurisdiction. Consequently, the rate of experimentation is normally slow. Results from the individual CPR settings may be contradictory and difficult to interpret. Such a ‘one-size-fits-all’ approach to policy experimentation can lead to disaster if it is based on erroneous data or on mistaken assumptions of how individuals will react (*ibid.*). Matthews (1986 p. 917) remarked along these lines that:

... among the main features of institutional change are its complexity and the unforeseeable nature of its consequences, setting us off on random walks to goodness know what destination. Institutional experimentation by a single firm is fine, because it does not much matter to the economy as a whole if it does not work. Institutional experimentation at the level of the whole economy gives one more pause.

⁶⁰ Indeed, in the case of authority rules over 100 variables have been identified as being used in at least one CPR somewhere in the world.

Given these limitations of organising CPR governance as if it were relatively simple, Ostrom (1999) has argued that it may be better to regard this organisational task as involving complex adaptive systems (see section 4.2.3). Such systems “are composed of a large number of active elements whose rich patterns of interactions produce emergent properties that are not easy to predict by analyzing the separate parts of the system” (ibid. p. 521). This perspective led her to conclusions similar to North (1990), particularly in relation to the importance for maximising ongoing adaptivity of (a) devolved (or decentralised) decision making, and (b) feedback about the performance of policy experiments that is needed for successful policies to be identified and imitated, and unsuccessful ones to be eliminated.

Ostrom referred to devolved decision-making as involving “[r]edundancy: Multiple units are experimenting with rules simultaneously, thereby reducing the probability of failure for an entire region” (1999 p. 526). Devolution can also mitigate feedback problems in CPR settings, she argued, because it means that “individuals who have the greatest interest in overcoming tragedies of the commons learn the results of the experimentation with rules and can adapt to this direct feedback” (ibid. p. 525).

Nevertheless, as discussed in section 5.2.2, there are normally limits to what can be achieved by complete devolution of decision making. Ostrom (ibid.) suggested that the way to address these limitations while maintaining adaptivity is to adopt ‘polycentric’ governance systems.

In a system of this kind:

... citizens are able to organize not just one but multiple governing authorities at different scales ... Each unit may exercise considerable independence to make and enforce rules within a circumscribed scope of authority for a specified geographical area. In a polycentric system, some units are general-purpose governments, whereas others may be highly specialized ... Self-organized resource governance systems, in such a system, may be special districts, private associations, or parts of local government. These are nested in several levels of general-purpose governments that also provide civil equity as well as criminal courts (ibid. p. 528).

In such a system, CPR appropriators have collective-choice, and possibly constitutional-choice, property rights which allow them to participate in the making of at least some of the operational-choice rules in respect of their particular resource (see section 3.5.3). In this way they retain many of the advantages of a fully devolved system, including (a) the ability to use their local knowledge in developing rules and (b) relatively direct feedback regarding how the rules in place are performing. Moreover:

... problems associated with local tyrannies and inappropriate discrimination can be addressed in larger, general-purpose governmental units that are responsible for protecting the rights for all

citizens and the oversight of appropriate exercises of authority within smaller units of government. It is also possible to make a more effective blend of scientific information with local knowledge where major universities and research stations are located in larger units but have a responsibility to relate scientific findings to smaller units within their region.

The fact that governance units in polycentric systems overlap one another offers further advantages in terms of adaptivity. For instance, information about rules that have worked well for one unit can be transmitted to other units that may experiment with it in their settings. Associations of local resource-governance units can be useful for speeding up the exchange of information between their members. Another key advantage of polycentric systems is that “when small systems fail, there are larger systems to call upon—and vice versa” (ibid., p. 528). However, this is not to imply that redundancy invariably enhances adaptive efficiency. One might imagine an optimal level of redundancy in the governance of each CPR that depends on its own characteristics and its setting. Thus:

... instead of presuming that all redundancy is inefficient (or, on the other hand, that large, centralized systems are always inefficient), it is crucial to analyze the level of diversity, types of risk, and location of crucial information in diverse locations before making any judgement about the results of adding specific kinds of redundancy to a governing system (Low *et al.* 2000 p. 24).

The idea of polycentric systems elaborates the notion discussed in section 5.2.1 of decision making in respect of large-scale CPRs being organised in multiple layers of nested enterprises. The advantages of such systems have often been overlooked because they can “look terribly messy and are hard to understand” (ibid. p. 530). As Alexis de Tocqueville (1945 p. 89) observed in his *Democracy in America*: “The appearance of disorder which prevails on the surface leads one to imagine society is in a state of anarchy; nor does one perceive one’s mistake until one has gone deeper into the subject”. The susceptibility of the economics profession, by and large, to this mistake was highlighted by Frey (1992 p. 211) as follows:

That democracies are characterised by more significant deviations from efficiency than authoritarian governments is rarely openly said; it is more of a presumption lurking in the background. The feeling is visible in the irritation of many economists about the ‘ineffectiveness’ or the ‘muddle’ of decision-making in a democracy. ... This feeling easily turns into a desire for ‘orderly’ solutions by a government with much authority. Such thinking constitutes in effect a return to the planning myth that society can and should be ordered from above by a strong government.

The USA at least provides many examples of polycentric CPR governance systems where there is convincing evidence of good performance despite an outward appearance of messiness. These include governance of the Maine lobster fishery (Acheson 1988), groundwater governance in southern California (Blomquist 1992), and co-management of the Pacific Salmon fisheries in the state of Washington (Singleton 1998).

5.3.6 *The downside of devolution for adaptive efficiency*

A significant aspect of the network externalities associated with devolving decision making seemed to escape the attention of scholars in this area until it was highlighted recently, as follows, by Challen (2000 p. 178):

Generally speaking, the political ramifications of institutional change are greater if the costs and/or benefits of change are incurred by small and/or concentrated groups in society that are able to mobilise resources for political lobbying, as opposed to large and/or dispersed groups. Consequently, it is relatively easy (low cost) for political decisions to be made that transfer property rights from a large dispersed group to a small concentrated group, but relatively difficult (high cost) to make the reverse change. Hence the notion of irreversibility of institutional change.

A generalisation can be made to the case of institutional change within a hierarchical model of institutions for regulation of natural resources. For the most part, property rights at lower levels of an institutional hierarchy tend to be concentrated into smaller societal groups than at higher levels in the hierarchy. ... As a general rule it would be relatively easy (low political costs) to transfer property rights down such an institutional hierarchy, but difficult (high political costs) to transfer property rights back up the hierarchy.

He concluded accordingly that the ‘dynamic transaction costs’ of institutional change are likely to be greater if the change involves devolution rather than centralisation of property rights. He defined dynamic transaction costs as the costs incurred in effecting institutional change. Thus: “Supply of new institutions is constrained by dynamic transaction costs arising in the costs of transition from one institutional structure to another” (Challen 2000 p. 147). Dynamic transaction costs can be viewed as the costs faced at the collective-choice and constitutional-choice levels of action. They are distinct from ‘static transaction costs’ which are the costs of decision making within a given institutional structure. These are the costs faced at the operational level of action (see section 3.5.3).

Two types of dynamic transaction costs were distinguished: (i) the transition costs of decision making and implementation for institutional change in the current period, where

these costs arise as a function of the status-quo institutional structure; and (ii) the intertemporal costs that arise when institutional change in the current period increases the transition costs of possible future institutional changes (i.e., by reducing the flexibility to respond as an uncertain future unfolds). Transition costs include the costs of the following aspects of institutional change:

- research and institutional design;
- negotiation, bargaining and decision making;
- political repercussions to decision makers;
- institutional creation, including the drafting of legislation, policies, regulations, etc.;
- implementation, including establishing regulatory organisations and programs and conducting education activities;
- obsolescence of organisations and human capital associated with pre-existing institutional structures;
- social displacement of individuals and firms affected by institutional change;
- compensation payments to persons or firms disadvantaged by institutional change;
- costs associated with lobbying and rent-seeking behaviour of interest groups; and
- increased perceptions of sovereign risk and policy uncertainty.

Therefore, according to Challen (*ibid.*), the transition costs associated with future institutional flexibility or adaptivity are likely increased to the extent that property rights are devolved and reduced to the extent that they are centralised. It follows that adaptive efficiency is ordinarily lessened by devolving property rights in respect of the collective-choice and constitutional-choice levels of action. This conclusion contradicts North's (1990) assertion that efficiency of this kind is unambiguously enhanced by devolving institutional choice (see section 5.3.4). He claims that devolution increases institutional adaptivity, while Challen proposes the opposite.

The way forward it seems is to integrate the insights of these authors within a single theory of institutional path-dependency. Such a theory would recognise that devolution of institutional choice increases adaptive efficiency in one way (i.e., by increasing the rate of institutional experimentation and learning) but reduces it in another (i.e., by strengthening the influence of vested interests). Identification of the level of devolution that is adaptively efficient overall would therefore involve a trade-off. Although any idea of optimising such a complex trade-off constitutes, as Hayek (1973 p. 14) would say, a "synoptic delusion", it is also clear that the respective strengths of the opposing considerations will differ from one

context to another. Hence there remains an important need to identify and/or develop heuristics or ‘design principles’ that can help to locate the adaptively efficient trade-off in any given context.

5.4 *Coevolution, path dependency and sustainable development*

In this section the issue of path dependency of institutional choice is viewed from a coevolutionary perspective. The reason is to gain a richer appreciation of the constraints path dependency places on shifting to paths of socioeconomic development that are more adaptive and thus more sustainable. Recall from section 2.4.2 that the Commonwealth and state governments of Australia committed themselves in 1992 to the pursuit of sustainable development.

5.4.1 *Coevolution*

Technological and institutional path dependencies were discussed in section 5.3 as if they were independent of each other, although in section 5.3.3 the interdependence between institutional choice and ideology was recognised. A coevolutionary perspective reveals how changes in technology, institutions and ideologies are reinforced not only by one another but also by changes in values and in the natural environment. Thus it indicates how a change in one part of the cultural or natural environment can lock in, or introduce irreversibilities⁶¹ to, the overall path of socio-economic development. Prior to elaborating, a brief outline of the coevolutionary perspective is in order.

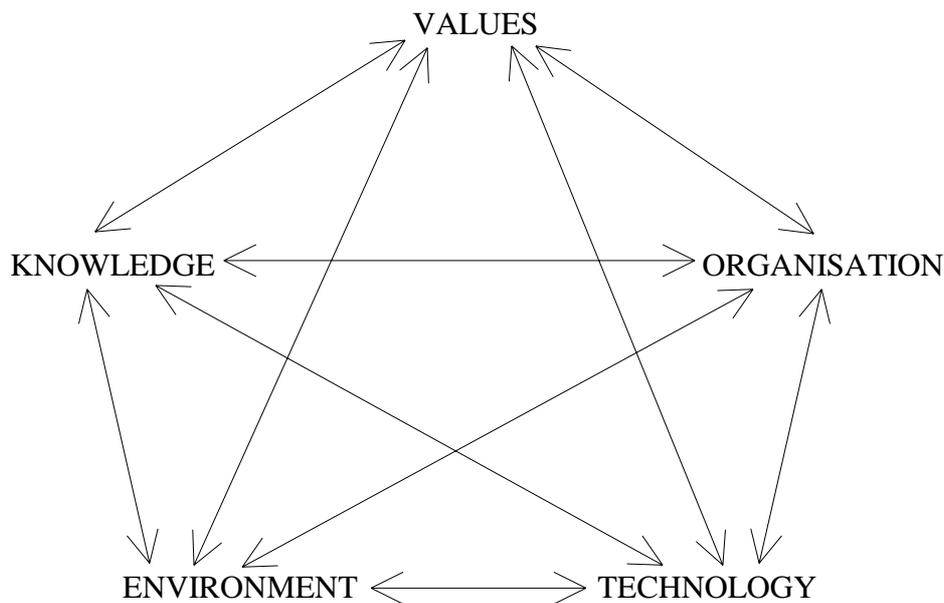
A still-common view is that natural evolution is a process whereby individuals of a single species are selected to fit increasingly well into a predefined, physical niche. A coevolutionary perspective, in contrast, recognises that much of the selection pressure exerted on any species at any time originates from the characteristics of other species. Species coevolve and the niches of all species are ever-changing as a result. Accordingly, there is no basis for asserting that humans, or any species for that matter, are progressing in the sense of becoming increasingly well-adapted to their situation (Norgaard 1997).

⁶¹ Defined here in the broad sense of costly reversibility (i.e., more costly to reverse a change than to accomplish it) than strict irreversibility.

5.4.2 *Coevolution and path dependency in socioeconomic development*

Approaching two decades ago, the idea of coevolution was introduced to economics by Norgaard (1984). He considered development as a process of coevolution between knowledge (the process of perceiving, interpreting and learning), values, organisation (underpinned by institutions), technology and the natural environment. These dimensions are portrayed in figure 5.1 as subsystems of an overall coevolutionary process of development.

Figure 5.1: The coevolutionary development process



Source: Norgaard (1994, figure 3.1).

All subsystems are treated symmetrically. Random changes, chance discoveries and deliberate innovations occur in each subsystem which influence, through modifying selection pressures, the qualities and distribution of components in each of the other subsystems. The evolutionary fitness of new components depends on the characteristics of each subsystem at the time. Consequently, the subsystems coevolve such that each reflects the other. Thus “everything is coupled, yet everything is changing” (Costanza *et al.* 1997 p. 65). This is illustrated in the following example:

... [T]he use of pesticides induces resistance and secondary pest resurgence, selecting both for new pesticides and for more systematic ways of thinking about pest control. Pests, pesticides, pesticide production, pesticide institutions and policy, how we understand pest control, and how we value chemicals in the environment demonstrate an incredibly tight and rapid coevolution in the second half of this century (Costanza *et al.* 1997 p. 66).

The coevolutionary model of social development has gained increasing acceptance in economics and elsewhere (e.g., Adger 1999; van den Bergh *et al.* 2000; Gowdy 1994; Lorenzoni *et al.* 2000; Turner *et al.* 1998). Here it will be applied to elucidate a number of implications of the modern knowledge subsystem or ideology for path-dependency in contemporary governance of the Australian natural environment. Recall how modern ideology was identified in chapter two as retaining considerable influence in this domain.

Recollect too how this ideology was characterised there as giving primacy to knowledge that is obtained through positivist inquiry with its presumption that objective universal truths exist and that they are best discovered by focussing on the investigation of material phenomena, and then as if they were mechanistic and atomistic. The coevolutionary implications of this ideology become clear once the validity of the post-positivist critique (see section 2.2.1) is acknowledged.

The positivist method is then recognised as not objective at all but based rather on an acceptance of the distinctive system of values that underpins the method. Actors with a cultural predisposition to such values will find it easier to accept the techniques and organisational structures the positivist method predicts will best further their interests. As Boulding (1970 p. 119) observed:

Science is a human learning process which arises in certain subcultures in human society and not in others. ... The scientific subculture ... is characterized by a strong common value system. For instance, a high value is placed on veracity, on curiosity, on measurement, on quantification, on careful observation and experiment, and on objectivity.

To the extent that fitness in a modernising world depends on adopting modern techniques and organisational forms, actors whose knowledge systems (i.e., mental models or belief systems) and value systems are supportive of this tend to prosper at the expense of others. Thus the kinds of mental models and values underlying positivistic science thus become steadily more prevalent across the wider society.

Boulding (1970 p. 124) referred to such a phenomenon in terms of “the evolutionary ecology of ethical systems. Successful ethical systems tend to create subcultures, and these subcultures tend to perpetuate and propagate the ethical systems which created them”. Thus actors with values and mental models supportive of individualistic (i.e., atomistic) social organisation become increasingly common. Likewise, actors who prefer to think mechanistically (i.e., in terms of steady-state relations between parts) and to live in a mechanistically-ordered world become more successful and thus numerous compared with

those who do not. Similarly, actors who are more cognisant of and prefer material compared with non-material attributes of experience find themselves more at home in a modernising world. By being more successful as a result, their share of the population increases⁶².

It follows that modern ideology is now reinforced considerably by actors' own knowledge systems and components of other cultural subsystems—namely in respect of values, organisation (and thus institutions), and technology—having coevolved around it. This is consistent with Boulding's (1970 pp. 120-121) observation that: "... [A]s science develops, it no longer merely investigates the world; it creates the world which it is investigating".

Nevertheless, this alone does not fully explain why the scientific method, and its underpinning modern ideology, has prospered for so long. For Norgaard (1984) this survival can be attributed to science's role in promoting the transformation of societies from coevolving with their natural environments to coevolving around the combustion of fossil hydrocarbons. Thus:

By tapping into fossil hydrocarbons, Western societies freed themselves, at least for the short to medium term, from many of the complexities of interacting with environmental systems. ... Tractors replaced animal power, fertilizers replaced the complexities of interplanting crops that were good hosts of nitrogen-fixing bacteria with those which were not, and pesticides replaced the biological controls provided by more complex agroecosystems. Furthermore, inexpensive energy meant crops could be stored for longer periods and transported over longer distances. Social organization coevolved around these new possibilities very quickly. Each of these accomplishments was based on the partial understanding of separate sciences and separate technologies. At least in the short run and "on the farm", separate adjustments of the parts seemed to fit into a coherent, stable whole. Agriculture transformed from an agroecosystem culture of relatively self-sufficient communities to an agroindustrial culture of many separate, distant actors linked by global markets. These massive changes in technology and organization gave people the sense of having control over nature and being able to consciously design their future while in fact problems were merely being shifted beyond the farm and onto future generations (Costanza *et al.* 1997 p. 68).

Even though proximate problems (e.g., social dislocation, land degradation, pollution) did arise in this process, until fairly recently there was fairly general acceptance—at least in nations like Australia that modernised most successfully—that they were exceeded by the proximate advantages. These problems were typically embraced as further opportunities to

⁶² A game-theoretic model of how the evolution of values, or preferences, is influenced by mental models has recently been developed by Güth *et al.* (1998).

demonstrate the efficacy of science and, implicitly, its accompanying ideology. Usually the response involved augmenting and reorganising governance according to the precepts of this ideology; that is atomistically, mechanistically, materialistically, reductionistically and ‘objectively’ (see section 2.2.2). In particular, additional organisation was needed to provision and administer scientific research and extension, and to equip people with the skills required to perform the research and extension and to adopt the innovations arising therefrom. The medium-term success of this project meant that science and its modern underpinnings were for the most part above criticism, at least until about three decades ago (Norgaard 1994).

The emergence at that time of significant popular reluctance to push on with the modern agenda can be interpreted in coevolutionary feedback terms as a result of ‘the chickens coming home to roost’. One reason has been that people since then have become increasingly aware that they are the victims of near-sighted thinking in the past (e.g., the case of dryland salinity). Accordingly, they have become more likely to experience pangs of conscience about thinking this way themselves. Moreover, many of the natural resource stocks, both in terms of sources (e.g., biodiversity and groundwater reserves) and sinks (e.g., capacities of the atmosphere, soils, rivers and oceans to assimilate pollutants), previously providing buffers against the consequences of the uncoupling of cultural and natural evolution had become depleted to the extent that their ability to continue doing so had markedly deteriorated.

Consequently, feedback regarding the environmental repercussions of cultural change began to occur much sooner and thus to become more proximate to current choices. Another factor was the rise of national (e.g., Australian Conservation Foundation) and supra-national (e.g., Greenpeace) organisations providing feedback regarding the more distant and dispersed environmental problems associated with modernisation (see sections 2.4.1-2.4.2). Firms, industries, regions and nations then were exposed more to the costs associated with loss of reputation and consequent risks of ostracism from advantageous cooperation opportunities (e.g., multilateral trade deals).

5.4.3 *Coevolving to a sustainable path*

Despite the escalating rate of feedback in respect of negative consequences of the modern path of development, societies on such a path have shown reluctance to fundamentally reassess the beliefs and values on which it is based. Instead, for the most part there has been continuing reliance on technological and organisational (including institutional) innovation in response to the new selection pressures. This has been exemplified by governments attempting to launch collaborative programs for environmental conservation since the early 1980's with little attention to the deeper, systemic cultural changes required within bureaucracies and communities for these programs to succeed (see section 2.5).

This reluctance is evident too in claims that solving environmental problems is simply a matter of internalising externalities at the operational level of action through applying price-mechanism or market-mechanism instruments. Given the rate at which environmental problems are arising, such piecemeal approaches afford an ever-diminishing margin of error. Norton *et al.* (1998 p. 203) characterised this situation as follows: "Like a car that has increased speed, humans are in more danger of running off the road or over a cliff".

This implies that path dependency arising from coevolution of cultural and natural subsystems around modern ideology has left societies adhering to this ideology on a development path that has become adaptively inefficient. It might be expected that feedback regarding the negative repercussions of staying on this path will select against modern ideology and in favour of alternative ideologies that are better adapted to the futures these societies, including Australia, are facing.

However, North's (1990) analysis indicates that this will be the case only in so far as actors are aware of this feedback and their mental models are 'true' in the sense that they lead them to interpret this feedback correctly as a negative consequence of their society's adherence to modern ideology. Otherwise, the actors "must act on incomplete information and process the information that they do receive through mental constructs that can result in persistently inefficient paths" (*ibid.* p. 8). It would seem that this possibility cannot be discounted in the context under discussion here given that in societies historically underpinned by modern ideology the mental models of most actors would broadly mirror this ideology. To lay fault with the ideology is therefore to question a significant part of themselves and to detract from what they have accomplished (e.g., technologically or organisationally) by following it in their lives. The strength of this phenomenon is highlighted by the quotation closing section

2.2.1.

Advocacy of sustainable development since the 1980's (see sections 2.4.1-2.4.2) can be viewed as a nascent ideological innovation in response to coevolutionary feedback that modern ideology has become increasingly ill-adapted or 'unfit' for helping societies to cope with its negative environmental repercussions. However, despite many governments signaling an acceptance that a shift to a sustainable development path is necessary, in practice the shift has been slow at best. In Australia, for instance, over a decade of such political rhetoric has failed to lessen significantly the weight given to economic growth (as conventionally defined materialistically) in policy decisions and to increase correspondingly the weight given to environmental and social considerations (Eckersley 1998; Salvaris 1998).

It seems therefore that strong and persistent collective intervention will be necessary if societies are to break out of their 'lock-in' to modern ideology that has arisen due to coevolution of their values, technologies, organisational structures and institutional frameworks around that ideology. As Sen (1995) has recognised, progress in solving environmental problems is likely to be too slow if values, and the ideologies and beliefs underlying them, are simply taken as given. H.C. 'Nugget' Coombs (1990 pp. 50-51), the distinguished Australian public servant and economist, expressed similar sentiments as follows:

Shifts to ecological living—including willingness to accept higher prices and institutional change—are unlikely unless the community generally develops a pattern of values compatible with it. ... [C]hanges in values are fundamental to the emergence of the ecologically acceptable economic system.

A common response to such concerns has been to call for programs of education and moral suasion to shift people, both as consumers and producers, from materialistic values and beliefs. As discussed in chapter two, Australian governments have relied heavily on programs of this kind in their attempts to address agri-environmental problems. The ideology of a 'landcare ethic' advocated in these programs in recent decades thus urges farmers to think beyond their narrow material self interest when making production decisions by considering also the off-farm and inter-generational environmental consequences.

However, the coevolutionary perspective presented above suggests that it is not only the effect of the materialistic aspect of modern ideology on peoples' values that is of concern for

shifting to a sustainable path of development. It suggests that the effects on values of the atomistic, mechanistic and reductionist aspects of this ideology are equally of concern. The less that the value systems of members of a particular community facing local environmental problems have coevolved with the emergence of those problems (i.e., due to the reductionist aspect of modern ideology emphasising global feedback over local feedback), for instance, the less will be the capacity of that community to adapt to the new selection pressures to which it has become exposed.

5.4.4 *The legacy of individual sovereignty*

Nevertheless, calls for collective intervention to expedite transition of beliefs and values to ones more consistent with a sustainable path of development soon come up against opposition rationalised through the lens of modern ideology. As noted in section 2.2.1, questions of value became regarded in this ideology as not a legitimate concern of science, and thus not of secular policy.

This suited (orthodox) economists in particular who more than other social scientists aspired to “theory of a kind which can only work with stable subject-matter. They need economic behaviour to have a motive force as simple and unchangeable as the gravitational force on which Newtonian physics relies” (Stretton *et al.* 1994 p. 19). This aversion to dealing with questions of value was reinforced by the preoccupation in classical liberalism with protecting people’s rights of privacy and free action (see section 2.2.2). This translated into a view, especially among neoclassical economists, that democracy requires that people independently form their value systems, including preferences (Norton *et al.* 1998).

These considerations meshed into the presumption in neoclassical economics that the preferences of each individual should be taken as given (i.e., regarded as ‘sovereign’). Consequently, many economists, as well as others trained to leave questions of value aside in policy analysis, have regarded policy intervention to affect people’s beliefs and values as not only unscientific but also as paternalistic and undemocratic (Randall 1988). Not surprisingly, they have often been less than whole-hearted in their support for programs of this type.

Nevertheless, there appears to be growing recognition among economists at least that democratically-expressed desires of citizenries to shift to sustainable paths development should take precedence over their disciplinary values. In her presidential address to an annual meeting of the American Agricultural Economics Association, for

instance, Sandra Batie (1989 pp. 1098-99) warned against “[c]lose minded adherence to our ideological convictions ... [I]f we cling too tightly to conventional neoclassical concepts we are in danger of trivializing important global problems”.

5.4.5 *Changing preferences democratically*

Notwithstanding the above, there is a tradition within economics which accepts that comparison of, and even attempts to change, individuals’ value systems is the essence of democracy—provided that these activities are performed through a democratic process of open discussion and debate rather than imposed or manipulated paternalistically. For instance, Knight (1947 p. 280) argued that “values are established or validated and recognized through discussion, an activity which is at once social, intellectual and creative”.

Buchanan (1954 p. 120) remarked similarly that “the definition of democracy as ‘government by discussion’ implies that individual values can and do change in the process of decision-making”. Sen (1995 p. 18) agreed as follows: “Buchanan is right to emphasize the role of public discussion in the development of preferences (as an important part of democracy)”. Discussion helps individuals to recognise detrimental consequences of their value systems, he argued. In turn, each individual’s capacity to self-reflect critically on the values consonant with the “kind of life one should sensibly choose” can lead them to modify their value systems to prevent detrimental consequences that would otherwise occur (ibid. p. 16). Indeed, Boulding (1970 p. 118) considered the idea that people’s learning of preferences should be quarantined from disputation as “absurd”. He went on to claim that “[t]he process by which we learn our preference structures is indeed a fundamental key to the total dynamics of society” (ibid. p. 123).

The conventional notion of individual sovereignty has thus been challenged on the basis that it is not undemocratic, as this notion implies it is, for a group to try to convince its members to fall into line with a value system that its members have agreed on, at least if the agreement has been achieved democratically (Norton *et al.* 1998; Sen 1995). Sen (1995 p.18) argued as follows that democratically-founded attempts to influence how values form often in fact are necessary: “Many of the more exacting problems of the contemporary world—varying from famine prevention to environmental preservation—actually call for value formation through public discussion” (ibid. p. 18).

Finding successful solutions to these problems, Sen argued, requires going beyond options for institutional reform that are workable with individual beliefs and values taken as given. Discussion provides a valuable source of feedback for remedying incorrect mental models that may be making it unnecessarily difficult for members of a group to agree on the nature of their problem and how to respond to it.

Referring specifically to the challenge of realising the collaborative vision for ICM in the Murray-Darling Basin (MDB), Bouilly (2001 pp. 1, 3) argued accordingly that:

The hallmark of the frontier society—the freedom to use land and water resources as one wishes—is becoming overtly antisocial. ... [We need to] move from a state where the basis of every negotiation in the community and government is ‘what’s in it for me’ to one where the question addressed is ‘what’s best for the common good?’ This shift will require a shift in the values held by individuals as well as by society as a whole. It is important to recognise that some values are negotiable and others are not, and that is why changing people’s values and the way they behave can be difficult, especially if the trade-offs are threatening survival and emotionally painful. The conflict which arises from challenging long-held values can also have positive effects as this tension can generate an energy in groups and communities that is often the catalyst for questioning the status quo, resulting in social change.

This view is consonant with Randall’s (1999 p. 32) observation more generally that:

Structured discourse and deliberation can often undermine conflict, and careful consideration of information can erode firmly held priors and open up new possibilities. ... [N]egotiations, real trades, and win-win solutions are often essential to break impasses.

For Sen (1995) and Norton *et al.* (1998) discourse of this kind is democratic provided that it proceeds according to rules that have been devised democratically. Such rules *inter alia* would forbid methods of influencing preferences that are manipulative or coercive. This argument highlights too the importance of Ostrom’s (1990) third design principle for long-enduring CPR organisations—namely the importance of group members participating in the collective-choice and constitutional choice levels of action wherein the rules of the group (in this case, for instance, rules defining selective incentives for group members to participate in policy debates and stipulating a code of conduct for these debates) are decided. For Norton *et al.* (1998 p. 200) attempts at ‘democratic preference change’ through structured discourse and deliberation should therefore:

... be in the form of rational suasion, of pointing out to people the consequences of their desires, and showing them alternative paths to personal satisfaction that have less severe impacts on the future of society.

Of course, the enhanced appreciation that group members gain from such discourse of the predicaments of one another and future generations would be irrelevant if they were motivated by rational self interest in a narrow sense. Nevertheless, the rationality of this process is typically bounded and can therefore account for emotional feedbacks obtained from interactions as well. The information they gain about each other thus becomes relevant if they also come to care about each other (Schmid 2000).

Thus disagreement within a group about the nature of a common problem, or how to solve it, that cannot be overcome by narrowly-rational argument may yet be overcome through the emotional aspects of boundedly-rational argument (e.g., due to the perceived sincerity of arguments and the admiration this evokes). Such possibilities can be viewed as elaborating the effects of face-to-face communication for large-group cooperation (e.g., group identity) discussed in sections 4.5.1-4.5.2. Deliberative discourse is thus a process where:

... on the one hand, people (and collectivities) may come to abandon or relinquish priorly held perceptions and claims (beliefs, property interests and so on); and, on the other hand, they may accede to new perceptions, convictions and motivations. ... It is precisely the fluid, unfinished, ambiguous process of inter-subjective communication, *with its impassioned, affective and non-rational as well as rational dimensions*, that permits the emergence of novel perspectives of coexistence and compromise (O'Connor 2000 p. 5, original emphasis).

Countering objections that attempts to compare and change individuals' preferences are necessarily paternalistic, Norton *et al.* (1998 p. 199) reasoned that:

... it is possible to respect individual self-determination of preferences and at the same time to address the possibility that sincerely felt preferences of many individuals in a society, if pursued as a public policy, will nevertheless be extremely detrimental to the public interest or to the rights of a minority.

Perhaps it helps in clarifying this issue to regard, as Common (2000) has suggested, preferences as depending both on individuals' 'personal interests' and on their mental models. As Buchanan (1989 p. 37) recognised, preferences themselves are "objects for choice" for each individual seeking bounded-rationally to further his or her self interest over the long run. Hence the private optimality of this choice depends on how correctly an individual's mental model predicts the implications of preference-choice options for satisfying his or her self interest. It follows that an individual's choices of preferences will be privately sub-optimal if they are based on an 'incorrect' mental model.

It might reasonably be argued therefore, as Common (2000) has done, that the domain of individual sovereignty should be limited to the most fundamental level of choice, namely in respect of personal interests. If this were the case then attempts at democratic preference change would not breach individual sovereignty provided that they leave individuals to independently determine where their respective personal interests lie.

In any case, as Boulding (1970) pointed out, we spend most of our lives disputing about preferences. Mostly this does not involve paternalism but rather a mutually-respectful exchange of opinions. Indeed, it is accepted democratic practice that arguments, and the values underlying them, be evaluated against one another through open discussion. Arguments are usually resolved with civility, one way or another, even if not everyone is completely satisfied with the result. Given that this is the case, and that adaptivity of cultures in the current epoch seems to depend vitally on changes occurring in individuals' preferences, there appears to be a strong case for arguing that the process whereby individuals dispute and learn preferences be made more inclusive and open—rather than remain as one that tends to legitimise the pattern of influence over preference formation that has evolved path-dependently to the present.

For instance, one reason given for lack of progress in addressing environmental issues is that corporations and conservative think tanks have been manipulating the mental models of the public (Papadakis *et al.* 2000). Another is that the mass media underplays the environmental costs of the materialistic development path because it depends on advertising revenues which depend, in turn, on maintaining materialistic, consumerist preferences (Common 2000). Observations of this nature led Norton *et al.* (1998 p. 196) to pose rhetorically the following conundrum:

So the question becomes whether it is better for preferences to be determined behind the scenes, either by a dictatorial government, by big business acting through advertising, or in some other way? Or do we want to explore and shape them openly, based on social dialogue and consensus, with a higher goal in mind?

Such thinking accords closely with the deliberative conception of democracy—involving free public discussion among equals who are governed by the decisions—that was discussed briefly in section 2.2.2. It is consonant too with the following ideas from communitarian political theory as characterised by Stretton *et al.* (1994 p. 270):

Communitarians think it is a gross mistake, which many liberals make, to suppose that people are freer the less they have been influenced by others. People need plenty of teaching—by family, school,

friends, employers, fellow workers and daily experience of life—to discover and develop their faculties, including their deliberating and choosing faculties. Individual independence and self-reliance are partly social, perhaps chiefly social, creations.

Moreover:

Since there are no neutral options, communitarians want the ideas of good to be explicit and widely discussed as important. Where some liberals fear that too much debate about moral principles may be divisive or may encourage ambitions to have government enforce some illiberal ‘one true good’, communitarians hope it will deepen and sophisticate everyone’s moral thought and lead to more and better-based consensus or more respectful and better understood differences. Far from necessarily reducing either freedom or consensus, the heart of the communitarian argument is that this approach is more likely to enhance them (ibid. p. 277).

5.4.6 *The possibility of changing preferences non-paternalistically*

Scepticism in orthodox economics about attempts by groups to effect changes in the preference-orderings of their members can also be traced to Arrow’s (1951) so-called impossibility theorem. This theorem suggests that a preference-ranking derived democratically for a group is inevitably influenced by how the decision making process is organised (Arrow *et al.* 1986). It follows that democratic determination of a group’s preference-ranking is susceptible to strategic manipulation.

However, this theory presumes an aggregative conception of democracy, and does not hold if the alternative deliberative conception applies (see section 2.2.2). Two of the assumptions underlying the impossibility theorem can be relaxed if the deliberative conception is accepted, these being (a) there is no communication between group members; and (b) their preference-rankings are fixed as given (Sen 1995). Once the possibility of communication is allowed, then so too must the possibility of interpersonal utility comparisons. As Sen (ibid. p. 8) has observed, such comparisons are part and parcel of practical policy making, even if the comparisons are “rough and ready and often open to disputation”.

Once interpersonal utility comparisons, and likewise transformations of members’ preference-rankings, become possible, the door then opens on the prospect of group members explicitly trying to change one another’s minds (i.e., mental models) so that agreement on a common preference-ordering for the group comes within reach. The transparency of this process can provide protection against behind-the-scenes manipulation of its outcome.

5.5 *Subsidiarity*

The appropriate role of government in the context of complex environmental problems, it was suggested in sections 5.2.1-5.2.2, is to complement rather than supplant the self-organising capacities within the civic sphere. To the extent that groups of citizens can overcome spontaneously the assurance problems they face in providing themselves with the collective goods required to solve those problems (e.g., knowledge and institutions), that is, a government should limit the use of its coercive powers to adding to the assurance or trust that already exists. By providing monitoring over and above that performed by citizens themselves, for instance, the reputational feedback on which the development of trust depends can be enhanced.

This prescription is consistent with the principle of subsidiarity, an early formulation of which runs as follows:

It is an injustice and at the same time a grave evil and disturbance of right order to assign to a greater and higher association what lesser and subordinate organisations can do. For every social activity ought of its very nature to furnish help to the members of the body social and never destroy and absorb them (*Encyclical 'Quadragesimo Anno'* as quoted in Schumacher 1973 p. 228).

Subsidiarity thus requires that functions of governance be devolved to the lowest level at which they can be exercised satisfactorily (Young *et al.* 1996). It implies that the onus should be on those who seek to deprive a lower level of a function to prove that this level lacks the capacity to exercise this function satisfactorily *and* that a higher level can do significantly better (Schumacher 1973).

5.5.1 *Subsidiarity as a heuristic*

The principle of subsidiarity clearly fits well with the idea that hierarchical organisation of governance should be allowed to emerge endogenously, each level nesting the levels from which it emerged, from the 'bottom up'. The product of such organic development is a polycentric system of governance (see section 5.3.5) wherein functions are distributed across multiple levels of an organisational hierarchy (see section 5.2.1) according to their respective capacities at the time. The principle may be regarded as a heuristic that has arisen in acknowledgement of the necessity of satisficing when making decisions about organisational structure given the complex trade-offs involved and the consequent impossibility of making optimal decisions.

In section 5.3.6, for instance, it was argued that identifying the adaptively efficient degree of devolution (i.e., delegation down a nested hierarchy) of constitutional- and collective-choice property rights involves trading off the benefits of greater devolution—in terms of richer experimentation and more direct feedback—against the associated costs in terms of reducing the flexibility with which functional responsibilities can be reassigned thereafter (i.e., due to creating stronger vested interests) as the outcomes of uncertainty unfold. In such a trade-off the subsidiarity principle would recommend erring on the side of devolving property rights further rather than less, thus implicitly giving greater emphasis to enhancing capacities for experimentation and feedback than to conserving scope for policy reversibility.

This principle satisfies also by being apparently unconcerned with comparing the costs of having a certain governance function performed more or less centrally within an organisational hierarchy. If a function can be undertaken less centrally, it implies, then it should be, regardless of whether the cost is calculated to be higher. The implication is that any calculated increase in costs will be more than compensated eventually by better outcomes. In contrast, modern policy makers tend to be discouraged from devolving governance functions by expectations that the cost of governance will increase as a result. Thus the World Bank (1996 p. 247) remarked: “Two persistent myths exist about community-based programs: that they cost more and that they take longer”. Likewise, Marsden *et al.* (1994 p. 154) commented that “some argue that all these ‘participatory processes’ lead to over-complication, to stultifyingly slow progress and to decision-making processes which are so extended and non-directional that nothing appears to happen”.

Nevertheless, as was pointed out in section 5.3.5, what might appear to be disordered and costly in the short term may in fact turn out to be crucial for adaptive efficiency over the longer term. These longer-term benefits are nevertheless unpredictable in any tangible sense and consequently tend to be overlooked in the mechanistic calculations of modern policy analysts. What such policy analysts do notice typically is that, using Hanna’s (1995) terminology, the transaction costs of the *ex ante* stages of governance (problem identification and policy development) are often increased by collaborating more with lower levels in the process of governance.

What they ordinarily fail to recognise is that the transaction costs of the *ex post* stages of governance (policy implementation and enforcement) are often reduced when collaboration with lower levels is increased (*ibid.*). Aside from cost savings during the *ex post* stage due to

experimentation and innovation increasing with devolution, during this stage there can be lower costs too as a result of the likely greater compatibility of the policies developed with local conditions (both biophysical and cultural)(*ibid.*). For instance, Shrybman (1986) has suggested that collaborative governance often avoids much of the cost and delay associated with administrative or judicial resolution of disputes that frequently accompany implementation and enforcement of policies developed more centrally within a governance hierarchy. Priscoli *et al.* (1986 p. 69) commented similarly: “Our experience is that consultation for complex and difficult decisions does not lengthen the process. In fact, the reverse may be true; consultation may prevent lengthy litigation and other delays”.

Moreover, differences in the increasing-return or positive-feedback implications associated with choosing whether to devolve a governance function are typically left unaccounted for when such choices are decided on the basis of mechanistic calculation. The incremental self-transformations of social and human capital that arise at lower levels of governance as a result of devolving functions (see section 5.2.1), and the consequent strengthening of capacity at lower levels to exercise those functions self-reliantly, might be vital for adaptive efficiency yet simply be too complex to figure in mechanistic determinations of whether devolution should go ahead.

5.5.2 *Subsidiarity in practice*

The principle of subsidiarity may well seem subversive in the sense that it challenges the modern presumption that governance should be organised in a centralised, top-down fashion. However, it is conservative too in so far as it requires that functions be devolved to lower levels only to the extent that they can be performed capably there. This is a crucial caveat nowadays when many governments are ideologically committed to privatisation and fiscal restraint, and at the same time are becoming less able to keep up with the rate at which environmental and other problems are emerging (Knox *et al.* 2001). Indeed, “[f]iscal crisis and ensuing economic reform policies often provide the greatest impetus to devolution policies” (Katon *et al.* 2001 p. 1). Hence there is a real risk of governments being driven to hastily devolve their functions to communities that are not yet equipped adequately—in terms of physical, financial, human or social capital—to perform them.

In fact, as Ostrom (2000b) has observed, violation of the subsidiarity principle in this way has been occurring in developing countries under the influence of some aid donors who have misrepresented the findings of the research discussed earlier (section 5.2.1)

demonstrating that resource-user groups are *sometimes* able to cope self-reliantly with their collective-action problems. She was concerned that this misrepresentation had led to a situation where “[t]he current recommended panacea for the best governance of natural resources in developing countries is a form of radical devolution involving a massive ‘turning over’ of resources to local users” (ibid. p. 1).

Ostrom was concerned too about the relatively casual way that governments had devolved their functions, and how local users typically were not consulted in the design of the institutional arrangements under which they were expected to exercise these functions. As she observed:

It is one thing to self-organize to create your own property and slowly develop the rules of association that enable a group to benefit from the long-term management of that resource. It is quite something else to have a government tell you that you now have to manage something that the government can no longer handle itself! ... [T]he development of effective institutions is a process that takes time and is strongly affected by a variety of factors related to the resource (or problem at hand) and the individuals involved. ... Enabling citizens and their officials to create collective-action organizations in the public and/or private sphere at multiple levels takes considerable time and effort ... (ibid. pp. 21, 23).

Knox *et al.* (2001 p. 47) argued similarly that:

Hasty devolution (such as in response to a fiscal crisis) carries a high risk of shoddy implementation imposed in a top-down fashion. A negotiated participatory process takes time in order to develop human, technical, institutional and administrative capacities.

Clearly concerns of this kind are relevant to current efforts to devolve environmental governance in Australia and elsewhere. They highlight the importance of devolving governance functions according to the capacities of lower levels, including community-based organisations, to exercise them. This is of course easier said than done. Members of a community are presumably best placed to know what they are capable of as a collectivity at any time, and thus it is vital that there is community input into any devolution process.

However, a community cannot be sure what it is capable of until it is put to the test. A devolution process needs therefore to be adaptive if it is to succeed. Two strategies of incorporating adaptivity into such a process are (i) devolve functions gradually in increasing order of difficulty, and (ii) temporarily ‘top up’ the capacity of a lower level to perform the functions devolved to it. These strategies typically go hand in hand. The first strategy takes advantage also of the beneficial self-transformative effects of success in small challenges (and avoids the demoralising self-transformative effects of failure in over-ambitious

challenges). As the saying goes, “nothing succeeds like success”. Wondolleck *et al.* (2000 p. 187) commented in this vein that:

Early small successes help build trust among participants and increase their confidence in each other and the process, thereby allowing the group to address more complex or controversial issues later. Successes also build support for the collaborative effort among the public and others who provide resources or otherwise aid the collaboration.

A community might thus be expected to start its collaboration in the governance of an issue by addressing only its less-divisive aspects. Likewise it might first be delegated functions to which its local knowledge suits it particularly well, like deciding how best to divide its population into subgroups for the purpose of ‘grassroots’ participation in decision making. In some cases a community might have demonstrated sufficient self-organising capacity in respect of other issues (e.g., provision of community-based welfare programs) to make both itself and government reasonably confident that it could handle more challenging functions from the outset.

Once a community’s participation in its own governance begins, from whichever point its previous history of self-organised collective action suggests is appropriate, subsidiarity requires that progressively it be devolved more challenging functions according to its success with current functions and the organic growth of its capacity associated with this success. Again, the community itself is best placed to gauge how much additional responsibility it is capable of taking on at any time.

Another strategy for applying subsidiarity adaptively, as was mentioned above, is to devolve appropriate functions to a lower level while being prepared to provide support to make up for any deficiencies that become apparent in that level’s capacity to perform those functions. In some cases this complementary hierarchical relationship might become a long-term arrangement (e.g., where governments agree to remain as the conflict-resolution arena of last resort). However, in many cases the need for top-down support in respect of particular functions can be expected to lessen, and perhaps disappear ultimately, as human and social capital accumulates gradually at the lower level as a result of experience in exercising those functions.

The pattern and pace of devolution of functions according to the subsidiarity principle is likely therefore to differ considerably between communities. One reason is that normally their initial capacities to govern themselves will differ, and therefore the initial assignment of functions to them would not be uniform. Furthermore, success by individual communities in

exercising the functions delegated to them depends on numerous stochastic variables which to some extent will unfold uniquely for each of them. Due to varied success across communities, and the beneficial consequences of success for self-governing capacity, subsidiarity would recommend slower or faster devolution of functions to them accordingly.

With subsidiarity thus resulting in the pattern and pace of devolution of governance functions evolving differently from one community to the next, it is clear that the task of managing centrally how devolution proceeds across the board would become increasingly difficult. The answer would appear to lie in devolving this function to a lower level (yet of course located higher in a nested hierarchy than the level of community primarily of concern).

For instance, if the primary concern is to devolve environmental governance functions to local communities (e.g., defined according to sub-catchment boundaries), the responsibility for deciding how devolution should proceed on the basis of subsidiarity for each of these communities might be located with their respective regional communities (e.g., defined according to catchment boundaries). Local communities might, in turn, recognise that some of the functions delegated to them could be discharged more effectively by devolving them further to particular subsets of their membership (e.g., rural neighbourhoods). It thus becomes apparent how polycentric organisation of governance emerges from applying the subsidiarity principle.

5.5.3 Subsidiarity and public participation

Before closing this discussion on subsidiarity, it is pertinent to comment on how this concept relates to government-sponsored programs claiming to encourage participation by the public—otherwise referred to as citizens, stakeholders, resource-user groups, and so on—in their governance. While such programs would seem at face value to be important vehicles for operationalising subsidiarity, various commentators have argued that in fact they often disempower, rather than empower, communities to take greater part in their own governance—and thus achieve a result opposite to that intended by this principle.

For instance, Arnstein (1969 p. 216) referred to citizen participation as “a revered idea that is applauded by virtually everyone” while observing that the applause of those currently with greater power is often reduced to polite handclaps when they realise that some of their power might be transferred to others as a result of putting the idea into practice. She argued accordingly that:

[P]articipation without redistribution of power is an empty and frustrating process for the powerless. It allows the powerholders to claim that all sides were considered, but makes it possible for only some of those sides to benefit. It maintains the status quo (ibid. p. 216).

Arnstein (ibid. p. 216) illustrated her point by presenting a “ladder of citizen participation” consisting of a range of levels of participation, with each level corresponding to the extent that citizens gain real power over policy making. A reformulation of this ladder by Pretty *et al.* (1997) making it more relevant to environmental governance is presented in table 5.3.

Table 5.3: A typology of public participation

Type of participation	Characteristics of type
1. Manipulative participation	Participation is simply a pretence, with ‘people’s’ representatives on official boards who are unelected and have no power.
2. Passive participation	People participate by being told what has been decided or has already happened. There is no obligation to listen to people’s responses.
3. Participation by consultation	People participate by being consulted or answering questions. External agents define problems and information-gathering processes, and so control analysis. There is no obligation to respond to people’s views.
4. Participation for material incentives	People participate by contributing resources, for example land, in return for material incentives. People have no reason to continue participating once the incentives cease.
5. Functional participation	Participation seen by external agencies as a way to achieve their goals, especially reduced costs. People may participate by forming groups to meet externally determined objectives. Such involvement may be interactive and involve shared decision making, but tends to arise only after major decisions already have been made externally.
6. Interactive participation	People participate in joint analysis, development of action plans and formation/strengthening of local institutions. Participation is seen as a right, not just a means to achieve project goals. Taking control over local decisions is expected to lead local groups to assume ‘ownership’ for maintaining the structures or practices they have agreed to.
7. Self-mobilisation	People participate by taking initiatives to change systems independently of external institutions. They may utilise resources and technical advice from external agencies, but retain control over how resources are used.

Source: Pretty *et al.* (1997 table IV, p. 54).

Pretty *et al.* (ibid.) argued that participation types 1 to 4 are more aptly regarded as gradations of non-participation since they do not involve any substantive devolution of governance functions, and thus power, to citizens. Munro-Clarke (1992) has claimed that often the real agenda with these types of so-called participation is to preserve the legitimacy of the existing power structure by encouraging citizens to believe that they could exercise real power if only they chose to.

Moreover, Painter (1992) has observed how introducing participation programs sometimes defuses the challenge that ‘grassroots’ protests present to the status-quo balance of power. For instance, programs of this kind may require grassroots movements to formalise their organisational structures and accountability provisions, thus diverting energy and resources from mobilising mass support. In addition, the ability of government agencies to slow the pace of decision making and “swamp the participants with information and blind them with science” (ibid. p. 34) may leave leaders of such movements unable to provide tangible results as fast as they and their followers expected. Leaders may thus become alienated from their followers as a consequence of appearing to have been co-opted, with the result that the grassroots movements lose impetus.

So-called participation programs that end up reducing the capacity of citizens to play a part in their own governance are clearly at odds with the principle of subsidiarity. Programs designed on the basis of this principle would empower citizens to participate at progressively higher levels of governance as time goes by. Participation programs should accordingly be designed to make full use of the capabilities that exist in each community.

This could mean that communities with low existing capabilities (e.g., due to internal conflict and/or lack of recognised leadership) begin with a type of participation that adds to their power in the short term only marginally if at all. For instance, beginning with ‘participation by consultation’ (type 3) might be consistent with subsidiarity in so far as this allows a community to develop skills (e.g., communication, networking, organisation, etc.) that it can use subsequently to engage effectively in types of participation further up the ladder. Clearly the long-term hope in applying subsidiarity would be to eventually empower as many communities as possible to become engaged in their own governance at the ‘self-mobilisation’ level of participation (type 7).

It is interesting to observe from the discussion in section 2.5.1 that Burton’s (1985) original proposal for public participation in the NSW Government’s TCM program envisaged the public being involved at least at the ‘interactive participation’ (type 6) level. Nevertheless, it is evident from section 2.5.5 that this aspiration has been difficult to satisfy in practice.

5.6 *Concluding comments*

The main insight arising from the previous chapter concerned the central importance of feedback for solving the assurance problems associated with large-group collective

action. In this chapter, the focus was on the role of hierarchical organisation, including government, in complementing spontaneous provision (i.e., horizontally between group members) of this feedback. There is nothing surprising in the finding that hierarchical organisation is vital for collective action in complex modern societies and that government plays a key part in that organisation.

However, it is apparent from this chapter that the orthodox modern conception of governance—presuming that the selective-incentive mechanisms necessary for resolving large-group collective-action problems would not be provided at all without government—is too restrictive as a basis for policy. It is usually possible for some degree of large-group collective action to emerge spontaneously as a result of horizontal interaction between group members. This lessens the need for hierarchical organisation to solve such a first-order problem. The organisational need that remains represents a second-order collective-action problem that may, in turn, be partly resolvable spontaneously as a result of horizontal interaction between leaders of different large groups—and so on.

For policy analysts to presume that government alone should establish and maintain the organisational capacity required to provide the institutions needed to solve all first-order large-group collective-action problems is thus to squander the significant ‘order for free’ that could be harnessed potentially if government were expected instead to facilitate the accretion of hierarchical organisation from the bottom up. In this alternative conception, government would be seen not as a Leviathan but rather as merely the highest level of a multi-layered, or polycentric, system in which governance units at any level ‘nest’ rather than supplant the capacities of lower-level units.

How would government operationalise this alternative view of its role? In so far as efficiency is a relevant consideration in organising governance, the discussion in this chapter indicates that adaptive efficiency is a more appropriate criterion than allocative efficiency. Unlike the neoclassical yardstick of allocative efficiency, the criterion of adaptive efficiency is conceptually well-suited to guiding choices between alternative organisational arrangements which are ordinarily so complex that it is unlikely that the choice made initially will turn out to be the one that best solves the organisational problem.

The criterion of adaptive efficiency recognises that the choice made will constrain subsequent choices as a result of path dependency arising from increasing returns. There is thus a strong likelihood that any process of organising governance will become locked-in to

an inferior path. The criterion of adaptive efficiency would require that differences between organisational alternatives in terms of their susceptibility to lock-in, and thus of their consequences for dynamic transaction costs, be taken into consideration. For instance, it would account for the implications of each alternative for the social capital, trust and reciprocity upon which effective democratic governance ultimately depends.

Moreover, the discussion in this chapter has highlighted the relevance for adaptive efficiency of organisational choices in terms of their respective consequences for feedback flows between actors. These consequences are clearly important in respect of the need to learn as much as possible from organisational experiments to make it more likely that successes will be imitated and used as a basis for further experiments, and organisational failures will be exposed and eliminated.

The complexities involved in predicting the various dynamic consequences of organisational choice discussed above make it necessary to use some heuristic when comparing organisational alternatives on the basis of adaptive efficiency. The most appropriate heuristic would seem to be the principle of subsidiarity. The importance of governments collaborating with lower-level governance units when applying this principle, rather than making decisions unilaterally in respect of their capacities to absorb certain functions, was emphasised.

Finally, a coevolutionary perspective can enrich our understanding of path dependency in respect of organisational and institutional choices by elucidating how these choices are selected by, and thus reinforce, other aspects of the prevailing culture. Of particular concern given the mounting challenges many societies are confronting as a result of the detrimental environmental consequences of the modern path of socioeconomic development is the self-preserving capacity of modern ideology as a result of being embedded deeply in people's mental models and thus in their value systems. The result is a tendency for feedback regarding the performance of aspects of culture, including organisations and institutions, based on this ideology to be interpreted with a modern bias (i.e., such that modern beliefs and values are credited for success in cultural outcomes but blame for failure is deflected elsewhere).

What seems to be needed, therefore, if cultural adaptation to deteriorating environmental circumstances is to be gradual ('smooth landing') rather than sudden ('crash landing') is reorganisation of how feedback occurs so that it becomes less concerned with perceptions *per se* and more with the beliefs and values underpinning them. This is consonant with the

increasing advocacy nowadays of collaborative organisational forms within which choices follow deliberation over actors' mental models and values (or preferences) rather than accepting these as given.

PART III:

CASE STUDY:

CONTEXT, RATIONALE AND METHOD

6. CASE-STUDY CONTEXT

6.1 *Introduction*

Developments in economic theory, and rational-choice theory more particularly, in respect of understanding how collaboration within a process of governance sometimes enhances the spontaneity with which cooperation occurs in implementing solutions to collective problems were examined in the previous two chapters. These general theoretical insights are the result of a research effort spanning two decades based on empirical evidence from (i) case studies of a range of cultures facing diverse types of collective-action problem (see section 5.2.1), (ii) artificial-intelligence experiments (e.g., Axelrod's (1984) computerised contests between strategies for an indefinitely-repeated prisoner's dilemma—see section 4.3.1) and (iii) 'laboratory experiments' using actual people as subjects (usually university students from the USA or western Europe—see sections 4.4 and 4.5).

How pertinent is this evidence to the kinds of collective-action problems likely to be faced in Australian agri-environmental governance? Those responsible for devising and practising strategies for the pursuit of the collaborative vision within this domain presumably will seek assurances in this regard before relying on the theory based on this evidence to guide them in discharging these responsibilities. Sensibly too, they will want explanations of how to connect the core relationships of this theory—between trust, reciprocity and cooperation—to the multitude of structural variables operative in actual agri-environmental settings. The challenge of developing policy-oriented models of this kind was addressed earlier in section 4.6.

The empirical research undertaken for the present study anticipated these needs of leaders, both governmental and civil, and their policy advisers and practitioners. The general approach followed in this research was the case-study method. Eisenhardt (1989 p. 534) described this approach as involving "a research study which focuses on understanding the dynamics within a single setting". Bonoma (1985 p. 204) commented that a study of this kind must be "constructed to be sensitive to the context in which management behaviour takes place". In this method cases are treated as experiments from which insights can be generalised to theory (Yin 1984).

Further discussion of the case-study approach and the reasons for its application in the present research is deferred to chapter seven. Meanwhile, the focus of this chapter is on detailing the context of the specific case study undertaken for this thesis. After providing background information regarding the geography of the study area and its history in section 6.2, the reasons for instigating the program of Land and Water Management Planning (LWMP) in the central-Murray region of NSW are discussed in section 6.3. The processes and outcomes of developing and implementing the LWMPs are then described in sections 6.4 and 6.5, respectively. Progress in implementing the on-farm aspects of the Land and Water Management Plans is considered in section 6.6 before describing in section 6.7 the process used in undertaking the first five-yearly review of LWMP implementation and presenting its main findings. Some issues pertinent to assessing the transferability of this region's model of collaborative agri-environmental governance to other contexts are explored in section 6.8, after which concluding comments are provided in section 6.9.

6.2 *Geographical and historical background*

The central-Murray region of NSW is situated in the catchment of the Murray River which itself constitutes part of the Murray Basin. This Basin is a saucer-shaped depression underlain by bedrock which covers some 300,000 square kilometres. Thus it is essentially a closed groundwater system (Denimein Community Working Group (CWG) 1995). This Basin is itself a part of the MDB which covers over one million square kilometres from southern Queensland to the Murray mouth in South Australia. Nearly 4,000 kilometres long, this river system covers about one-seventh of the area of Australia. It is Australia's largest and most developed river system (Murray-Darling Basin Ministerial Council 2000) and is among the world's ten longest continuous stretches of river (Purdie 2000). It incorporates 75 per cent of Australia's irrigation and provides just over 41 per cent of Australia's gross value of agricultural production (Murray-Darling Basin Ministerial Council 2000).

The four Districts for which LWMPs were developed in the central-Murray region largely correspond with four irrigation schemes that were constructed and financed by the NSW Government. The Irrigation Districts of Berriquin, Deniboota and Denimein constitute three of these schemes. The fourth scheme comprises Wakool Irrigation District and Tullakool Irrigation Area. The LWMP Districts are accordingly known as Berriquin, Deniboota, Denimein and Wakool, respectively. They are situated within the broad 'riverine' floodplain of the Murray River which formed during the Pliocene era (Cadell CWG 1995). The location

of these Districts is illustrated in figure 6.1.

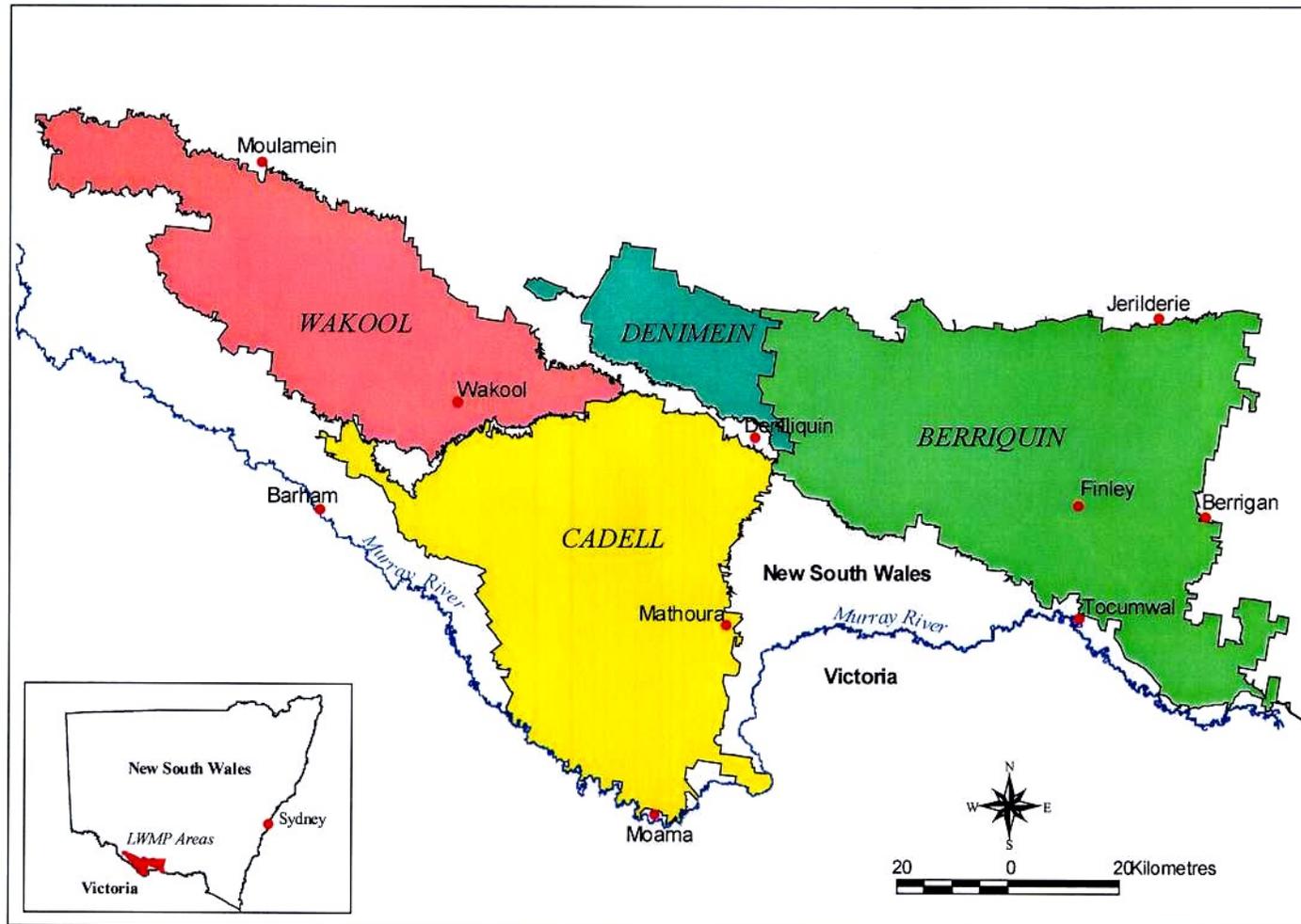
The first documented government discussions on using the Murray River for irrigation were in 1863. However, it was not until 1919 that construction of the Hume Dam commenced. Its opening in 1936, together with Yarrawonga Weir and the Mulwala Canal, progressively brought water to Berriquin Irrigation District from 1939. This District was gazetted in 1934 as a Provisional Domestic and Stock Water Supply and Irrigation District. Its irrigation scheme was designed primarily to provide drought relief for livestock and irrigation of pasture and fodder crops.

Much of the area had been supplied with water by 1944. Irrigation increasingly was used for agriculture rather than for livestock as intended originally. Consequently, the intensity of irrigation grew far beyond what had been envisaged when the scheme was designed (Marsden Jacob Associates 1994). The history of the Wakool/Tullakool scheme followed a similar course. The Provisional Domestic and Stock Water Supply and Irrigation District of Denimein was not gazetted until 1949 (Denimein CWG 1995), while the extension of the canals required for commencement of the Deniboota scheme did not occur until the mid 1950's (Cadell CWG 1995).

The farm area in the four schemes is 749,202 hectares. Berriquin accounts for 45 per cent of this, followed by Wakool/Tullakool (29 per cent), Deniboota (19 per cent) and Denimein (7 per cent). The number of farm businesses within the schemes has recently been estimated at 1,610, of which 209 operate farms with less than 20 megalitres of water entitlement. After excluding these small businesses, the average business area is 518 hectares and the average water entitlement per business is 1,026 megalitres (Murray Irrigation 1998b). The Cadell LWMP District includes the Deniboota scheme as well as an adjoining area to the east (East Cadell) which includes considerable private irrigation development—some private irrigation schemes commenced operation as early as the 1930's. East Cadell includes a farm area of 156,137 hectares.

By area, the greatest land use across the four LWMP Districts is dryland pasture (34 per cent of farm area in 1997-98), followed by winter crops (21 per cent), winter irrigated pasture (20 per cent), and rice (6 per cent). However, the greatest water use occurs with rice (54 per cent of 1997-98 total water use), compared with annual pasture (20 per cent) and perennial pasture (14 per cent) (Murray Irrigation 1998b). Rice is normally the most profitable broadacre crop to grow in this region. For instance, its budgeted gross margin of

Figure 6.1: Map of the LWMP Districts in the central-Murray region of New South Wales



Source: Murray Irrigation Limited

\$1,192/hectare for the year 2000 compares with \$224/hectare for wheat, \$374/hectare for canola and \$491/hectare for soybeans⁶³ (NSW Agriculture 2000). However, the area on which it can be grown is limited by its relatively high water use. Its typical water use of 13.0 megalitres/hectare compares with 3.6 megalitres/hectare for wheat, 2.0 megalitres/hectare for canola and 8.0 megalitres/hectare for soybeans (ibid.).

Across the four LWMP Districts, around 46 per cent of the farm area has been developed for irrigation, although the rate varies from a low of 30-40 per cent in the Cadell District to a high of 70 per cent in the Berriquin District. The area irrigated in any year depends on annual water availability, and is commonly less than 30-50 per cent of the area developed for irrigation (Murray Irrigation 1998b). While this intensity of irrigation is low, the large area irrigated means that Murray Irrigation, which now runs the schemes, has the largest single diversion license in the MDB (Marsden 1996). Together the four schemes use about 15 per cent of all the irrigation water available in the MDB (Murray LWMP Office 1996).

The major local centre of population is Deniliquin, which was established before the irrigation schemes were introduced. In contrast, the major centres for the Murrumbidgee Irrigation Area, Griffith and Leeton, only came into existence with the introduction of irrigation. In its early stages the irrigation industry was used explicitly by the NSW Government as a vehicle for meeting social as well as economic objectives. It was normal within publicly-sponsored irrigation schemes for the area of land held, the amount of water that could be used on it, and often the crop or pasture grown, to be determined by the Government (Berriquin CWG 1995). The principles underlying these controls stemmed primarily from the Government's 'closer settlement' policy of the time which aimed within the irrigation schemes to achieve equitable distribution of water among the maximum number of settlers (Irrigation Farm Working Group 1986). The construction of the schemes was justified too by its contribution to regional employment of labour (Haig-Muir 1996).

Deniliquin has a population of about 8,500 and is a drive of about 300 kilometres (three and a half hours) north from Melbourne and 750 kilometres (nine hours) south-west from Sydney. Its industries are mainly associated with the surrounding agricultural and pastoral industries, and it also serves as a regional administrative and work headquarters for various

⁶³ The specific cropping activities to which these figures refer are: long grain rice (aerial sown), Australian Standard White wheat (flood irrigation layout, conventionally sown into rice fallow), canola (conventionally sown in border-check layout, and flood irrigated), and soybeans (rows or beds).

government and semi-government organisations (McCotter 1994). The local region within which the central-Murray region's LWMP Districts are situated has a population of about 25,000 people (Murray Irrigation 1999).

6.3 *Origins of the central-Murray region's LWMP program*

Watertables within the schemes were at depths of ten to 30 metres when irrigation commenced in 1939 (Marsden Jacob Associates 1994). The vast majority of the shallow groundwater within the four schemes is saline, but salinity levels are generally highest in the Wakool scheme (Murray Irrigation 1998b). Once a watertable rises to within a critical depth from the soil surface, which in the MDB is generally considered to be two metres, upward movement of salt to the root zone can occur due to capillary rise of saline moisture from the watertable (Pope *et al.* 1988). The primary effect of soil salinity on plant growth is to decrease the availability of soil water to plant roots by increasing the osmotic potential of the soil solution (Rhoades *et al.* 1971).

Most of the deep-rooted vegetation in the central-Murray region that existed at the time of European settlement has since been cleared and replaced by shallow-rooted crops and pastures. The hydrological consequences of this, and of irrigation itself, became apparent 'on the ground' when problems with shallow watertables were first recorded in the Wakool scheme area in the early 1950's (Haig-Muir 1996).

The (NSW) Water Conservation and Irrigation Commission (WCIC)⁶⁴ agreed in January 1943 to proceed with a government-organised rice-growing project in the Wakool Irrigation District, a decision process in which "warnings about possible future salinity problems were ignored, underestimated, or overlooked ..." (ibid. p. 67). This decision followed from agriculture being accorded 'war industry' status in 1942, the associated declaration of rice as an essential commodity, and consequently the Commonwealth asking the WCIC and the NSW Department of Agriculture to consider how rice production could be rapidly increased. Despite the WCIC agreeing to grow rice within Wakool Irrigation District for only the duration of the war plus one year thereafter, a postwar political agenda of closer settlement "eventually triumphed, and rice, dairying, and other forms of intensive irrigation became

⁶⁴ Predecessor of the Water Resources Commission which, in turn, preceded the Department of Water Resources.

central to developing land and providing income for both old and new settlers ...” within the District⁶⁵ (ibid. p. 71).

Seemingly as a result of this agenda, “an alarming rise in the water table” was observed in 1954, “particularly adjacent to Tulla and Tullakool where there is much evidence of salting also” (Water Conservation and Irrigation Commission 1956-7 p. 21). By 1981, 30,900 hectares within the Wakool scheme had watertables less than two metres from the soil surface (Wakool CWG 1995). By 1988 the shallow watertable area in the Berriquin and Denimein schemes had reached 58,000 hectares (Marsden Jacob Associates 1994). By 1990, the shallow watertable area in the Cadell LWMP District had reached 6,000 hectares (Cadell CWG 1995).

Early responses to the problem of rising watertables were in the ‘progressive conservationist’ tradition discussed in section 2.3.2, wherein the emphasis was on technical innovation conceived and implemented centrally by experts. However, unlike in dryland agricultural areas where the conservation solutions were designed for adoption by individual farm businesses, in the irrigation schemes the large-scale engineering mindset behind them was applied also to developing solutions to the watertable-related problems. This approach was exemplified by the Wakool Tullakool Sub Surface Drainage Scheme which was built between 1979 and 1988 to rehabilitate salinised land and prevent further salinisation. This scheme consists of 59 groundwater pumpsites, 108 kilometres of pipelines, and two evaporation basins which occupy an area of nearly 2,100 hectares. The groundwater is pumped via the pipelines into the basins for solar evaporation (Wakool CWG 1995).

Intensification of irrigation also contributed to increasing problems of surface drainage. Since the schemes were intended originally for low-intensity irrigation, they were constructed without surface drains (Marsden Jacob Associates 1994). These problems were worst in Berriquin which mostly has very little topographical relief and lacks effective natural drainage. An expert-driven large-scale engineering solution prevailed once more, and construction of the first stage of a government-financed surface drainage scheme commenced in 1979.

⁶⁵ In 1947 the site of the rice-growing project was resumed for soldier settlement and gazetted as Tullakool Irrigation Area (since much of the site was located within Tulla Station). Observe too Haig-Muir’s (1996 p. 72) remark that “the Wakool project is notable as the prime example of state farming in Australian wartime agriculture, and the most intensive exercise in state farming in the nation’s history”.

By the end of the 1980's, NSW Government policy for funding further drainage works (about one-third of Berriquin had surface drains by then) changed to accommodate the *Natural Resources Management Strategy* developed by the MDB Ministerial Council. This Strategy "identifie[d] the need for communities and Government to co-operate and coordinate their efforts"⁶⁶ (Murray-Darling Basin Ministerial Council 1989 p. iii). Hence Government funding of drainage-based solutions would be provided only to the extent that the recipient communities could demonstrate a commitment to integrating changes in their own behaviours with these solutions. Demonstrating this commitment was to be through a process of collaboration with government agencies, including a community-participation program. This shift was formalised in the *NSW Integrated Drainage Policy for Irrigated Areas* (Department of Water Resources 1992).

This policy shift coincided with growing concerns that rising watertables would threaten local agricultural viability by exacerbating the existing waterlogging problems as well as by causing soil salinisation. Concerns arose also regarding the broader social consequences of this threat within local communities. For instance, McCotter (1994 p. 8.2) predicted that:

... if the [Berriquin] LWMP is not implemented the agricultural industry will suffer further decreases in output and its dominant role in the regional economy will be significantly reduced. The district will also be faced with a number of detrimental economic and social problems including depopulation, an ageing society, deteriorating economy, unemployment and the withdrawal of services.

Similarly, Haig-Muir (1996 p. 74) found that:

In places like Tullakool the burning question is how to strike an equitable balance between sustainable agriculture, costs, environmental amenity, and community. ... Forty years on from the wartime project at Wakool, any radical changes which may be imposed from outside will inevitably produce serious disruption, if not disintegration, of the region's economic basis and socio-demographic structure.

Even so, the population of Deniliquin and its surrounding region is known for its ability to act cohesively to protect and further its interests. For instance, a community worker was quoted by Bullen *et al.* (1998 p. 29) as follows:

Deniliquin is a strong community ... The isolation gives it a bonding sense ... Local Government doesn't have much to do with community services in Deniliquin. It is not that they don't see it as a need. It is just that we as a community have been doing it for 20 years.

⁶⁶ At the time this Council consisted of Ministers representing the water, land and environmental portfolios of the Commonwealth, NSW, Victorian and South Australian Governments.

In this spirit, the Berriquin farming community responded to the threat of rising watertables by organising a public meeting in August 1991 to instigate development of the Berriquin LWMP which would constitute a strategy for applying the philosophy of TCM at the sub-catchment scale (see section 2.5.1). Over 250 farmers and community representatives attended the meeting and voted to support the proposal. A Community Working Group (CWG) was elected at the meeting to oversee the development of the plan. Representatives from local government and relevant government agencies were subsequently invited to become members of the CWG (Stewart 1992). The objective ultimately adopted by the CWG was “to halt or reduce accessions to the watertable, thus stopping or retarding the spread of high watertable areas and the attendant salinisation and to decrease the extent and duration of waterlogging across the District” (Berriquin CWG 1995 p. 51).

Government and community leaders now began to recognise that solutions to watertable-related problems, involving large-scale engineering schemes or otherwise, were subject to social dilemmas of their own. The aquifers underlying the shallow watertables responsible for soil salinisation normally overlap boundaries between farms and also between farming areas and other areas. Due to transmissivity of groundwater within an aquifer, one party’s effort to lower its own watertable helps to lower others’ watertables.

‘Freeboard’ between the soil surface and an underlying watertable consequently has characteristics of a CPR the provision of which constitutes, especially given the number of farm businesses involved, a large-group social dilemma. Accordingly, this freeboard is provided, or conserved, only to the extent that the farmers and other parties sharing the dilemma are assured that their own provision efforts would be reciprocated (see section 4.3.2). Otherwise, as Marsden Jacob Associates (1995 p. 5) observed in the context of the Berriquin LWMP program, “... free rider problems would undermine the incentives for, and effectiveness of, individual action”.

Hence the incentive to invest in large-scale engineering solutions given a social dilemma of this kind is reduced to the extent that there is a lack of assurance that cooperation by other parties, including farmers, in providing complementary measures will be forthcoming. For instance, a large share of the potential benefits from a District-wide network of surface drains in Berriquin depends on farmers reciprocating by constructing drains within their properties capable of connecting with this District-wide network (ibid. 1994). This reciprocation is affected in turn by the NSW Government cooperating with farmers in designing the scheme

so that it meets their needs. It also depends on the Government cooperating with farmers in other activities, like providing culturally-sensitive education programs alerting them to the need for farm plans and improved on-farm drainage systems. The booklet entitled *What's Happening in Berriquin?*, circulated by the Berriquin CWG prior to its first round of local consultation meetings, recognised the social dilemma associated with the District's LWMP as follows:

You may already be doing your best, either individually or as part of a small group, but unless everyone's efforts are directed towards a common goal, they will not succeed in the long term ... This is the purpose of the Land and Water Management Plan. It helps all the people in your district (including landholders, local shires and state government departments) to direct their efforts toward a single goal.

The following remark from the *Report of the Inquiry into Catchment Management* (CoA 2000a p. 69) highlights that the central-Murray region's LWMP (CMR-LWMP) program is not unique among Australian catchment management programs in facing this kind of social dilemma:

... [E]ven when a number of residents do implement ecologically sustainable catchment management, other residents may not be motivated to participate. As a result, residents who do not participate will be in a position to obtain the benefits of participation without any of the associated burdens, effectively 'free-riding' on the efforts of others. Two results generally flow from this. First, even if those who do choose to participate remain within the program, the overall effectiveness of the program will be diminished ... Second, over time, the number of participants will diminish when those who are shouldering the burdens of participation realise that their efforts are being diminished by the 'free-riders' ...

6.4 *Developing the LWMPs*

By June 1992, CWGs had formed to develop draft LWMPs to address problems of rising watertables in all four districts. The conditions under which the CWGs could gain financial and logistical support from the NSW Government for plan development and implementation were outlined in the *Guidelines for Land and Water Management Plans* prepared by the Murray and Murrumbidgee Catchment Management Committees (established under the TCM program) in consultation with the NSW Government. These *Guidelines* defined the community to be represented by the CWGs as "everyone who lives or runs a business in a particular town. It includes people who live in farms or town, and also businesses, local government and state government agencies" (Murray and Murrumbidgee Catchment Management Committees 1992 p. 4).

The importance of the CWGs consulting actively with their constituents was emphasised in the *Guidelines* as follows:

Consultation with the wider community is critical in the early stage of identifying the problems, evaluating the impact of different solutions and developing a plan ... It is essential to keep the community informed of progress and give everyone the opportunity to comment on the draft plan (ibid. p. 4).

At the same time, the CWGs were encouraged to “gain the support of government if you want funding” (ibid. p. 7) and to “be realistic about possible government funding” (ibid. p. 13). They were expected to evaluate options in terms of their technical feasibility, economic effects, environmental effects, community effects, and compatibility with government regulations and policy. Moreover, they were expected to ensure that “access to and use of natural resources as well as costs are shared fairly among all and that no one group is unfairly burdened” (ibid. p. 15). Costs would be shared according to the principle of “‘those who benefit pay’ ... Put simply, this means that the cost of the options should be divided proportionally among those who benefit: farmers, people living in the area and the state” (ibid. p. 15).

The DWR appointed Peter Stewart, an independent consultant, in late 1991 as a Project Co-ordinator for the Berriquin LWMP program, but soon after this role was extended to the processes commenced in the other three Districts. Each CWG met at least monthly until the draft plans were submitted to the NSW Government towards the end of 1995. As the process proceeded, members spent increasing time in additional meetings held by specialised subgroups. The average Denimein CWG member was estimated to have attended a meeting every ten days during 1993-94 (Denimein CWG 1995).

After the large public meetings held initially in each District to gain community support for the LWMP processes and select CWGs, each group moved independently to more focussed strategies of grassroots community participation. The Project Co-ordinator and CWG members made themselves available to discuss the progress of the LWMP with non-farmer stakeholder groups, like local business associations.

Farmers were consulted in rounds of locality meetings held in places convenient for farmers like wool sheds, paddocks, community halls, clubs, and pubs. In general, four or five rounds of these meetings were held during plan development. In Berriquin, the initial round comprised 23 locality meetings, followed by 17 for the other four rounds. The typical attendance at each of these rounds was around 300, or about 40 per cent of Berriquin farm

businesses. For all these rounds, “information was relayed to farmers about the LWMP and their views sought. Feedback from the meetings was collated, analysed and then disseminated via newsletters, brochures, media releases and radio interviews” (Berriquin CWG 1995 p. 5). A final round of four larger locality meetings was held in March 1994 at which the LWMP proposals, their costs and cost-sharing arrangements were discussed.

Negotiations with the NSW Government over cost-sharing arrangements eventually took place during September 1995 and the resulting Berriquin LWMP was formally endorsed at a community meeting held a month later and attended by over 300 farmers (*ibid.*). Similar consultation processes were followed, and levels of community approval obtained, in the other three Districts.

Government-community cost shares were largely based on precedents set elsewhere (e.g., the Victorian salinity planning process which had commenced earlier) rather than on detailed calculation of the respective benefit shares (Jerrems 1996). The NSW Government agreed to contribute \$116 million over the first 15 years of plan implementation, subject to the Commonwealth Government meeting half this cost and the community delivering annually on its agreed contributions. Farmers agreed to contribute \$382 million over 30 years (Percival 1996). Most of this contribution is ‘in kind’, in the form of costs incurred in adopting the on-farm measures included in the various LWMPs⁶⁷.

A diversity of on-farm measures appeared in the four plans. Examples are establishment of perennial pastures, upgrading farmers’ existing groundwater pumps, and installation of drainage reuse systems. In addition, farmers were levied between \$0.50 to \$3.15 per megalitre of irrigation entitlement, depending on the District, to help fund communal LWMP works and measures. Local government in the region agreed to contribute a further \$2 million toward implementing the plans (Marsden 1996).

The estimated impacts of implementation of each of the LWMPs on areas of shallow watertables (within two metres of soil surface) in the respective Districts can be gauged from a perusal of table 6.1. It is evident that the problem of shallow watertables is greatest in Berriquin, where an estimated 63 per cent of the land would be underlain by shallow watertables by 2020 if the LWMP were not implemented. Moreover, it can be seen that implementation of the LWMPs is expected to substantially reduce the shallow watertable

Table 6.1: Estimated impacts of implementing the LWMPs on areas of shallow watertables

LWMP District	Estimated area (ha) of shallow watertables (% of District area)		
	1995	2020 with implementation	2020 without implementation
Berriquin	115,000 (36)	124,000 (39)	200,000 (63)
Cadell	11,600 (4)	33,000 (10)	66,800 (21)
Denimein	2,000 (3)	1,400 (2)	10,100 (17)
Wakool	23,600 (9)	21,600 (9)	38,100 (15)

Source: Derived from Berriquin CWG (1995); Cadell CWG (1995); Denimein CWG (1995); and Wakool CWG (1995).

area in each District as at 2020. In fact, implementation in both Denimein and Wakool was forecast to reduce the shallow watertable area in 2020 compared with the situation in 1995. In Berriquin the shallow watertable area was forecast to increase marginally by 2020 if the LWMP were implemented. However, in Cadell the shallow watertable area was forecast to treble by 2020 even with implementation (but increase about six-fold without implementation).

6.5 Implementing the LWMPs

Deliberations over how authority and responsibility for implementing the LWMPs were to be structured involved a lengthy and intense debate within each local community, as well as between the communities and the NSW Government. As part of the wider process of water policy reform led by the Council of Australian Governments, the four irrigation schemes were privatised in March 1995. The schemes became the property of Murray Irrigation Limited (hereafter abbreviated to ‘Murray Irrigation’).

As at 1999, the Murray Irrigation owned infrastructure valued at \$280 million, including 3,300 kilometres of earthen water supply channels. It had an annual business turnover of \$20 million and employed over 125 permanent staff (as well as making extensive use of local contractors). It was the largest privately-owned irrigation supply and drainage company in Australia, with a bulk entitlement of 1.445 million megalitres—equal to 67 per cent of the NSW share of Murray River irrigation entitlements (Murray Irrigation 1999). Shares in the

⁶⁷ The full cost of these measures was counted in the landholder contribution irrespective of any private benefits expected from the measures.

company were fully apportioned among irrigators (i.e., its water supply customers), in proportion to their volumetric delivery entitlements. Eight of the ten elected company director positions are reserved for irrigators, with two reserved for persons with skills in engineering and finance. One vote is allowed for each landholding owned within the company's area of operation (Murray Irrigation 1997).

The community of irrigators operating within the privatised schemes eventually agreed with the NSW Government's proposal that Murray Irrigation become the 'implementation entity' for the plans as they apply to its defined area of operation. The details of how devolution of LWMP implementation authority to Murray Irrigation was to occur were specified in a Heads of Agreement signed in April 1996 by community leaders and relevant NSW Government Ministers (Percival 1996). Such a document signifies agreement in principle, and convention dictates that it will be honoured by successive NSW Governments unless they are willing to bear the considerable political shaming that dishonouring it would attract. Nevertheless, the intention is to legally formalise the Heads of Agreement by way of a funding deed, although the process of negotiating the deed is still underway.

The Heads of Agreement makes Murray Irrigation autonomous within the constraints set by Government-imposed conditions attached to the three licenses it needs to operate under the Irrigation Corporations Act, 1994. The three licenses work together to require that Murray Irrigation ensures implementation of the four LWMPs within its defined area of operation.

The first license is the Operating License. It sets out the context within which the company is allowed to undertake its business. The second license, the Water (Management Works) License, establishes the right to operate the company's water management assets with a given water allocation under conditions of environmental management responsibility. The third license is a Pollution Control License, issued under the Pollution Control Act, 1970. Provided that the company complies with the environmental standards specified by the license, it is not liable to challenges by third parties on grounds of environmental mismanagement (Schroo 1998). Murray Shire Council agreed to become the implementation authority in respect of the East Cadell area (i.e., outside Murray Irrigation's area of operation), although in 1995 it contracted Murray Irrigation to carry out this role as its agent.

The Heads of Agreement requires the Government to appoint an independent party to audit the compliance of all parties with the licenses, including with the LWMPs (McGlynn 1998). Legal powers provided to Murray Irrigation under its Operating License and the Irrigation

Corporations Act were expected to be sufficient for it to ensure that farmers within its area of operation complied with the LWMPs. It was anticipated that the company would enforce farmer compliance with LWMPs through attaching conditions to water supply agreements with its customers. LWMP levies could be raised through the company's normal water charging system (Schroo 1998). Subject to its satisfaction with the company's progress in implementing the plans, the Government's agreed contribution is released to it annually.

These institutional arrangements for implementing the central-Murray region's LWMPs are historic in so far as they appear to represent the first instance of the ongoing obligations of community and governmental partners in respect of implementing solutions to Australian agri-environmental problems being 'contractualised'. The Natural Heritage Trust, which was established after these arrangements were settled, has been criticised in the *Report of the Inquiry into Catchment Management* (CoA 2000a p. 66), for not being:

... adequately supported by effective partnership agreements that are based on 'fair dinkum' commitments by partners to maintain effort, levels of resourcing and the full implementation of the range of actions required to address the problems facing catchments. Nor do the partnership agreements contain credible and effective enforcement measures for failures to honour the agreements reached.

Given the proposal in *Managing Natural Resources in Rural Australia for a Sustainable Future* (CoA 1999) that this lack of accountability be remedied by providing catchment organisations with funding subject to formal partnership agreements (see section 2.5.6), it would seem that the institutional arrangements devised in respect of implementing the LWMPs offer a valuable prototype from which these partnership agreements could be adapted.

For most of the on-farm measures included in the LWMPs, the implementation requirements are specified for farm businesses collectively (e.g., number of on-farm drainage reuse systems installed per LWMP District) rather than for each farm business. Hence a social dilemma persists in so far as satisfying the requirements represents a collective good. There may thus be a consequent tendency for individuals with less interest in this collective good to free ride on the provision efforts of individuals with a greater interest. To the extent that farmers do exhibit free-riding behaviour in respect of implementing the on-farm aspects of the LWMPs, and their implementation collectively thus falls short of agreed targets, there may be a need for Murray Irrigation to introduce selective-incentive mechanisms to discourage such behaviour (i.e., by exercising its right to attach conditions to water supply agreements with individual farm businesses).

The Board of Murray Irrigation established an Environment Committee to provide it with advice *inter alia* on matters relating to LWMP implementation (Murray Irrigation 1998a). The four CWGs (renamed Community Implementation Groups) now provide feedback and advice to the Board regarding LWMP implementation in their respective Districts (Murray Irrigation 1998b). They have continued to keep their communities involved in implementation decisions through locality meetings, newsletters and the like. The Community Implementation Groups (CIGs) have a particularly important role in suggesting, on the basis of consultation with their constituents, how their LWMPs can be improved as better knowledge becomes available. The Heads of Agreement anticipated this need for adaptive management and allowed for what is now known as a ‘substitutions’ process (Diacono *et al.* 1998). A so-called substitution is an agreed variation to a LWMP without changing the total Government and total community contributions (Rudd 1999).

Minor substitutions can be adjudicated by the Deniliquin-based Murray LWMP Management Committee comprising representatives of the independent auditor, Murray Irrigation and the Department of Land and Water Conservation. However, more substantial substitutions must be referred to the more senior LWMP Assessment Team (LWMPAT). This Sydney-based body is chaired by a representative of Premier’s Department and includes members from the following NSW Government agencies: Treasury, Department of Land and Water Conservation, NSW Agriculture, Environment Protection Authority, Department of Urban Affairs and Planning, National Parks and Wildlife Service, Department of Local Government, and NSW Fisheries.

In turn, the LWMPAT’s recommendation in these cases is referred to the higher-level Irrigation Reform Steering Committee for a final decision. However, ultimately a substitution must be ratified by both the community (represented by locality groups, CIGs, and Murray Irrigation) and the NSW Government (represented by the LWMPAT and the Irrigation Reform Steering Committee) for it to proceed (Diacono *et al.* 1998). Hence, the LWMP substitutions process constitutes a distributed system of governance (as characterised in section 3.5.4, respectively), with different collective-choice property rights in respect of that process (defined in section 3.5.3) assigned to different levels of the system. There are similarities too with a polycentric system of governance as defined in section 5.3.5.

Musgrave (1996a p. 56) has expressed concern that “despite the substance and discipline imparted to them by their legal underpinning”, the successful implementation of LWMPs

ultimately depends on “moral agreement” between governments and communities and the trust on which it rests. He concluded “that such an important process of reform should have to rely on such a fragile instrument is cause for concern. Despite this, understanding of the problems leads to the conclusion that such reliance is probably unavoidable” (ibid. p. 56).

The trust problem of course cuts both ways, but a particular challenge for governments is to establish confidence that the community leadership with whom they reach agreement has the capacity to deliver on its side of the bargain. In the case of the central-Murray region’s LWMPs, the community’s side of the agreement includes adoption of a diverse range of conservation measures by a large population of farmers spread across an extensive area. Given the past lack of progress by governments in gaining widespread farmer adoption of conservation measures (Barr *et al.* 1992; Martin *et al.* 1992; McDonald *et al.* 1993), the NSW Government’s signing of the Heads of Agreement for the implementation phase of the CMR-LWMP program represented a significant vote of confidence in the leadership of the relevant communities.

Community leadership of the CMR-LWMP program now rests with Murray Irrigation. This organisation has relied until now on farmers complying spontaneously with the LWMPs. In doing so it has, given the social dilemma faced by farmers in deciding whether to comply, placed considerable faith in their collective ownership of the plans that was sought through actively seeking their collaboration during the process of developing them. Nevertheless, it has attempted to augment this commitment by using some of the funds obtained from farmer levies and government to educate farmers about why and how they should comply, and to provide subsidies (i.e., selective incentives of the ‘carrot’ rather than ‘stick’ kind) for some aspects of on-farm implementation—although subsidies are available for relatively few of the required on-farm actions.

The institutional arrangements outlined above in respect of implementation of the central-Murray region’s LWMPs seem to have anticipated the general direction of institutional change for environmental governance proposed in the recent discussion paper *Managing Natural Resources in Rural Australia for a Sustainable Future* (CoA 1999) issued jointly by the Commonwealth and state governments (see section 2.5.6 for details). The experience of administering such arrangements in the CMR-LWMP program may therefore offer valuable insights into the workability of the ideas in the discussion paper and how they might be applied most successfully.

6.6 Progress with on-farm LWMP implementation

In order to demonstrate progress with implementing the on-farm aspects of the LWMPs, each year Murray Irrigation undertakes a face-to-face survey of a sample of landholdings within the four LWMP Districts (see section 7.7.2 for details of the survey and sample). The progress made with implementation of key on-farm aspects of each of the four LWMPs, as estimated by this method, is presented in table 6.2.

Table 6.2: Summary of progress in implementing key on-farm aspects of the LWMPs

On-farm activity	Total implementation to 30/6/00	Required implementation by end 2010	% of requirement satisfied by 30/6/00
<i>Berriquin:</i>			
Prepare whole farm plans/farm development plans (no.)	279	1,160	24
Install drainage reuse systems (no.)	193	1,160	17
Upgrade existing groundwater pumps (no.)	14	26	54
Install new groundwater pumps (no.)	54	26	208
Laser-controlled landforming (hectares)	156,890	235,847	66
<i>Cadell:</i>			
Prepare farm plans (no.)	155	745	21
Install drainage reuse systems (no.)	97	745	13
Establish perennial pastures (hectares)	22,388	8,845	253
Revegetation, regenerate remnant vegetation, establish trees and saltbush (hectares)	19,391	6,000	323
Laser-controlled landforming (hectares)	19,414	30,000	65
<i>Denimein:</i>			
Prepare farm plans and preliminary farm plans (no.)	80	127	63
Install drainage reuse systems (no.)	46	127	34
Establish perennial pasture (hectares)	4,559	9,900	46
Revegetation (hectares)	275	560	49
Laser-controlled landforming (hectares)	16,495	3,000	550
<i>Wakool:</i>			
Prepare farm plans, preliminary farm plans, drainage development plans (no.)	125	318	39
Install drainage reuse systems (no.)	73	318	23

Source: Adapted from Murray Irrigation (2000a, table 19).

Given that about one-third of the 15 year period allowed for implementation of the on-farm requirements of the LWMPs had elapsed by June 30, 2000, a benchmark of one-third (or 33 per cent) satisfaction of requirements would seem to be reasonable for assessing the adequacy of progress with implementation of each activity up to that date. Progress with five of the activities in the table can thereby be assessed as slower than required. These activities consist of preparation of farm and related plans in Berriquin and Cadell, and installation of

drainage reuse systems for Berriquin, Cadell and Wakool.

Progress with installing drainage reuse systems in Denimein, and preparing farm and related plans in Wakool, is occurring at about the required rate. Progress with implementing the remaining ten activities can be assessed by the same criterion as faster than required. These activities are: preparing farm plans in Denimein; laser-controlled landforming in Berriquin, Cadell and Denimein; upgrade existing groundwater pumps in Berriquin; installing new groundwater pumps in Berriquin; establishing perennial pastures in Cadell and Denimein; and, undertaking vegetation-related activities in Cadell and Denimein.

Murray Irrigation has explained the slow progress with preparing farm and related plans in Berriquin and Cadell as a consequence of a delayed start to the farmer education program intended to increase farmer awareness of the benefits from such plans. It has also argued that this delay is partly responsible for the slow progress with installing drainage reuse systems in Berriquin, Cadell and Wakool. However, it has explained that this delay is also attributable to the lead time of up to three years between farmers commencing and completing installation of a drainage reuse system⁶⁸. Below-average water allocations to the region in recent years, as well as delays in Murray Irrigation gaining approval to proceed with the Berriquin LWMP's surface drainage works, have been offered as further reasons for the slow progress with these activities to date (Murray Irrigation 2000a). The Murray LWMP Management Committee (2000 p. 2) has argued that, once such mitigating factors are taken into account, "[t]he achievements made within the first five years are consistent with the directions and targets set in 1995 ...".

6.7 *The first five-yearly review of LWMP implementation*

The Heads of Agreement stipulated that progress in implementing the LWMPs be reviewed each year on the basis of annual reports submitted by Murray Irrigation and indicated an expectation that a major review would be held every five years. These five-yearly reviews supplement the scope afforded by the substitutions process (described in section 6.5) for adaptive management within the CMR-LWMP program. The first review of this kind commenced in August 1999. Its terms of reference, developed by the Murray LWMP Management Committee and ratified by the LWMPAT, required *inter alia* a comparison of

⁶⁸ The streamlining in 1998 of the process of approving major farm works, such as reuse systems, under the NSW Planning legislation should lessen lead times generally.

actual trends in the status of natural resources with the projections detailed in the LWMPs; a comparison of actual implementation of on-farm activities with the implementation targets detailed in the LWMPs; and, a review of the suitability of each of the on-farm items detailed in the LWMPs.

A strategy was developed to consult with all stakeholders during the review process, focussing on the directions they would prefer the LWMPs to follow over the ensuing five years. Initial feedback was obtained from the Murray Catchment Management Committee and relevant NSW Government agencies. A newsletter was prepared in respect of each LWMP which highlighted the issues raised by these entities. After these were circulated to farmers, 30 meetings to obtain the views of farmers were held across the region (in local halls, woolsheds, bowling clubs, etc.) during three weeks in July and August 1999.

These locality-based meetings attracted representatives from over 50 per cent of the farm holdings covered by the LWMPs. NSW Government agencies were requested to provide a thorough whole-of-government response to the terms of reference. Furthermore, the Murray Catchment Management Committee hosted a 'community forum' to provide an opportunity for individuals, business interests, aboriginal interests, environmental interests, and so on, to have an input into the review. Written submissions from such groups were also invited.

The collated input obtained from the various facets of the consultation process was then considered by the four CIGs in reviewing how the LWMPs for their respective Districts might most appropriately be revised. In February 2000 the revised LWMPs were circulated for comment to all parties who had made submissions to the review. In the following month the Environmental Manager for Murray Irrigation, together with the Chairman of the Cadell CIG, made a presentation to the LWMPAT in respect of the future directions indicated in the revised LWMPs. In general terms, the review found that:

... the LWMP objectives and overall strategy continue to be appropriate for the circumstances. The recent relatively low rainfall years and the implementation of the LWMP has resulted in the stabilisation of the watertable level, however the threats from the effects of the high and saline watertables make both the region and the downstream environment vulnerable. ... As such the need for the LWMPs is as great as it was in the early 1990s when the development of the Plans commenced (Murray LWMP Management Committee 2000 p. 15).

A particular issue attracting greater attention in the revised LWMPs, as a consequence of arguments presented during the review consultation process, concerns the management of biodiversity. Public awareness of this issue had increased considerably since the time the

original plans were developed. Responses to the issue within the revised LWMPs include strengthening the focus on native vegetation management within the education programs offered to farmers, and increasing the financial incentives offered for enhancing and protecting the region's native vegetation and significant wetlands. Nevertheless, it was argued that the problem of rising saline watertables—the original focus of the LWMPs—remains the most significant threat to the health of existing vegetation.

6.8 *Transferability of the central-Murray region's LWMP model*

The potential of collaborative governance to make greater progress in Australia with agri-environmental commons dilemmas than has occurred under centralised, progressive governance has been recognised previously (e.g., Musgrave 1996a; Musgrave *et al.* 1988; Pigram *et al.* 1994). The scope for community-based organisations involved in collaborative development of agri-environmental plans to evolve into group-property regimes capable of effectively implementing the plans has also been discussed (Industry Commission 1992; Read 1989).

The devolution to Murray Irrigation of primary responsibility for implementing the LWMPs is an early instance of this scope being tested. Although it is a private company, it is also a group-property regime in so far as it has been granted property rights to assets with characteristics of CPRs, like irrigation supply channels and drains, and (implicitly) to the 'watertable freeboard' within its area of operation. In this case the incorporation of the community-based planning organisations (i.e., the CWGs reconstituted as CIGs) into a group-property regime with respect to watertable management was assisted by the establishment of Murray Irrigation.

Although this company's area of operation was primarily determined by its infrastructure management role, this jurisdiction fortuitously coincides in large degree with that needed for regional watertable governance. Significant economies of scope were therefore available by spreading Murray Irrigation's fixed costs over both functions. Moreover, the fact that this company evolved from an arm of the Government's water supply agency that had been previously commercialised meant that it inherited expertise and organisational cohesion of considerable value in discharging its new LWMP-implementation role.

A number of commentators have suggested that the institutional arrangements for developing and implementing the central-Murray region's LWMPs be used as a prototype for LWMP programs and similar exercises undertaken elsewhere (Marsden Jacob Associates 1995; Diacono *et al.* 1998; Schroo 1998). Nevertheless, irrigation communities may have advantages over other communities in making such a model work (Musgrave 1996b; Schroo 1998). As mentioned above, the opportunity in the central-Murray region to co-opt a community-based organisation, albeit established originally for managing irrigation-related services, for the purposes also of managing implementation of the LWMPs offered considerable economies of scope. The transaction costs of establishing and running a community-based organisation responsible for implementing the LWMPs would otherwise have been much higher, and possibly prohibitive.

In contrast, many 'dryland' agricultural communities lack existing organisations with appropriate expertise that could as easily be co-opted for managing implementation of natural resource management plans like the LWMPs, and that could be as easily held accountable by government for meeting implementation targets and standards (e.g., through the kinds of licenses, with conditions attached that the LWMPs be implemented, applied to Murray Irrigation). There is potential for local government councils to fulfil this role, although obstacles in respect of natural resource problems typically overlapping local government boundaries (thus requiring two or more local councils to cooperate in fulfilling this role), and councils often lacking expertise in addressing land and water conservation issues, would have to be overcome for it to be realised. Irrigation also serves as a focus for social cohesion, even where irrigators are distant from each other and running different enterprise types, that often is weaker in dryland settings with less of a common economic focus.

Despite these challenges, there remains considerable enthusiasm for extending the CMR-LWMP model beyond irrigation-related contexts. For instance, Marsden (1996 p. 54) remarked that "in several key respects we believe the four Murray Land and Water Management Plans are the forerunners of the new contractual approach to regional resource management". More recently, it was recommended in the *Draft Report of the Independent Inquiry into the Clarence River System* that a 'partnership agreement' approach to coastal floodplain management based on the CMR-LWMP model should be developed and tested (Healthy Rivers Commission 1999).

6.9 *Concluding comments*

This chapter about the CMR-LWMP program has highlighted a range of structural variables the values of which will differ considerably from one context of agri-environmental governance to the next. Clearly, the biophysical, including hydrological, setting of the region is unique. It has a singular history too, including in terms of: government-sponsored irrigation development; government being otherwise responsible for decisions which contributed toward the present watertable-related environmental problems; and a heavy past reliance on top-down large-scale engineering fixes for problems arising in irrigation supply and drainage. Not surprisingly therefore, it has its own culture which is apparent *inter alia* in the social cohesion with which it meets collective challenges and in its irrigators' enthusiasm for self-governance. Due to its irrigation history also, it inherited an elaborate organisational capacity allowing considerable devolution of agri-environmental governance functions to its community.

Hence the dangers of generalising the findings from this case study simplistically to other Australian agri-environmental contexts—for instance, in introducing the institutional reforms signaled in the discussion paper *Managing Natural Resources in Rural Australia for a Sustainable Future* (CoA 1999)—are clear. Nevertheless, as explained in chapter seven, individual case studies such as the one undertaken for this thesis can play a vital part in developing theoretical models capable of guiding systematic adaptive pursuit of the collaborative vision for agri-environmental governance in particular structural settings.

7. CASE-STUDY RATIONALE AND METHOD

7.1 *Introduction*

In this chapter the reasons for applying the case-study method in this thesis are given. The particular combination of techniques used to apply the method is detailed and justified also. The discussion begins in section 7.2 by considering the challenge of understanding complex systems and how case studies can help meet this challenge. In section 7.3 the benefits of methodological triangulation for case-study analysis of complex systems are considered. A review of research methods, including the case-study method, upon which development of theoretical models of collaborative environmental governance has relied previously is presented in section 7.4. An overview of the methodology of the case-study research performed for this thesis, comprising both qualitative and quantitative techniques, is provided in section 7.5. The qualitative and quantitative methods used are detailed in sections 7.6 and 7.7, respectively.

7.2 *Complexity and the case study*

As observed in section 5.3.5, governance of human interactions with CPRs is typically a complex undertaking. The patterns of interactions are normally so rich that they are impossible to predict by analysing manageable subsets of interactions separately. Thus it is usually not feasible to conduct a comprehensive analysis of all the possible changes in rules (i.e., institutions or selective-incentive mechanisms) that could be made in an attempt to steer interactions towards preferred outcomes. It follows that it is appropriate to regard rule changes as policy experiments. This reasoning constitutes the rationale for the adaptive-management approach that is beginning to attract the interest of policy analysts concerned with environmental problems in Australia and elsewhere (see section 2.5.6). According to Cocks (1999 p. 82) this approach represents an “attempt to steer or lever society in a preferred direction by thoughtful trial and error—a process of social learning ...”.

Rule changes can thus be viewed as tests of hypotheses concerning how preferred outcomes might be brought to fruition. The scientific, or hypothetico-deductive, method involves deducing hypotheses from theory which are then tested empirically. The theory evolves according to whether this testing supports or rejects its hypotheses. However, as discussed in section 1.2, Australian leaders and their policy advisers have previously lacked a coherent

theory of how the collaborative vision of agri-environmental governance might be achieved. Such a theory is required if scientific pursuit of this vision by means of adaptive management is to be instigated.

The second-generation developments in the rational-choice theory of collective action reviewed and synthesised in chapters four and five would seem to offer potential in meeting this need. Nevertheless, as observed in section 6.1, realising this potential depends on validating and elaborating these core theoretical insights according to what has been learned in Australia from the actual practice of agri-environmental governance.

The problem with this, identified earlier in section 2.5.4, is that the culture of environmental governance in Australia remains largely dismissive of this kind of experiential learning. Consequently, as Dovers (1999 p. 100) has remarked, "... the very rapid growth in community-based [environmental governance] programs follows no apparent coherent design or intent ...". Likewise, Mobbs *et al.* (1999 p. 4) contended that many of these programs "are in place before any sound proposition of how they might work has been formulated".

The research method of case studies seems to have considerable potential to facilitate the kind of learning with which we are concerned here. Some definitions of this method were provided in section 6.1. It is a method of research that has gained considerable legitimacy in the social sciences (e.g., Eisenhardt 1991; Stake 1998), including in studies of agribusiness behaviour (e.g., Howard *et al.* 1991; Sterns *et al.* 1998). For instance, it was used extensively in the early days of research into the economics of farm management (Case *et al.* 1957), and Malcolm (2000) has argued recently that it still has a vital role to play in this area. Dillon *et al.* (1980 p. 30) characterised the case-study method as involving in this context:

... intensive, detailed study of only one or a few farms. The objective of the study is to learn, not only what is happening to the study farms, but why, i.e., to elucidate the cause and effect relationships that operate. Two or three contrasting cases, by way of their differences, make it easier to identify important factors leading to the results observed.

In the present study, the case of interest is not the governance of a particular farm business but rather the governance of a specific CPR (i.e., natural capacity for sub-surface drainage) the appropriation of which is shared by multiple farm businesses among a range of other entities. Nevertheless, similar considerations apply. The use of the case-study approach in this instance is consistent with various Australian commentators recently highlighting the importance of drawing general lessons from particular experiences with collaborative

environmental governance. For instance, Mobbs *et al.* (1999 p. 131) have argued that a priority for the social sciences in this area is to “isolate elements, strategies or mechanisms within particular experiences with potential for more generic application”. The purpose of applying the case-study method in the present investigation is accordingly to learn from one particular experiment with collaborative environmental governance in order to contribute to empirically-grounded validation and elaboration of theoretical models of such systems of governance.

Yin (1984) observed that traditionally many researchers have been sceptical of the usefulness of case studies, one common reason being that they provide very little basis for statistical inference of findings to a wider population of cases. His retort was that this is not what case studies should be concerned with. Their appropriate purpose is to generalise “to theoretical propositions and not to populations or universes” (*ibid.* p. 21).

Nevertheless, external validity—concerned with the problem of knowing whether the findings from one case apply more generally—is obviously an important consideration with case studies, as it is with other research methods. The external validity of theoretical propositions arising from a case study is ultimately assessed by whether or not they are corroborated by other case studies. This represents a form of data triangulation, where data are collected at different times or from different sources in the study of a phenomenon (Easterby-Smith *et al.* 1991). As noted by Hussey *et al.* (1997 p. 67), “similar cases will help to show whether your theory can be generalised and dissimilar cases will help to extend or modify any theory”.

Corroboration can come from a single project with a research design which includes multiple case studies, as discussed by Yin (1984). Otherwise it can arise less formally as the stock of studies of particular cases of a phenomenon of interest accumulates incrementally over time. Thus Dovers (1999 p. 101) commented in the context of Australian environmental governance that:

Most cases can yield useable lessons both positive and negative, and the challenge is to build up a stock of these from across our collective experience, and apply these in various combinations to answer our future needs.

The present study seeks to add to this stock of lessons. More particularly, the purpose of applying the case-study approach was to help develop theoretical models of collaborative, community-based agri-environmental governance that offer a scientific basis for adaptive management within this domain. The challenge of developing such models given the

multitude of structural variables involved was discussed in section 4.6. As is evident from sections 7.5-7.7, the set of structural variables focussed upon in this investigation emerged from a process of coming to understand the case-study context through (a) a review of literature pertaining to the CMR-LWMP program (the results of which constitute chapter six) and (b) qualitative, in-depth interviewing of people identified as key informants in respect of this program.

Some idea of the magnitude of the challenge faced in choosing which structural variables are most deserving of attention in a particular case study is given by the remark of Born *et al.* (2001) that one project has listed 210 distinct structural variables identified in various studies as influencing the success of ICM programs⁶⁹. They reported too how participants in a workshop distilled specific variables of this kind into 14 general variables that they divided into ‘exogenous structural variables’—that are (at least initially) outside the direct influence of the parties participating in them—and ‘endogenous structural variables’ that are more or less internal to the program and under the direct influence of the participants. The workshop participants agreed further that each of these general factors: (a) has a wide range of potential values; (b) in many cases has an unpredictable impact on accomplishments; and (c) is not independent from other factors (*ibid.*). The 14 general factors are shown in table 7.1.

Table 7.1: General structural variables influencing ICM performance

Exogenous variables	Endogenous variables
Nature of the ecological setting	Program initiation
Demographic and socio-economic setting	Composition of stakeholder participation
Situational history	Statement/clarity of purpose
Issue salience	Organisational process, direction-setting, and structure
Regulatory/programmatic context	Leadership
	Staffing
	Government commitment and support
	Funding
	Existence of catchment plans

Source: Adapted from Born *et al.* (2001 p. 12, table 3)

7.3 *Methodological triangulation in case-study analysis*

Aside from the challenge of establishing the external validity of findings from case-study research, there is the further formidable challenge of ensuring construct validity. This

⁶⁹ Born *et al.* (*ibid.*) actually referred to ‘factors’ rather than ‘structural variables’.

criterion is concerned with establishing that correct operational measures are chosen for the concepts that are of interest in the study. Thus Yin (1984) has observed that criticisms of case studies often arise from scepticism that a case-study investigator can develop a sufficiently operational set of measures as well as concerns over the use 'subjective' judgements to collect the data. He suggested that one way of increasing construct validity is to use multiple sources of evidence in a manner encouraging convergent lines of inquiry.

One strategy of doing so is known as methodological triangulation, where both quantitative and qualitative methods of data collection are used (Easterby-Smith *et al.* 1991). This accords with Denzin's (1970 p. 297) definition of triangulation as "the combination of methodologies in the study of the same phenomenon". Quantitative methods seek to be objective and concentrate on measuring phenomena numerically. They emphasise the collection of data in a standardised way, like a structured interview schedule, to facilitate replication.

By contrast, qualitative methods are more subjective in nature, seeking rather to gather data that "captures the richness of detail and nuance of the phenomena being studied" (Hussey *et al.* 1997 p. 56). In consequence, such methods tend to use data that has been obtained in a less structured fashion than is the case with quantitative methods. Thus they represent more of a dialogue than an interrogation. They allow issues and explanations to be explored that might not originally have been anticipated. Nevertheless, the unstructured source of qualitative data means that they cannot be replicated, and at best only corroborated by similar studies or other methods (Valentine 1997). Hence considerable advantages can flow from designing a case study in such a way that quantitative and qualitative methods serve to complement one another (Jick 1979). Indeed, this was the strategy followed in the present case study.

Finally, since each regime of environmental governance constitutes a complex adaptive system, the performance of any given rule change is path dependent. Hence it is dangerous to reach the conclusion that success with a particular set of institutional arrangement in one setting means that the same rule change would be as successful in other settings. Dovers (1999 p. 101) thus concluded as follows:

[S]implistic searches for easily transferable ‘blueprints’ of processes and institutions for application elsewhere should be avoided ... Most processes and institutions are the product of a unique context in time and place, and cannot easily be transposed. Rather, a more sensitive and finer scale of mode of inquiry will be needed, looking at the detail of attributes, features or methods used.

Returning to this theme, Dovers (2000b p. 17) argued that “mimicry is an unimaginative kind of learning. Better learning comes from many lessons accrued from a variety of sources, sorted carefully and then matched to problems at fine resolution”. These comments accord with Schofield’s (1993) view that generalising from the study of a particular case is possible only when the case is described in sufficient detail to allow its context to be compared with the contexts of the wider population of relevant cases. Qualitative research clearly has a vital role to play in this more sensitive and detailed mode of inquiry. The richness of the case-study data it provides serves to draw out the nuances of the case’s context which help to explain the success or failure of particular institutional arrangements. In this way the inclusion of qualitative methods in a case study can be expected to enhance the external validity of the theoretical propositions arising therefrom.

7.4 *Background to the methodology chosen for the present study*

The case-study approach has been used extensively since the mid-1980’s by scholars seeking to develop theoretical models of collaborative, community-based CPR governance. Derivation of such propositions has typically been on the basis of data triangulation using an accumulated stock of case studies, as exemplified by McCay *et al.* (1987) and Ostrom (1990). The case studies performed in this area to date have predominantly used qualitative methods. The reasons may be adduced from Matthews’ (1986 p. 917) observation that:

Because economic institutions are complex, they do not lend themselves easily to quantitative measurement. Even in the respects in which they do, the data very often are not routinely collected by national statistical offices.

A major emphasis of this effort has been to identify ‘design principles’ that can help to predict the likelihood in specific settings of collaborative governance adequately resolving commons dilemmas (e.g., as shown in table 5.1). However, progress with this line of research slowed during the 1990’s because many of the variables suspected to be critical functioned interactively and it was difficult finding case studies which allowed the interactions to be isolated for qualitative analysis (Ostrom 1998a). As Wirt *et al.* (1971 p. 4) have observed, “[t]he slippery nature of causation makes the move from description to

explanation extremely difficult”.

The impasse in using qualitative analysis to investigate interactive relationships within case-study settings led to an upsurge in using the quantitative methods of experimental economics and social psychology to study such relationships. These methods allow all attributes of a decision problem, except those under scrutiny, to be controlled in a laboratory-like environment. The rationale for, and potential of, this approach to economic research has been discussed by Smith (1994). As discussed in chapter four, experimental methods have identified a number of interesting regularities in the laboratory conditions under which cooperation emerges in the form of conserving a CPR. Recent accounts of this research have been provided by Schmitt *et al.* (2000) and Kopelman *et al.* (2000).

Nevertheless, considerable uncertainty remains regarding the extent to which the insights gained under experimental conditions are valid under the much more complex decision environments faced by appropriators of CPRs in the real world (Ostrom 1998a). Thus Lowenstein (1999 p. F33) has observed that experimental economics has not “been able to avoid the problem of low external validity that is the Achilles heel of all laboratory experimentation”. Loomes (1999 p. F3) has commented also on:

... the dangers of constructing experimental environments so stripped of context that participants search desperately for cues about the kind of behaviour that might seem sensible, or that they think the experimenters might be looking for, with the result that they fail to process the tasks as they would do in the richer social environment we may be seeking to model.

One approach to this problem, followed by Cardenas (2000), is to apply the method of experimental economics to real-world appropriators of CPRs in their own surroundings. He argued that these ‘field experiments’ provide much greater variability in the structural variables of interest, so that there are better prospects of delineating their influence on behaviour. Moreover, he suggested that they could provide “a more natural and familiar setting for the subjects with respect to the problem being studied by the experimenter” (*ibid.* p. 38) so that, presumably, they are more likely to act as they would in real-world commons dilemmas.

7.5 *Overview of the present case-study methodology*

An alternative response, that seems not to have been followed previously, is to apply quantitative research methods directly to the behaviour of individuals facing real-world

commons dilemmas⁷⁰. This approach would allow selected hypotheses deduced from the rational-choice models of collective action based on previous research to be ‘field tested’. This was the quantitative research method followed in the present study. The generic technique used was multiple regression which allows quantitative testing of hypotheses by passively observing phenomena as they occur naturally. Cohen *et al.* (1983 p. 14) outlined the technique as follows:

The basic strategy ... is first to state a theory in terms of the variables that are involved and, quite explicitly, of what causes what and what does not ... The observational data are then employed to determine whether the causal model is consistent with them, and estimate the strength of the causal parameters. Failure of the model to fit the data results in its falsification, while a good fit allows the model to survive, but not be proven, since other models might provide equal or better fits.

Details of how this technique was applied in the present study are provided in section 7.7. As discussed in section 7.2, the composition of the quantitative models, in terms of the structural variables specified to operationalise the hypotheses of interest, was based on knowledge of the particular context of the CMR-LWMP program.

Triangulation of the findings from this quantitative research was facilitated through complementary qualitative research. The method of qualitative research applied in the case study is detailed in section 7.6. Consistent with the objective of triangulating the quantitative research findings, the first purpose of the case-study qualitative research was to explore how the theoretical propositions presented in chapters three to five—from which the hypotheses to be tested quantitatively would be selected—accord with behaviour in an actual Australian setting of agri-environmental governance (namely, the CMR-LWMP program). This would necessarily involve some development or elaboration of those parsimonious propositions in terms how they relate to the multitude of specific structural variables operative in the case-study setting. Accordingly, this purpose is consistent with the ‘explanatory’ type of case study identified by Scapens (1990) in his typology.

The type of data generated by qualitative research can be valuable too for constructing a structured interview schedule to provide data for quantitative research (Kumar 1996). For instance, qualitative data in the form of verbatim interview transcripts expose the researcher to the way the target population verbalises the constructs of interest for quantitative study. Qualitative research can in this way enhance the prospects of validly operationalising these

⁷⁰ However, a number of studies have used quantitative research methods to analyse group-level behaviour in respect of providing a certain type of CPR. For instance, Tang (1992) and Lam (1998) each used cross-sectional data from different irrigation systems to explore how institutional arrangements and other factors influenced their performance.

constructs when developing a structured interview schedule through which quantitative data will be collected. Accordingly, the second purpose of including qualitative methods in the present case study was to enhance the construct validity of the measures used to operationalise the structural variables of interest in the quantitative analysis.

A third purpose for including qualitative methods was to add depth and texture to the quantitative research findings in order that their practical implications might better be understood. Dunn (2000 p. 80) has remarked in this vein that: “Transcribed interviews are wholly unlike other forms of data. The informant’s non-academic text reminds the researcher and the reader of the research of the lived experience which has been divulged”. In other words, it reminds us “that there are real people behind the data” (ibid. p. 80).

The final purpose of the qualitative research was to complement the documentation-based description of the case-study context presented in chapter six. The intended benefit of this was to increase the validity with which empirical findings from the case-study context could be generalised to other contexts.

7.6 *Qualitative method*

In this section the qualitative method followed in the present case-study research is detailed.

7.6.1 *In-depth interviewing*

The case-study qualitative research consisted of undertaking in-depth interviews of people regarded as ‘key informants’ in respect of the CMR-LWMP program. The in-depth interview is a conversation with a purpose between the informant and the researcher (Valentine 1997). This technique is consonant with the first purpose of the case-study qualitative research identified in section 7.5 in so far as it is usually “employed as part of an exploratory study where the researcher is attempting to gain understanding of the field of study, and to develop theories rather than test them” (Minichiello *et al.* 1990 p. 101).

The questions asked in an in-depth interview normally vary according to the interests, experiences and views of each informant. Nevertheless, each interview is normally given some structure by a basic set of questions, called an interview guide, tailored to the particular informant (Dunn 2000). The basic set of questions is organised around the particular themes that the researcher wishes to explore in particular depth. These questions

are typically drawn from existing literature on the issue of concern (Minichiello *et al.* 1990).

In the present case study of the CMR-LWMP program, the basic set of questions was based on broad theoretical themes suggested by the literature reviewed in preparing chapters three to five. Accordingly, these broad themes related to informants' perceptions regarding:

- (i) the importance of collaboration between stakeholders (including between government and the community) in identifying solutions to the region's watertable-related problems;
- (ii) the quality of collaboration achieved between stakeholders in developing the LWMPs and devising policies for their implementation;
- (iii) the importance of cooperation between stakeholders in ensuring implementation of the LWMPs; and
- (iv) the quality of cooperation achieved between stakeholders in implementing the LWMPs.

Interview questions were also included to explore the reasons for informants' perceptions in respect of these broad themes.

Translating the themes into a basic set of questions for a particular informant required an understanding of how these themes related to the kinds of structural variables most relevant to the informant's experiences within the program. This understanding was facilitated by the literature reviewed in compiling chapters two and six, as well as by the researcher's knowledge obtained from prior professional involvement in the program⁷¹. The basic set of questions differed between informants also as a result of the importance of using language appropriate to each informant. For instance, different categories of informants can be expected to differ considerably in their familiarity with particular jargon, metaphors and acronyms (Dunn 2000).

In addition to the basic set of questions devised for each informant, additional questions were formulated spontaneously during interviews according to the responses received. Allowing for unstructured dialogue of this kind is standard practice with in-depth interviewing (*ibid.*). For instance, the informant may be asked for his or her own theory of why events unfolded as they did (Yin 1984). Moreover, the researcher may need to rephrase the same basic question a number of times in order to explore an issue more thoroughly. Equally, it is important also to provide informants with ample opportunities to explain in their own words the complexities and contradictions of their views and experiences (Valentine 1997).

⁷¹ While employed with NSW Agriculture, the researcher was responsible for supervising economic evaluations of the various on-farm measures considered during the plan-development phase of the CMR-LWMP program.

7.6.2 *Selection of key informants*

The aim in recruiting key informants for interview is to select an illustrative sample rather than a representative one. The informants selected for interviewing thus come typically from categories of people that theory, together with prior knowledge of context, indicates are relevant (Dunn 2000).

The in-depth interviews that formed the basis of the case-study qualitative analysis were conducted in two distinct phases. The first phase focussed on how the CMR-LWMP program was perceived by people within the central-Murray region who had performed key roles in the development and/or implementation of the LWMPs. This phase was particularly exploratory, and the questioning largely unstructured as a result. The primary purpose in this phase was to: (a) provide a solid basis for developing the interview schedule for the quantitative research; (b) refine the themes and questions to be included in the second, semi-structured phase of in-depth interviewing; and (c) identify the most appropriate informants to be interviewed during the second phase.

On the recommendation of the then Chairperson of LWMPAT, Professor Warren Musgrave, the Environmental Manager for Murray Irrigation, Mr. Geoff McLeod, was the first informant interviewed in the first phase⁷². Mr. McLeod suggested a number of other informants be approached during this exploratory phase. As a result, seven informants were interviewed at this stage (including Mr. McLeod). These informants, and their affiliations when interviewed, are detailed in table 7.2. All these informants had been actively involved at the regional level in the plan-development phase of the CMR-LWMP program and still had some continuing involvement in the program. All were located within the LWMP Districts.

⁷² Before transferring to Murray Irrigation in 1996, since 1991 Mr. McLeod had been NSW Agriculture's senior frontline officer involved in the central-Murray region's LWMP program. This agency had primary responsibility for evaluating the on-farm measures considered for inclusion in the LWMPs.

Table 7.2: Key informants in the first phase of in-depth interviewing

Key informant	Affiliation when interviewed	Other information
Mr. Gordon Ball	Director, Murray Irrigation.	Previously Chairperson, Berriquin CWG.
Mr. Bill Currans	Executive Officer, Murray CMC.	Previously involved in the CMR-LWMP program while employed with NSW Agriculture.
Mr. Noel Graham	Chairperson, Cadell CIG.	Farmer in West Cadell portion of Cadell LWMP District.
Mr. Jamie Hearn	Cadell LWMP Implementation Officer, Murray Irrigation.	Farmer in West Cadell portion of Cadell LWMP District. Previously Chairperson, Cadell CWG.
Mr. Gerard Lahy	Chairperson, Wakool CIG.	Farmer in Wakool LWMP District. Previously Chairperson, Wakool CWG.
Mr. Geoff McLeod	Environmental Manager, Murray Irrigation.	Previously co-ordinated NSW Agriculture's technical input to the CMR-LWMP program.
Mr. Adrian Smith	Denimein LWMP Implementation Officer, Murray Irrigation.	Previously involved in the CMR-LWMP program while employed by NSW Agriculture.

The interviews in this first phase of in-depth interviewing were all conducted (a) by the researcher, (b) face to face, (c) at places nominated by the informants, and (d) during March 1999. Aside from providing informants with some broad reasons for wanting to interview them, they were not given advance notice of the questions. This was also the case in the second phase of in-depth interviewing. These interviews were recorded by written notes. Transcripts of these records were subsequently checked by the informants.

The in-depth interviews during the second phase of interviewing were semi-structured in so far as an interview guide consisting of open-ended questions was devised for each interview according to the particular interests, experiences and cultural influences of the informant. The composition of each interview guide was influenced as well by gaps in documented evidence and issues arising during the first phase of interviews. Informants' responses to the questions comprising the interview guide often led to additional questions being asked spontaneously. Most of the 25 informants interviewed in the second phase generally had been suggested by a number of the first-phase informants. The selection of informants for this phase was guided also by advice from Mr. Ron Cullen, then representing the industry sponsor of the study (i.e., the DLWC), and Professor Musgrave.

The second-phase informants were more widely representative of the various groups with a stake in the CMR-LWMP program than had been the case in the first phase. Nine of the informants (Anon., Chivers, Cullen, Dalton, Harriss, Lacy, McGlynn, Musgrave and Schroo) were affiliated with the NSW Government at the time of interview. Of these, three (Dalton, Harriss and Lacy) were based in or near the central-Murray region. A further two informants (Martin and McLeod) had previously been involved in the program while employed with the NSW Government.

One informant (Taylor) was Mayor of Deniliquin Council, one of the local governments within the region, at the time of interview. Two informants (Keyworth and Robinson) were from the Murray-Darling Basin Commission. Three were involved as community representatives in the TCM program (Currans, Sleigh and Trevethan). Three informants were farmers who, aside from being located within the LWMP Districts, had no further formal role in the program (Berriquin Farmers 1, 2 and 3).

Two informants were farmer representatives on their LWMP District's CIG (Anderson and Liphuyzen). One other (Lacy) previously had been a Government representative on the Berriquin CWG during the plan-development phase. Two informants were Directors of

Murray Irrigation (Baxter and Liphuyzen), and a further informant was from the staff of Murray Irrigation (McLeod).

Finally, two informants were consultants located outside the region who had been involved in the plan-development phase of the program (Jacob and Stewart). The latter had been the program's Project Co-ordinator during this phase.

All second-phase interviews were conducted by the researcher from July to September 1999. All but one interview was conducted face to face at a location nominated by the informant (the exception was conducted by telephone). The duration of these interviews varied from 45 minutes to three hours. All interviews were tape-recorded (after obtaining permission) and later transcribed. Minichiello *et al.* (1990) summarised the advantages of recording in-depth interviews by audio tape rather than written notes as follows:

Tape recording... can enhance greater rapport by allowing a more natural conversational style. The interviewer is free to be an attentive and thoughtful listener. The raw data remains on the record. Therefore, all the material is available for analysis when the researcher has the time to concentrate fully.

Transcripts of the in-depth interviews were sent to the relevant informants in order to validate their accuracy. The second-phase informants, and their affiliations when interviewed, are detailed in table 7.3.

The three farmers interviewed in the second phase (Berriquin Farmers 1, 2 and 3) were nominated by Mr. John Lacy. He has been located at Finley, within the Berriquin LWMP District, as a District Agronomist with NSW Agriculture since 1976. He was asked to nominate three farmers from the Berriquin LWMP District that he expected would provide a reasonably representative cross-section of farmers' views regarding the CMR-LWMP program. These farmers gave permission for excerpts of their interview transcripts to be published on the condition that their identities be withheld.

Aside from these farmers, second-phase informants were asked to give permission for complete records of their interviews to be published in association with this study. Permission was forthcoming from all but one of these informants (located in head office of NSW Agriculture). However, the transcript of the interview with Sue Taylor also has not been published since she no longer is Mayor of Deniliquin Council and the new administration has requested that her transcript not be published. The remaining interview transcripts are presented in appendix A.

Table 7.3: Key informants in the second phase of in-depth interviewing

Key informant	Affiliation when interviewed	Other information
Berriquin Farmer 1	Located in Berriquin LWMP District.	
Berriquin Farmer 2	Located in Berriquin LWMP District.	
Berriquin Farmer 3	Located in Berriquin LWMP District.	
Mr. Bill Anderson	Vice-Chairperson, Cadell CIG.	Farmer, East Cadell portion of Cadell LWMP District.
Mr. Kelvin Baxter	Director, Murray Irrigation.	First Chairperson, Murray Irrigation. Farmer, Berriquin LWMP District.
Ms. Ros Chivers	DLWC, Sydney.	Involved in LWMP implementation issues, especially funding.
Mr. Ron Cullen	Director, Integrated Catchment Planning, DLWC, Sydney.	Involved in LWMP implementation issues, especially funding.
Mr. Bill Currans	See table 7.2.	
Dr. Mike Curl	Gen. Manager—Strategic Review, NSW Agriculture, Orange.	Previously provided NSW Agriculture’s head-office management of the CMR-LWMP program. Represented NSW Agriculture in negotiations leading to the Heads of Agreement. Has served as a member of the LWMPAT and the Irrigation Reform Steering Committee.
Ms. Kaye Dalton	DLWC, Deniliquin.	Previously Co-ordinator of the Murray CMC. Co-author of <i>Guidelines for LWMPs</i> .
Mr. David Harriss	Regional Director, Murray Region, DLWC, Albury.	Responsible for regional DLWC involvement in LWMP implementation issues.
Mr. Peter Jacob	Consultant, Marsden-Jacob Associates, Melbourne.	Analysis of Berriquin LWMP economics and of institutional arrangements for LWMP implementation.
Mr. Scott Keyworth	Director, Natural Resources Projects, MDBC, Canberra.	
Mr. John Lacy	District Agronomist, NSW Agriculture, Finley.	Previously a member of the Berriquin CWG.
Mr. Daniel Liphuyzen	Chairperson, Denimein CIG.	Farmer, Denimein LWMP District.
Mr. Warren Martin	Consultant, Sydney.	Instrumental in establishing the CMR-LWMP program while Deputy Director of the DWR. Involved in privatisation of the central-Murray region’s irrigation schemes and negotiation of the Heads of Agreement while Director of Regions in the DLWC and a member of the Irrigation Reform Steering Committee.
Mr. Tony McGlynn	Director, Special Projects, DLWC, Sydney	Involved in privatisation of the central-Murray region’s irrigation schemes and community-government negotiations over cost-sharing for the LWMPs. Previously a member of LWMPAT.
Mr. Geoff McLeod	See table 7.2.	
Prof. Warren Musgrave	Chairperson, LWMPAT.	
Ms. Sandy Robinson	Manager, Irrigation Regions Program, MDBC, Canberra.	Previously involved in CMR-LWMP program funding while employed with Commonwealth Department of Primary Industries and Energy.
Mr. Hans Schroo	DLWC, Sydney	Member of LWMPAT at time of interview. Involved in LWMP implementation issues.
Mr. Andrew Sleigh	Chairperson, Murray CMC.	Farmer, Berriquin LWMP District
Mr. Peter Stewart	Consultant, Molino Stewart Pty Ltd, Sydney.	Previously Project Co-ordinator for the CMR-LWMP program.
Ms. Sue Taylor	Mayor, Deniliquin Council	
Mr. Paul Trevethan	Chairperson, SCMCC.	Previously Chairperson, Murray CMC. Farmer, central-Murray region (outside the LWMP Districts).

7.6.3 *Analysis of interview transcripts*

Minichiello *et al.* (1990 p. 285) succinctly characterised the challenge of analysing data collected from in-depth interviews as follows: “How do we transform strings of sentences ... into meaningful data which contribute to knowledge?”. The solution to this challenge begins with coding the text contained in the interview transcripts. Thus:

Codes label and reorganise the data according to topics which open the inquiry and permit the researcher to make sense of the thousands of lines of words. They are retrieval and organising devices that cluster the relevant segment of the data relating to a particular theme or proposition They also play an important role in the process of discovering themes or developing propositions (*ibid.* p. 294).

The codes used should be based on the research questions asked and fit into a coherent scheme. Although a researcher might begin a process of in-depth interviewing with a preliminary coding system in mind, this system inevitably evolves during that process. This is because coding assists in the testing of existing propositions and discovery of new propositions as the data is collected. Minichiello *et al.* (*ibid.* p. 285) remarked upon this process as follows:

The ongoing analysis that takes place in qualitative research requires that the researcher develops an eye for detecting the conceptual issues while the data is being collected. Without analysis occurring in the field, data has no direction.

The process of developing a coding system for the present qualitative research began with the basic theoretical themes that emerged from chapters three to five, as refined and elaborated by the description of the case-study context provided in chapters two and six. This prototypical system was revised and refined as the interviewing process proceeded, as later the taped interviews were transcribed, and later again as the transcripts were reread numerous times over ensuing weeks. The process of returning to the transcripts repeatedly was essential for familiarisation with the data collected. Minichiello *et al.* (*ibid.* p. 285) emphasised the importance of this process as follows:

It is important to remember that data analysis does not happen overnight. Many researchers read and reread their notes and field notes for several weeks or even months. This allows them to discover recurring themes or event which stand out.

The system by which text was coded in the present research started by arranging the coding scheme as a system of headings in a word-processing document. Passages of text distributed across the in-depth interviews that corresponded with a particular code (e.g., ‘farmers’

assessment of fairness of Murray Irrigation's environmental policies') were thus grouped together under a single sub-heading. This system was found to be sufficient in this study for organising the data from the in-depth interviews into units that were sufficiently small and interlinked to make manageable the task of searching for patterns in the data, drawing propositions from these patterns, and then attempting to corroborate these propositions.

7.7 *Quantitative method*

A brief overview of the quantitative method applied in the present research was provided in section 7.5. Further details of this method are provided in this section.

7.7.1 *Focus of the quantitative research*

The commons dilemma faced by farmers in deciding whether to contribute towards implementation of the LWMPs was discussed in sections 6.3 and 6.4. This first-order social dilemma arises because (a) the LWMPs are primarily concerned with conserving 'watertable freeboard' which constitutes a CPR, and (b) the on-farm implementation requirements set in each of them apply to farmers collectively rather than as individuals. Hence considerable scope remains for farmers to act opportunistically by way of shirking in their own implementation efforts and seeking to free ride on the efforts of other parties (including other farmers).

The quantitative analysis undertaken in this study addressed this first-order social dilemma, as well as the second-order social dilemma—as discussed in section 4.3.2—normally associated with providing the assurance required for reciprocity to allow escape from a first-order dilemma. In each case, the specification of the multiple-regression models used for this part of the study was guided by the rational-choice theory of collective action reviewed in chapters three to five. As noted in section 7.5, these models were used to test quantitatively—in the context of the central-Murray region's real-world commons dilemma—the veracity of various hypotheses deduced from this theory, as operationalised by structural variables suggested by the first phase of qualitative interviews (see section 7.6) and by the understanding of the case-study context obtained from the review of literature pertaining to the CMR-LWMP program (upon which chapter six was based).

The model for studying the behaviour of individual farmers in the first-order social dilemma, and the results obtained therefrom, is discussed in chapter nine. Three models were

developed and estimated in respect of the second-order dilemma, and these are discussed in chapter ten. Each of these three models deals with a different strategy of providing feedback to ‘under-complying’ farmers—namely farmers regarded as failing to implement their fair share of the on-farm requirements of their District’s LWMP.

7.7.2 Quantitative data

It was noted in section 6.6 that each year Murray Irrigation undertakes a face-to-face survey of landholdings across the four LWMP Districts in order to demonstrate progress made in implementing the on-farm requirements of the LWMPs. Permission was given by Murray Irrigation for the data collection for this study to be carried out as part of its survey for 1998-99. This allowed data to be collected from a considerably larger sample than would otherwise have been possible given the resource limitations of the present study.

This advantage was considered to outweigh the corresponding disadvantages associated with loss of control over recruitment of interviewers, and questioning with the interview schedule for this study (which typically took from 30-60 minutes) having to await completion of the questioning with Murray Irrigation’s own interview schedule (which typically took from 45-60 minutes). The researcher was involved in a session held during July 1999 to familiarise the interviewers with the two interview schedules.

The sample of landholdings was selected according to a stratified-random procedure designed for Murray Irrigation by Lin Crase and Julie Jackson at the Wodonga campus of Latrobe University. Holdings were stratified by LWMP District, area of landholding, and enterprise mix. The holding-area (in hectares) strata were 0-100, 101-200, 201-400, 401-600, and greater than 600. The enterprise-mix strata were dairying, horticulture/viticulture, mixed farming/rice, and mixed farming/non-rice. The target sample size was 318 holdings. This comprised 156 holdings for Berriquin, 44 for Wakool, 98 for Cadell and 20 for Denimein. In cases of refusal to participate in the survey, replacement holdings were drawn from a randomly selected ‘reserve list’ for the relevant stratum.

The interview schedule for the present study was concerned with farm businesses, which each may comprise more than one landholding. Hence a business was interviewed only once for this study if more than one of its holdings were selected in Murray Irrigation’s sample. There were 235 farm businesses in the sample, which represents 14.6 per cent of the 1998 population of 1,610 farm businesses. There were 129 farm businesses interviewed for

Berriquin, 37 for Wakool, 55 for Cadell and 14 for Denimein. The interviews were conducted during July and August 1999.

Quantification of most of the variables included in the multiple-regression models was achieved through the use of bi-polar (e.g., strongly agree/strongly disagree) rating scales (the exceptions were the variable for the respondent's age, which was measured in years, and some dummy variables). Such scales involve ordinal measurement of the variables of concern, and are typically applied when interval or ratio measurement is not feasible for conceptual or practical reasons. Thus they are used frequently in interview schedules concerned with opinions, beliefs or attitudes such are of primary interest in the present study (de Vaus 1995). The full interview schedule is provided in appendix B and the particular rating items used for measuring the variables included in the quantitative models are detailed in chapters nine and ten when those variables are introduced.

Nine-point rating scales (with the negative and positive poles scored for analysis as one and nine respectively) were used for all such variables but one⁷³. The exception was measured by a seven-point scale—for consistency the scores in this case were adjusted to fit a nine-point scale⁷⁴. A 'don't know' response was also allowed. Scales with seven to nine categories have been found to be more reliable than scales with fewer points (Pannell *et al.* 1999b) and provide a richer data set for statistical analysis. The schedule was normally completed within 30-45 minutes. Interviewees were assured of the confidentiality of their responses.

In some cases the complexity of a concept, like political conservatism, warrants composite measurement by multiple survey items. A common procedure for composite measurement of concept is the derivation of a summated scale from the scores for a number of individual rating scales. A score is allocated to each of the individual scales according to how positive the response is with regard to the concept being measured. The scores for the different items for each interviewee are then combined in some way (de Vaus 1995)—in this study by calculating the mean of the item scores.

⁷³ In the interview schedule the poles for nine-point rating scales are actually scored as zero and eight respectively. The polar scores were changed to one and nine when prior to analysis it was judged that this would facilitate ease of interpretation (all scores measured by such scales were accordingly increased by one unit).

⁷⁴ The original score, measured by a rating scale with poles equal to zero and six, was adjusted by dividing it by six and then multiplying it by eight. Then the resulting score was increased by one unit, as described in the previous footnote, in the process of changing the poles of the nine-point scale to one and nine.

7.7.3 *The ordered-probit technique*

There are numerous variants of the multiple-regression method, the best known of these being Ordinary Least Squares (OLS). Parametric methods of multiple regression, including OLS, assume that all variables are measured according to an interval scale. With such a scale there is equality of interval. This condition holds if a given distance along a scale (e.g., between two and three) signifies the same change in the value of the variable being measured as does any other equal distance along that scale (e.g., between eight and nine). It requires too that a given distance along a scale (e.g., between two and three) signifies the same change in the value of the variable for all respondents.

Since the rating (ordinal) scales used to measure most variables for the quantitative analysis in the present study provide no guarantee of equality of interval, the ordered-probit technique of multiple regression was chosen for this analysis. In a model of this kind the dependent variable is assumed to be ordinal. Hence errors from incorrectly assuming interval equality for this variable are avoided. Nevertheless, interval equality is still assumed for the explanatory variables in such a model. Since most of the explanatory variables in the models estimated in this study are ordinal, the possibility of measurement errors associated with these variables remains. Consequently, the estimated models should be interpreted with some care.

An ordered-probit model is developed around a latent regression as is the case with a binomial probit model. Following Greene (2000), the general specification of a single-equation ordered-probit model is

$$y^* = \beta' \mathbf{x} + \varepsilon$$

where y^* is a latent (unobserved) variable, \mathbf{x} is a $(K \times 1)$ vector of observed explanatory variables, β is a $(K \times 1)$ vector of unknown parameters, and ε is a random error term. Although y^* is not observed, what can be observed is

$$\begin{aligned}
 y &= 1 && \text{if } y^* \leq 0, \\
 &= 2 && \text{if } 1 < y^* < \mu_1, \\
 &= 3 && \text{if } \mu_1 < y^* < \mu_2, \\
 & && \cdot \\
 & && \cdot \\
 & && \cdot \\
 &= J && \text{if } \mu_{J-1} \leq y^*.
 \end{aligned}$$

The μ 's are unknown parameters to be estimated with β . It is assumed that all error terms have zero mean and that the error terms for different observations are not correlated. The ordered-probit model also assumes that ε is normally distributed across observations. Alternatively, an ordered logit model results if ε is assumed to be logistically distributed. However, O'Donnell *et al.* (1996 p. 741) noted that if ε represents the combined influence of many independent factors not formally expressed in the model, then central limit theorems can be used to justify the assumption that ε is normally distributed. In any case, Greene (1993 p. 673) has observed that the ordered logistic model "is a trivial modification of the [ordered-probit] formulation and appears to make virtually no difference in practice".

The parameters of the ordered-probit model are obtained by the method of maximum-likelihood estimation. In this study, the ordered-probit models were estimated using the STATA software (StataCorp. 1997) which maximises the log-likelihood function using the Newton-Raphson procedure. The software also provides standard errors and asymptotic Z statistics for the estimated β parameters. In addition, a pseudo- R^2 was calculated as a measure of the goodness-of-fit of the estimated models. The measure chosen was one recommended by Veall *et al.* (1992) because, when it takes a value less than about 0.6, it seems to mimic the OLS- R^2 that would be calculated if y^* were in fact observed.

With parametric methods of multiple regression, the substantive significance of the estimated coefficient of an explanatory variables is gauged by calculating an elasticity. This involves looking at the effect on the dependent variable of increasing the explanatory variable by one per cent, usually from its sample mean value. In standard ordered-probit models, where the explanatory variables are measured by interval scales, this general strategy is appropriate, although the calculations in this case are somewhat more complicated (see Greene 1993 pp. 673-675). However, in the ordered-probit models estimated in this study it was not appropriate to follow this approach since most of the explanatory variables are measured by ordinal scales within which changes of one per cent are implausible.

Hence an alternative approach of calculating 'sensitivity factors' was used. The first step in this approach was to calculate the probabilities of the dependent variable taking on each of its possible values (i.e., 1, 2, 3, ..., 9) given that all explanatory variables (except dummy variables) are set equal to their sample mean values and dummy variables are set equal to zero. The second step in calculating sensitivity factors for a particular (non-dummy) explanatory variable was to recalculate the probabilities for the dependent variable with the

value of the explanatory variable increased by one unit from its sample mean value (the values of other explanatory variables left unchanged). In each of these steps the calculation of probabilities was as detailed by Greene (*ibid.*). The final step was to calculate the percentage change, due to the one unit increase in the explanatory variable, in the probability of the dependent variable taking on each of its possible scores. Thus there were nine sensitivity factors calculated for each (non-dummy) explanatory variable.

7.7.4 *Social-survey data in economic analysis*

Prior to closing this discussion of the method of quantitative analysis used in the case study, a comment on obtaining data through social-surveying techniques is perhaps in order due to the scepticism of some economists regarding the validity of results obtained therefrom. As Mitchell *et al.* (1989 pp. 14-15) observed:

Of all the social sciences, economics has been the least comfortable with the survey research method. ... Most economists eschew measures of subjective phenomena, such as attitudes and behavioral intentions, in favor of objective entities ...

This scepticism of economists has probably been greatest in relation to the use of social-surveying techniques in the contingent-valuation (CV) method. Mitchell *et al.* (*ibid.* p. 15) noted that this method pushes social surveying “close to the limits of its capability”. That is, it tends:

... to require a greater effort from the respondent than most conventional surveys. Few respondents bring well-realised values for unfamiliar amenities to the CV interview. Yet they are asked to pay attention to the sometimes lengthy description of the market, search their preferences, take their income constraint into account, and determine a dollar amount which represents the most they would pay for each level of the good the survey attempts to value (*ibid.* p. 119).

The scepticism of economists can be traced to doubts that the hypothetical choices posed in the CV method provide an accurate guide to the choices that would be made if there really were a competitive market (Wilks 1990). More specifically, the concerns are that (a) survey respondents will act strategically by giving answers deliberately calculated to influence policy makers; (b) respondents lack the motivation to search their preferences with sufficient care to give meaningful answers; and (c) answers to hypothetical questions cannot predict behaviour (Mitchell *et al.* 1989).

Nevertheless, empirical evidence indicates that “there is no valid basis for dismissing the CV method out of hand on these grounds” (ibid. p. 15). The consistent lack of evidence for prevalent strategic behaviour in the valuation of public goods using this method seems particularly noteworthy, suggesting as it does that:

... strategic bias is not a significant problem for CV studies under *most* conditions. Instead of being a fundamental, unavoidable threat to the CV method, strategic behaviour is just one of many possible sources of bias which that designer of a CV study must take into account (ibid. p. 170, original emphasis).

The implication is that the social-survey method is not inherently flawed but must rather be applied carefully if its validity is to be ensured. Consistent with this view, Randall (1996 p. 205) commented on the use of this method in CV studies as follows:

My position on the validity of CV has long been clear. The details matter; and the important details include the incentives for thoughtful and truthful response, and the multitude of research decisions in design, data collection, data handling and analysis, and reporting and interpretation of results.

7.7.5 *Applying the social-surveying method in this study*

Hence it seems that the scepticism among some economists regarding the usefulness of social surveying as a research method is not justified by empirical evidence, even in respect of the highly hypothetical context of CV studies. In the present study the context to which the social-surveying method was applied was considerably less hypothetical than typically encountered in CV studies. The questions asked of respondents related to a real context which is salient and familiar to them. Hence cognitive limitations of respondents would be less of a barrier to accurate responses than is the case in CV studies. Moreover, the opportunity to respond strategically is likely to have been moderated significantly by the context in which the interviews took place.

Probably the survey item most susceptible to strategic bias was concerned with eliciting respondents’ intentions to contribute towards implementation of the on-farm aspects of the LWMPs (i.e., the item used to measure the dependent variable—known as Intention to Comply—for the model reported in chapter nine). The most likely bias here derives from the incentive for respondents to further their prospects of free riding. That is, by deliberately understating their implementation intentions it is conceivable they might have hoped to encourage government to undertake more of the implementation itself, or at least to meet a greater share of the on-farm implementation costs.

One moderating factor was that the interview for the present study was conducted after responses to Murray Irrigation's own interview schedule—concerned with determining the progress of respondents in implementing the various on-farm aspects of the LWMPs—had already been elicited. Hence respondents were constrained in replying strategically by the objective data regarding their on-farm implementation that they had provided shortly beforehand.

Strategic bias of a free-riding kind may also have been counteracted by another type of bias—compliance bias. This occurs when respondents alter their answers in an attempt to please the interviewer or the sponsor of the study (Wilks 1990). There are two reasons why compliance bias in this study may have taken the form of respondents overstating their on-farm implementation intentions: (a) farmers collectively had promised to implement the on-farm aspects of the LWMPs; and (b) the survey was conducted by Murray Irrigation—which *inter alia* is responsible for ensuring on-farm implementation of the LWMPs.

Given these moderating factors, as well as the finding reported above that strategic bias is usually not a significant problem even in CV studies, it seems unlikely that strategic bias represents a problem of much concern for the present study. This confidence is reinforced by the policy implications of the present study having been considerably less transparent to respondents than is the case in a CV study where it is normally fairly clear that responses will be used to attribute a value to a particular good. In this study the primary focus was on testing various hypothesised relationships between variables, and the respondents were not aware of the hypotheses being tested—and most unlikely to anticipate them. Consequently, the likelihood of strategic bias influencing the hypothesis tests seems slight.

The problem of compliance bias may have been more significant given that respondents would generally have been aware that the survey was sponsored by Murray Irrigation which they knew to be responsible *inter alia* for ensuring that the on-farm aspects of the LWMPs are implemented. Moreover, most of the interviewers were residents of one of the LWMP Districts or long-term employees of Murray Irrigation at the time the survey was conducted—and thus respondents may reasonably have expected them to have some personal interest in seeing the LWMPs successfully implemented.

For Murray Irrigation's purposes the recruitment of such people was desirable since they were familiar with the on-farm aspects of the LWMPs and therefore well placed to assist farmers in answering the objective questions (e.g., regarding the area previously

landformed by respondents) comprising its own interview schedule. The answers to these questions could easily be audited and hence were susceptible to minimal risk of compliance bias. One way that the potential problem of compliance bias from using these interviewers for the present study was addressed was by instructing them to maintain a neutral pose during each interview, both in presenting the questions and recording the answers.

The other way was by including dummy variables in the ordered-probit models to control for varying degrees of compliance bias possibly associated with different subsets of the 17 interviewers used in total. Preliminary analysis indicated significant differences between data collected by four groups of interviewers in respect of a few of the key survey items. The four groups were: (i) non-farmers not located in any of the four LWMP Districts (two interviewers accounting for 58 interviews); (ii) farmers from inside the LWMP Districts with no further involvement in the LWMP process (ten interviewers accounting for 118 interviews); (iii) people who had served on an LWMP Working or Implementation Group or who had a history of employment with Murray Irrigation, excluding the person comprising the fourth group (four interviewers accounting for 45 interviews); and (iv) an ex-chairperson of one of the CWGs (one interviewer accounting for 14 interviews).

Dummy variables were thus included in each of the models reported in chapters eight and nine to test (on a two-tailed basis) for compliance bias associated with interviewer groups (ii), (iii) and (iv), respectively. These variables are referred to as Interviewer Dum1, Interviewer Dum2 and Interviewer Dum3, respectively. Interviewer group (i) was chosen as the reference group for the dummy code (coded as zero in respect of each variable) as this group was expected to be responsible for the least compliance bias—since interviewers in this group were not linked to the LWMPs except through their involvement in the survey.

Nevertheless, there was no way during model estimation of controlling for the possibility of ‘general’ compliance bias following from the survey being known by respondents to be sponsored by the organisation responsible for ensuring implementation of the LWMPs. However, some idea of the general level of compliance bias in this case might reasonably be inferred by gauging the consistency of the sample mean and median scores for the Intention to Comply variable with Murray Irrigation’s expressed confidence, on the basis of progress with on-farm implementation of the LWMPs to date, that this implementation will ultimately meet the agreed targets (see section 6.6). This confidence would seem to be consistent with a sample mean for this variable close to the maximum possible score of nine. The sample mean is in fact 6.9. This suggests that respondents tended to be conservative on

average in declaring their intentions in respect of on-farm LWMP implementation rather than susceptible to compliance bias. While this kind of evidence is not conclusive, in combination with the other precautions taken it suggested that the quantitative analysis could proceed with reasonable confidence that its findings would not be affected seriously by compliance bias.

The final issue to be discussed briefly here concerns the steps taken to ensure the construct validity of the items included in the interview schedule. A first important step, albeit *ad hoc* from the point of view of this study, was the researcher's professional involvement in the CMR-LWMP program from 1992 until 1995 while employed as an economist with NSW Agriculture. A second step involved familiarisation with documentation of the program, including with minutes of meetings of CWGs and CIGs. A third step involved the in-depth interviews with staff of Murray Irrigation and present and past chairmen of the CWGs and CIGs that were conducted in March 1999 as part of the first phase of in-depth interviewing for the qualitative analysis (see section 7.5). These three steps served to suggest how the theory to be tested might relate to the practice of the CMR-LWMP program and, accordingly, how the variables of interest would most validly be operationalised in the interview schedule.

A fourth step consisted of asking relevant staff of Murray Irrigation, as well as various researchers experienced in the use of the social-survey method, to review a draft of the interview schedule, identify where they saw problems arising, and suggest improvements. A pre-test of the revised schedule with farmers from the LWMP Districts was intended, but this step had to be abandoned when Murray Irrigation commenced the survey interviewing process earlier than anticipated.

A fifth step undertaken to enhance construct validity involved participating in the pre-survey briefing of interviewers and addressing any problems they anticipated in respect of respondents finding items unclear or ambiguous. A sixth step consisted of attending the debriefing session for interviewers that was convened soon after all interviews had been completed. This highlighted a few items in the interview schedule which a sizeable proportion of respondents had either found ambiguous or irrelevant to their experience. The data for these items were not used in the quantitative analysis. The final step of triangulation involved comparing the consistency of the case-study findings from the quantitative and qualitative analyses.

PART IV:

CASE-STUDY FINDINGS

8. FROM COLLABORATION TO COOPERATION IN THE CENTRAL-MURRAY REGION'S LWMP PROGRAM

8.1 *Introduction*

This chapter is primarily concerned with the first purpose of the case-study qualitative analysis as identified in section 7.5. Accordingly, it focuses on exploring how actual behaviour within the CMR-LWMP program corroborates and elaborates aspects of the rational-choice theory of collective action that were considered in chapters three to five. More specifically, the exploration dwells largely on structural variables influencing the behaviour of farmers covered by this program. As discussed in section 6.3, these farmers face a watertable-related commons dilemma wherein lack of cooperation risks costly escalation of their irrigation-salinity and waterlogging problems. This behaviour was also the subject of the case-study quantitative analysis, thus enabling triangulation of the findings from the qualitative and quantitative analyses.

This chapter is concerned mainly with investigating the relevance to farmers of the trust that second-generation developments in the rational-choice theory of collective action predict should be pivotal to their capacity to act cooperatively within this commons dilemma. As explained in section 4.6, trust is one of a triad of mutually-reinforcing variables situated at the core of the emerging second-generation theory—the two others being reciprocity and the level of cooperation.

Nevertheless, this theory clearly cannot be applied to a specific context without seeking to identify *inter alia* the structural variables operative in that context upon which the relevant trust depends most critically. Accordingly, this chapter seeks to elucidate how particular structural variables—either endogenous or exogenous as defined in section 7.2—affect the kinds of trust seemingly vital to farmers' cooperation within the CMR-LWMP program. The in-depth interviews with key informants constitute the data upon which this chapter is based (see section 7.6 and appendix A). Selected excerpts from the interview transcripts are therefore interspersed where appropriate in this chapter in order to highlight the significance of, and add cultural texture to, the findings of the analysis.

This chapter continues in section 8.2 with a consideration of the situational history of the CMR-LWMP program. Prior to the instigation of the program, the history of the relationship between the NSW Government and the region's irrigators had long been characterised by paternalism on the part of the Government. This had in turn provoked antagonism and mistrust from the irrigators. The role that leadership within the Government and the regional community played in forging an escape from lock-in to this vicious cycle of non-cooperation and mistrust—by envisioning and championing the community-based collaborative process that became the CMR-LWMP program—is addressed in section 8.3. The subsequent process of seeking to gain wider community ownership of, or commitment to, the program's collaborative vision, as well as to the decisions made in its pursuit, is then examined in section 8.4.

In section 8.5 of the chapter some particular structural impediments to community-Government collaboration during the process of developing the LWMPs are discussed. This is followed in section 8.6 with a review of the process of gaining the community's agreement to a collaborative partnership with the Government for the process of implementing the LWMPs. The resulting agreement involved Murray Irrigation becoming formally responsible for ensuring that the community's side of the partnership is honoured (see section 6.5). The role of Murray Irrigation, as a group-property regime, in ensuring farmer compliance with the LWMPs, and the implications of this for farmers cooperating in the required monitoring and sanctioning effort, is explored in section 8.7. Finally, some concluding comments are presented in section 8.8.

8.2 *An uncooperative history*

Prior to the commencement of the CMR-LWMP program, the relationship between the irrigator community and the NSW Government in respect of how the irrigation schemes were run had long been soured by deep-seated antagonism and mistrust. The irrigators resented the Government operating the schemes paternalistically. Daniel Liphuyzen, who is the current chairperson of the Denimein CIG and was a member of the CWG, referred to “the entrenched bureaucratic attitude of reluctance to change” and characterised the typical response of water bailiffs (i.e., the staff responsible for the day-to-day operation of the schemes) to suggested improvements in the running of the schemes as “I hope this doesn't mean more work for us. How are we supposed to do it? It's just not on”. Kelvin Baxter, who is an irrigator and a Director of Murray Irrigation and was the first Chairperson of this

company, discussed how:

New technology just hadn't been taken up at all. The Government was still running the scheme as in 1938 when it was first built. We saw the need for change in the way the scheme was operated. It was a very labour-intensive scheme. That suited Government at the time. It was a shocking example of a government trading enterprise really. ... I mean it was very much an employment agency.

Consistent with these views from irrigators, Warren Martin, who was Deputy Director of the DWR during the time that the central-Murray region's LWMPs were developed, observed that:

I think that the irrigation areas and districts were seen a bit within the Department as being Government-owned operations. There was a bit of an attitude that we know best. That was there, there's no question about that.

Similarly, Peter Stewart, who was Project Co-ordinator for the plan-development phase of the CMR-LWMP program, commented on how:

... the old Department of Water Resources people used to rule with an iron fist. They had been like that for many years. There was a culture of "them and us". "Them" was the Government and it laid the law down. And "us" were the people who paid the water bills and did what they were told.

The irrigators in the central-Murray region had responded to this historical paternalism by Government through forming the Southern Riverina Irrigation District Council (SRIDC) to press their concerns in the political domain. Mr. Martin remarked how in the 1980's:

There was a fair degree of antagonism between the SRIDC and the Water Resources Commission [precursor to the DWR] at that stage. You'd go to meetings and there was shouting across the floor. The Commission and the SRIDC at that stage were at loggerheads to a large degree. ... The SRIDC viewed the Commission, and the executive of the Commission at that stage ... as a very antagonistic group. The SRIDC played the politics pretty hard.

8.3 *Leadership*

As noted in section 6.3, the NSW Government's decision to address watertable-related problems in the central-Murray region in collaboration with the regional community was primarily the result of external imposition of the Natural Resources Management Strategy by the MDB Ministerial Council. Forging such a partnership would obviously be challenging given the historical antagonism between the DWR and the region's irrigators. As Mr. Martin observed:

[T]he Department [of Water Resources] was not necessarily supportive of full community participation at that time. It wasn't only the irrigators that you had bring around, to get greater community participation. A number of irrigator leaders wanted to participate, but there was still some

resistance within the Department. There was still a hands-on tell-them-what-they-should-do mentality to a degree.

It seems from a number of irrigators interviewed that committed leadership by Mr. Martin and some other government officers played a major part in lessening this bureaucratic resistance. This helped irrigator leaders to gain trust that collaborating with Government in addressing the watertable-related problems would be worthwhile. For instance, Gordon Ball—who was Chairperson of the Berriquin CWG and is now a Director of Murray Irrigation—commented that Mr. Martin’s early involvement gave leaders of the Berriquin irrigation community confidence that the collaborative process envisaged for the CMR-LWMP program could work. Noel Graham and Gerard Lahy—currently the Chairpersons of the Cadell and Wakool CIGs, respectively—independently remarked likewise upon the crucial importance of Mr. Martin acting as their “champion” within the higher levels of Government⁷⁵. Not only was he approachable, but they had confidence in his “vision” for the partnership and that he would stick by his word once he gave it. Indeed, they were satisfied that Government actions were normally delivered as he said they would.

For his part, Mr. Martin explained that working to make himself known personally to the irrigator communities, or at least to their leaders, and taking an active interest in their ideas and concerns was vital to his efforts to win some degree of trust from them. He observed that gaining trust:

... takes a long time. You’ve got to build it up. They’ve got to be confident that you know what you’re talking about to a degree as well. And that you can deliver some things. ... Probably the difficulty is knowing the problem is there and getting in early to fix it up. Very often you don’t hear about the problems. Again it’s getting round and talking to people.

He commented as follows on the benefits of this trust for obtaining feedback from these communities: “[T]hey would tell me things they wouldn’t tell other people, because they trusted me to a degree”.

The difficulty of reversing the Government’s mistrust of irrigators, which had been associated largely with the antagonistic relationship between the DWR and the SRIDC, was in turn lessened significantly by irrigators choosing people to lead them in the CMR-LWMP program (i.e., their representatives on the CWGs) who mostly were not linked with the SRIDC. Mr. Martin described this transition as follows:

⁷⁵ Mr. Graham was a member of the Cadell CWG, while Mr. Lahy was the Chairperson of the Wakool CWG.

The SRIDC tended to be the older irrigators that had been around agri-politics for a long time. ... The younger irrigators in the Berriquin, Wakool, Deniboota and Denimein planning working groups were probably in their early 30's ... So they were the sons, a generation down. Which I think was good because they didn't come with the same baggage, if you like, from prior SRIDC debates. They hadn't been involved and came with a fairly open mind about the Department and how it could do things.

The challenge facing this new generation of community leaders he described as follows:

All the irrigators weren't, in my view, convinced that the community could actually do it. Some of them were saying to us at that stage "You go away and do it and tell us what we've got to do". But a number of irrigators were championing the community involvement. There wasn't a lot of them to start with, but there was a growing groundswell. They had some strength and they had a fairly good argument that turned the views of some of the other irrigators anyway. There wasn't a full agreement, to start with, that they wanted actually to participate. Some of them had to be brought along. Gordon Ball was a very strong advocate. In Wakool and Denimein and Deniboota some of the younger irrigators out there had some trouble convincing the older irrigators that participation was the way to go.

8.4 *Pursuing community ownership*

It seems that building the trust of the wider community in the authenticity of the Government's offer of a collaborative partnership to address the watertable-related problems followed to a substantial extent from Mr. Martin's active commitment to the concept of "community ownership" that was integral to the philosophy of TCM (see section 2.5.2). Mr. Stewart acknowledged this commitment as follows:

I'll take my hat off to Government here. Government certainly had a concept which they wished to put into place. And that concept was community ownership of the Land and Water Management Plans. It was very clear to me when speaking to people like Warren Martin that certainly there'd be boundaries around what would go into these plans. There'd be Government policies and other constraints, but by and large you had a blank sheet of paper. And local community people—because they had to live in that environment and deal with its problems—were seen as the best people to come up with workable solutions. I think that was a very sound philosophy. And I can say that in all my time there I had no pressure from Government at all about changing tack or adding anything.

From the commitment to community ownership followed the decision by Government to appoint Mr. Stewart as an independent Project Co-ordinator for the CMR-LWMP program. Mr. Martin justified this step as follows:

I saw it was essential to have someone in the Murray on-site. As discussed previously, antagonism management and trust building were important issues. My view was that we needed an independent person. We didn't want a Departmental person. Peter Stewart, a consultant, was already working

inside the organisation on another job. He'd demonstrated an ability to deal with community groups on that other job.

Mr. Stewart took up this position in early 1992. Despite the good intentions on the part of Government, its lack of consultation with the CWGs about the appointment caused them concern that the commitment to community ownership of the process had been short-lived. Geoff McLeod, who was with NSW Agriculture during the plan-development phase of the CMR-LWMP program and is now Murray Irrigation's Environmental Manager, explained that the unilateral appointment made the CWGs wary that "DWR [was] trying to run the show again". Mr. Stewart recalled as follows the consequent mistrust of him at the first CWG meeting he attended (with the Berriquin CWG):

You could have cut the atmosphere with a knife. It was palpable. ... It was a difficult meeting for me. My view was that either I had something to offer or I didn't, and that they'd come to their own opinions about that. And if they didn't like what I had to offer then, well, that's the way life goes sometimes and I'll walk away. If they thought I had something to offer then that would dawn upon them and the relationship would start to develop.

Faced with this mistrust, he decided not to force himself onto the CWGs:

I never pushed myself on to any of the Working Groups, ever. I deliberately waited to be invited. And I didn't get initial invitations, by the way. It wasn't a case of me just saying "I'm the Planning Co-ordinator now for all you guys, and I expect to come to all your meetings". They discussed it among themselves and I was invited initially to a meeting. And then it didn't take very long for them to say I should come to all their meetings.

A further strategy, instigated by Mr. Martin, for establishing the independence of Peter from the Government was to accommodate him and his small team of staff away from the Government offices.

Aside from protecting his independence from the Government, Mr. Stewart was careful to ensure that he protected it too from the various other interests involved in the program. He explained:

That way I believed I could make sure that all stakeholder interests could be accommodated without me being seen as siding with any of them. I didn't side with any of them either. I never had one vote at any of the meetings, ever.

He saw that this required him to:

... drive the process. And, if you do that in a fair kind of way without trying to impose your own views—what you're not looking for is content that *you* believe in; what you're trying to do is have a process that gets content that *they* believe in—then I think you've done your job pretty well.

This role of driving the process was typically pursued through running 'workshop sessions' during CWG meetings—although always in deference to the CWG chairperson. Mr. Stewart elaborated as follows on how he did this while maintaining his independence and achieving CWG ownership of the ideas arising from these sessions:

Just because of my exposure to a greater range of things, I was in a position to answer questions or give opinions. But I never used to operate in that way. I would always try to seek the opinions and views of the other people there. And nine times out of ten what you were thinking would come from someone else in any event. But then they had ownership of it. That's one reason why we used the whiteboard a lot too. Because ideas that people have, you give them a certain legitimacy by putting them up on the whiteboard. They get excited to see their own idea up on the board. It's true. It works.

And:

... I don't think I ever said "The ten key points for this are so and so". Never ever. I had the ten important points in my head or on a piece of paper or something. But I'd say "What do you think the important points of this are?". I didn't care if it took time to draw it out. ... In the end, if they'd only come up with eight of the ten points you wanted to cover, I wouldn't just say "I think nine and ten are ...". I'd say "Have you given any thought to this side of it?". It might just be framing the same concept differently, but I wanted them to think of it as their own idea and then get it up onto the whiteboard as their own idea.

In this way the CWGs incrementally gained confidence that the Government was truly respecting them as collaborators within the CMR-LWMP program. Nevertheless, their capacity to fulfil this role effectively depended importantly on their own internal cohesion. Asked whether there was mistrust initially within the CWGs, Mr. Stewart responded "Yes, of course. Some people didn't know each other to begin with. Some people came in there with a bit of baggage, with a reputation for being this, that or the other thing".

The challenge of establishing trust within CWGs was probably greatest in the case of the Cadell LWMP District which encompassed Deniboota Irrigation District as well as East Cadell which contained private irrigation schemes as well as extensive dryland areas. Bill Anderson, who represented East Cadell on the Cadell CWG and currently represents it on the CIG, explained how “there has been a fair amount of feeling between the two areas”, particularly because private irrigators in East Cadell believed that over the years Deniboota irrigators had won various concessions from Government at their expense. Nevertheless, it was important for a single CWG to be responsible for the whole of the Cadell since it formed a natural groundwater catchment. Hence Deniboota irrigators would be unable to address their watertable-related problems effectively without cooperation from East Cadell landholders.

Mr. Graham, who is from Deniboota, suggested that success in encouraging East Cadell farmers to join the CWG was attributable to the Deniboota members of the CWG being a generation younger than the older Deniboota farmers that East Cadell farmers would associate more directly with their “feeling” in respect of Deniboota irrigators. He characterised the Deniboota members accordingly as “sons of current property owners, idealistic, who presented no challenge to anyone. Nevertheless, we were old enough to represent the future and have our ideas respected”. Mr. Anderson agreed with Mr. Graham’s interpretation of events and went on to observe that Jamie Hearn, who had been Chairperson of the Cadell CWG:

... was one of the greatest things in building bridges between East and West Cadell. Because he came from West Cadell, from Deniboota, but he showed an equal concern for those who lived in East Cadell.

Even so, it seems it took genuine leadership for Mr. Anderson and other East Cadell farmers to agree to join the CWG. Mr. Anderson recollected that “[I]t was hard at the start. I think a lot of people at the outset felt betrayed that we got involved”.

Within the CWGs it was understood that decisions would not be owned by all members unless an atmosphere of trust and respect among members existed that encouraged everyone to frankly air their ideas and views. Mr. Stewart recalled:

Someone said to me they’d remembered as important me saying “There’s no wrongs and rights, just differing opinions”. It was just something off the top of my head at the time. But it kind of settles people down and it generates the right atmosphere for people to put forward their points of view. The Working Group in Cadell was just terrific. They were outstanding. They had the capacity to debate issues with a whole range of views in the room, but without acrimony. And there was a lot of

humour.

Mr. Liphuyzen observed similarly that:

People have different opinions and you've got to let everyone express their opinions. ... You can get too much group-think. You've got to let everyone express their opinions so that you get that other view. Otherwise you'll be too blinkered in your approach. I think everyone worked well enough together in our group [i.e., Denimein CWG]. We did have one or two members at different times that were sticking on an issue and wouldn't change off it and were getting the rest of the group's backs up. But most of the time I think it worked pretty well.

Attention to fairness was also important in gaining widespread ownership of decisions within the CWGs. As Mr. Stewart remarked, fairness was:

... almost like a natural topic to air. Like "If we do that then it's not fair to so and so. He bought that property years ago. The water right would have been part of the price he paid for it". Then "Oh, yeah. What about the farmers over at da-de-da? They've got a water right but aren't doing anything with it". And on it goes. Those kinds of debates occurred frequently and were healthy.

Nevertheless, it was clear that ownership of the LWMPs by the CWGs would not in itself guarantee ownership by their respective communities. Consequently, each of the CWGs devised a strategy for engaging the participation of their respective communities in the CMR-LWMP program. John Lacy, who is an agricultural extension officer with NSW Agriculture and was a member of the Berriquin CWG, recalled that the CWG originally considered holding occasional large public meetings for the purpose of obtaining wider community participation. However, his experience had taught him the advantages of small discussion groups for achieving beneficial changes in farmer behaviour. He observed that:

The big benefit of discussion groups is that it allows farmers to learn off each other and it allows farmers to give feedback. Farmers are looked on as being equals to the facilitator. It's just a great learning process.

Mr. Lacy and others argued successfully that this approach to involving farmers should be adopted by the Berriquin CWG. The Berriquin District was accordingly divided up by the CWG into the localities within which discussion-group style meetings would be convened. The other CWGs saw merit in this strategy and chose independently to follow a similar strategy. Mr. Liphuyzen commented on the effectiveness of this strategy in the Denimein District as follows:

Smaller groups offer people much more of a hands-on involvement. They are much more at ease to comment on what they think of something. If you just had one regional meeting, you'd get people who always want to hear their own voice and also a lot of people that just sit and say nothing and have no input. So the smaller meetings were a good part of the process. If we came up with

something that wasn't acceptable, I think we would have been told straight away.

Each of the three Berriquin farmers interviewed made similar comments. For instance, Berriquin Farmer One said:

There's only the odd one that gets up at a big public meeting. I think people feel far more comfortable speaking with their neighbours just in the local area than they do standing up at the town hall.

Even so, as Mr. Lahy recalled, some farmers would have kept quiet at the smaller meetings too if they hadn't been personally encouraged to speak up. He explained that this reticence was typically overcome in the small-group format by the chairperson "eyeballing" everyone present and asking them in turn "Well, what do *you* think?".

A further feature of the locality meetings that a number of those interviewed indicated was vital for their effectiveness in gaining ownership of the meeting outcomes by the participants was that the responsibility for chairing the meetings, presenting technical information and leading discussions was largely taken on by CWG members living in, or at least known, in those localities. Mr. Lahy claimed that this strategy was instrumental in gaining trust from the wider farming community that the consultation process was genuine and that the information provided to them was correct. Mr. Graham commented that this strategy had the advantage also of allowing a CWG to use its knowledge of local culture in order to frame and present information and options in order to "move" its community to best effect.

8.5 *Community-Government collaboration in LWMP development*

Ownership by the Government of the CMR-LWMP program and the resulting plans was clearly critical also, especially given that it was providing resources to support plan development and looking to contribute considerable funds toward the implementation of the plans. Consequently, it had a legitimate interest in ensuring that plan development was technically sound. This was acknowledged in Mr. Stewart's comment that:

... I saw there'd need to be a process which engaged the community but also had strong technical support to it as well. And the two were interactive all the way through. ... So there was a sort of marriage of farming common-sense and aspirations with the technical side of things.

Nevertheless, the marriage was not always an easy one. For instance, some of the CWGs believed strongly that the Government's commitment to community ownership of the

process meant that they should have a real say in how the funds provided by the Murray-Darling Basin Commission for plan-development-related technical studies were used. They were wary that the DWR would dominate these kinds of decisions by virtue of being the direct recipient of the Commission's funds, and as a result retain "in-house" more of the technical program than justified by its capacity to deliver what was required on schedule.

Thus Mr. Stewart claimed that "at the start the Department said 'Yeah, it's all contestable. It is alright if you go out into the marketplace'. But that only lasted until the crunch time came". He observed that it was a case of:

The Golden Rule applies: He who has the gold makes the rules. ... And they doled it out as they saw appropriate. ... When an external source of funds comes up, such as LWMP money, the temptation is to not use it entirely on the purpose for which it was given. Thus sometimes tenuous connections were made between the LWMPs and what people were doing in the Department, in order to justify paying Departmental staff salaries from that bucket of money ... and that did happen to some extent. Not a lot, but it did happen.

In a similar vein, Peter Jacob, who undertook various consultancies commissioned as part of the plan-development process, concluded that:

I think that you need to set up processes to avoid governments then capturing a lot of that funding for themselves. If that happens then you can really mess up the strategic direction of the plan-development process. It becomes looking for research just for the sake of research. There's a number of examples I could identify.

Mr. Stewart attributed this problem of CWG dissatisfaction with collaboration by Government regarding the use of program resources to a lack of appropriate experience and skills on the part of key Government staff in the region. He commented as follows that it was less a problem of Government lacking in-principle commitment to collaborating with the community through the CWGs:

There was a commitment, that's one thing. You may have a commitment to marry, but you may still end up divorced. No, they didn't have the skills. ... It's funny, you know. I've been involved recently in floodplain management planning. The people who are running that now are saying the same kinds of platitudes that were stated for the LWMPs all that time ago now. But saying it will work isn't enough to make it work. The people who are involved have to make it work.

However, Mr. Martin indicated as follows that the problem may also have been partly due to paternalistic attitudes lingering at the regional level in DWR:

When the LWMPs started, the region still at that stage regarded the irrigation areas and districts as their responsibility to a degree because the privatisation hadn't occurred. ... Some of the

management people in the region didn't like it at all, having the irrigators telling them what to do.

It seems that another reason for the problem was lack of appreciation by CWG members sometimes of the complexity of the technical issues. As Mr. Martin observed: "The community will always think that you can do modeling in about a tenth of the time that you can actually do it in, to get the proper answer out of the thing". He went on to comment that this misunderstanding lessened as the CWGs became more aware of the complexities involved: "I think there is now a better understanding of how difficult it is in a lot of these exercises to actually undertake technical studies, and get answers, and actually have to make decisions".

8.6 *Community-Government collaboration in implementing the LWMPs*

Nevertheless, LWMPs were ultimately developed which, after a process of negotiation, were agreed to by the communities of the four LWMP Districts, as well as by the NSW Government. Ownership of the plans by the various District communities was demonstrated, in the words of Mr. Stewart, by:

... the overwhelming support the plans got at the final stage. Every plan had a large community meeting at the end to see if the plan was supported or not. And they turned up in their droves. They gave a tick to what their Working Group had done.

What had been agreed between the District communities and the Government was formalised in a Heads of Agreement, as discussed in section 6.5. Mr. Ball remarked that this document is valued by the communities, as well as by Murray Irrigation as the designated implementation authority for the LWMPs, as providing them with greater trust that Government will deliver on its side of the LWMP implementation program than they would have taken away from promises backed only by handshakes. Mr. Stewart observed likewise that "I think that one of the real strengths of the LWMPs is the extent to which obligations were stitched up in a 'contractual' sense. And those obligations are in place irrespective of the personnel who were there at the time in the agencies".

By the same token, signing the Heads of Agreement represented a significant concession from the communities of the LWMP Districts. When asked about the strengths of the CMR-LWMP program, Ros Chivers, an officer in the head office of the DLWC, replied as follows:

I think the fact that there are, for want of a better word, contractual arrangements in place that require that landholders and Murray Irrigation actually do what they agreed they would do, so that we do get on-ground change. Without those sorts of contractual arrangements, we are finding that there is very little sustained on-ground change in other areas of the State. In other areas maybe \$100,000 is handed out for certain work to be done, but it's not necessarily the case that the work is carried out or maintained. Because there is no monitoring and evaluation, nor any contractual arrangement to say "If you don't do it, then we will penalise you".

Warren Musgrave, who was Chairperson of the LWMPAT at the time of interview, remarked similarly that community-government collaboration process followed in the CMR-LWMP program had:

... been a success in the sense that you have a contractually-based partnership arrangement between government and a community group for a plan where the costs are shared between the two partners ... This to my mind is a significant breakthrough in resource management in Australia, to give that degree of discipline and formality of agreement between the parties. And to get to the point of actually having done it is a fantastic achievement. ... Now I don't think that a top-down approach would get you that far. Except perhaps with significantly greater incentives.

The last sentence of the foregoing quotation indicates that the greater trust in the plans and Government that the communities gained as a result of being engaged in the program had a tangible economic impact in so far as it made them more amenable to cooperating spontaneously with Government—thereby reducing the transaction costs of inducing them to do so. The following observation from Mr. Martin demonstrates the vital contribution that the leadership of the District communities, namely the CWGs, and the trust that was engendered in them through the community-participation process, made to realising this outcome:

You've got to give the credit for the success probably to the Working Groups and the Chairs who ran them. ... It wasn't all pats on the back from the community people for the LWMPs. Gerard Lahy often told me "I don't know why I'm doing this. I'm getting more abuse out of this than doing other things. I could be away just managing my farm". ... He actually drove the community through some of the changes. When he took back to his community the funding negotiation outcomes, he had some trouble getting their agreement to them. ... [He] had to battle to get endorsement because some of the community were saying "No, Government should be paying more". He actually won their hearts and minds over.

In fact, this ownership by the CWGs of the plans they had developed led to considerable tension when it became apparent to them that it was the Government's intention that Murray

Irrigation, once the privatisation had proceeded, would become responsible for implementing the four LWMPs rather than themselves. As Mr. Baxter, who was to become the first Chairperson of the Board of Murray Irrigation, recollected:

There was no doubt that the four individual CWGs developed a fair bit of ownership of what they were doing and desired to be themselves responsible for implementing the LWMPs. It was like “It’s our plan and we’ll implement it ourselves, thank you very much”. But they would never have been incorporated bodies, and that would have presented problems with managing the Government funds and so forth. And Murray Irrigation was going to be the entity that held the Supply License, the Operating License and the Pollution Control License. And a condition of those licenses was successful implementation of the LWMPs. It’s not that we didn’t trust those blokes, but we reckoned we’d need to have our foot on it. So a reasonably tense situation developed ...

Mr. Martin elaborated upon this account as follows:

[I]n the end Kelvin Baxter became a very strong advocate and had to go and sell the new company as the implementer. And he managed to sell it. But the Board⁷⁶ itself wasn’t necessarily fully trusted. People downstream in Deniboota and Wakool saw the Board as looking after Berriquin and not looking after them. There was this geographical attitude and the Board wasn’t held up by all irrigators as a panacea.

Eventually a mutually-acceptable compromise was reached. According to Mr. Baxter:

[It] was resolved in a common-sense way. ... [W]e ended up with the LWMPs all under the control of Murray Irrigation. And I say that only in an institutional sort of way. The framework still gave the CIGs plenty of room for local autonomy regarding local decisions about what was best for their area and their plans. Under the framework Murray Irrigation were responsible for the CIGs’ actions. We had to ensure that what they did in their plan areas was in the best interests of us complying with our licenses. Provided our aims were being satisfied there, they were, and still are, given a lot of latitude in how they implement the broad objectives of the LWMPs.

This arrangement seems to have worked out reasonably well. For instance, Mr. Liphuyzen remarked that a number of issues had led the Denimein CIG to:

... sort of come to loggerheads with Murray Irrigation. But I suppose Geoff McLeod, Murray Irrigation’s Environmental Manager, also has got to answer to the CIGs for the other LWMPs. He’s also got to answer back to Murray Irrigation. So when we try to push something through,

⁷⁶ This refers to the Irrigation Management Board (IMB) for the central-Murray region which the Government established under section 17 of the Water Resources Act. Mr. Martin commented that “The Department [of Water Resources] was directed [by Minister Causley] to give the Board a major say in the running of the irrigation districts, because the Government wanted to move toward privatisation”. Mr. Baxter was Chairperson of the IMB by the time that deliberations over local implementation of the LWMPs had begun.

we've got to have something that is workable and that we can all live with. So there has been a bit of compromise there. And Geoff's also got to ensure that the LWMPs are acceptable to LWMPAT as well. Whoever we had as the implementing body would have had the same onus on them. We've been happy enough with Murray Irrigation.

This account meshes well with Mr. McLeod's description of Murray Irrigation's experience with the arrangement:

From time to time, there has been inconsistency between the [Murray Irrigation] Board's desires and the desires of the CIGs. But I think that, in almost all cases, the differences have all been adequately resolved, albeit with a bit of pain. With some issues, I guess, the groups have wanted to take a more "softly, softly" approach to change. Individuals on the groups of course are going to be directly affected by some of that change. Obviously, they can influence the decisions that are made in their groups. Whereas the Board has a broader responsibility.

This account of the set of hierarchical relationships between the CIGs, Murray Irrigation and the NSW Government, together with the earlier account in section 6.5, accords with Ostrom's (1990) eighth design principle for long-enduring CPR organisations (see table 5.1) in so far as the governance activities at higher levels tend to complement or 'nest' those at lower levels rather than supplant them. It is consistent too with her sixth design principle to the extent that the formalised relationships between Murray Irrigation and the CIGs offer farmers local access to reasonably low-cost arenas for resolving disagreements regarding interpretation of the LWMPs or whether individual farmers are complying with them adequately.

However, it appears from the comments of a number of informants that there remains some way to go in satisfying this principle in respect of the so-called substitutions policy outlined in section 6.5 (which permits changes to the LWMPs subject to certain conditions). For instance, Mr. McLeod commented that:

One of my concerns has been that LWMPAT members see themselves as an umpire [of the substitutions process] from a whole of government approach, but have not set up any real process for direct interaction between what's happening at the regional level and themselves. ... [T]here still isn't any direct linkage between LWMPAT and the Regional LWMP Management Committee. ... From time to time I believe that the delay in getting decisions about substitutions from Government has been because they're just not confident about what they're being asked to decide on.

8.7 *Group-property governance of community compliance with the LWMPs*

The Heads of Agreement had the effect *inter alia* of devolving to Murray Irrigation the responsibility for ensuring that individual farmers within each of the four Districts satisfy collectively the on-farm requirements of the LWMPs. Nevertheless, it left the irrigator-owned company complete discretion as to how this might be achieved. The CMR-LWMP program in this way came to satisfy Ostrom's (ibid.) seventh design principle for long-enduring CPR organisations. This principle is concerned with CPR appropriators having rights to craft their own institutions which are recognised by higher authorities (see table 5.1).

Mr. McLeod characterised the strategy Murray Irrigation has applied in ensuring on-farm compliance as follows:

Our approach has been, first, education, second, encourage by incentives, third, make them aware that there are sticks in the cupboard and, fourth, you pull the stick out and use it. We hope that we don't have to get to the last stage. As a generalisation, we often see that people only do the wrong thing because they don't understand the impacts of what they are doing. We focus first on increasing landholders' awareness of the impact of their actions, or how they might change their actions to benefit others as well as themselves. Murray Irrigation has got the ultimate stick of being able to turn someone's water off. We seek to use that as sparingly as possible. ... But there are individuals who will always try and get around us. And anyone who does, by stealing water for example, is hit pretty hard. Their wheels are locked, and their irrigation allocations are debited. For farmers who grow rice on unsuitable soils, there are water penalties applied to them. For farmers who transgress our Total Farm Water Balance Policy, their following year's allocation is reduced.

Clearly, this is a strategy of graduated sanctions as discussed in sections 5.2.1 and 5.2.7.

The hope was that co-ownership by irrigators of the organisation responsible for intervening to ensure LWMP implementation, together with the dependence of this group-property regime (see section 6.8) and themselves on successful implementation, would make them more prepared to cooperate with interventions than if it were the Government, which historically they had mistrusted, that was intervening. Indeed, this hope appears from the comments of key informants to have materialised in significant degree. For instance, Tony McGlynn, who is an officer in head office of the DLWC, judged that locating responsibility for implementing the LWMPs with Murray Irrigation has been "very important in

getting real change on farms. You wouldn't be able to get it out of Government. It would be a 'dig in' situation". Consistent with this view, Berriquin Farmer One said that "I think now, as Murray Irrigation's shareholders, we can see that it has to take more responsibility for environmental management and that they've got to do something".

It seems also that irrigators are becoming aware that Murray Irrigation's responsibility for policing implementation has put the region's irrigation community in the position of being able to establish a positive environmental reputation for itself rather than merely attempt to avoid a bad reputation. Berriquin Farmer Two remarked accordingly that:

I personally feel it's better with Murray Irrigation doing it [making and policing the rules]. And it demonstrates to the Government that we are serious and that we are trying. It's no longer the Government chasing us around and saying "You're not doing the right thing". ... If we can collectively show through Murray Irrigation that we are trying, and that we're not going to tolerate people that do the wrong things, it must help us collectively. It's important that we look like we're trying to proceed down the right path, because there's a lot of negative feeling about irrigators.

In a similar vein, Mr. Baxter stated that:

I believe, and I say this to irrigators, "We should respect the responsibility we have been given as an organisation. Do we really want the Environment Protection Authority going up all the back lanes looking for problems? Or do we want to be responsible for finding out ourselves what's going on up those back lanes ourselves and nipping those in the bud? ... If we don't take our responsibilities seriously, we may well lose them. Then all the irrigators would be worse off".

Moreover, the comments received indicate considerable confidence that Murray Irrigation is more committed and successful in its attempts to expedite LWMP implementation by farmers than would be the case if Government were the responsible entity. For example, Mr. Jacob commented that:

[Y]ou now have a very environmentally-responsible irrigation entity ... compared with when the irrigation schemes were under government ownership. ... We've been surprised by how quickly the private entity in this case has picked up the resource management role.

Sandy Robinson, from the Murray-Darling Basin Commission, observed similarly from her experience with the CMR-LWMP program that "It's interesting that once you've got things down to an arrangement, communities tend to be tougher on themselves than they'll let government be with them".

Likewise, Mr. Hearn thought that Murray Irrigation has achieved far more in implementing the LWMPs than would be the case if the Government were still responsible. The company had introduced some tough policies in support of the LWMPs—including limiting average water application to four megalitres per hectare, and compulsory testing of soil suitability for rice growing—which he believed would have been beyond the political will and capacity of Government to introduce effectively. He claimed that around 15-20 per cent of farmers were upset by these policies. Mr. Lahy made a similar comment, observing that “It was a very difficult policy for Murray Irrigation to sell, and Geoff McLeod has borne much of the brunt of it”.

Nevertheless, the company cannot take for granted that the cooperation from most farmers it has enjoyed to date will continue. Ms. Robinson recalled confronting people in Murray Irrigation with this challenge by asking them “How do you not become ‘those bastards in town’ as opposed to ‘those bastards in Sydney’?” Mr. McLeod acknowledged that maintaining the trust and support of farmers depends on the company continuing to engage them actively in its policy-making deliberations. He claimed accordingly that:

The company does go out of its way to listen to what people are saying, not only to be seen doing it. When developing major policies we have on each occasion set up consultative committees of local landholders to develop those policies. Our Directors are democratically elected, so I guess that they are very much aware that if they ignore the views of their constituency they may not be on the Board the next time around.

In addition, as observed by Mr. Baxter, the SRIDC since privatisation has actively pursued a new “role of watchdog for the shareholders in respect of how Murray Irrigation operates”.

Due to these democratic checks and balances, a considerable degree of flexibility typically has been built into Murray Irrigation’s environmental policies in order to satisfy local norms of fairness. For instance, Berriquin Farmer Two remarked when discussing the policy limiting average water application:

I know it’s caused a bit of hardship to some of my friends. ... [But] no, I don’t think they feel that they’ve been treated unfairly. There are ways around it. If you do your whole-farm plan and start your drainage works, then Murray Irrigation will allow you to use more than four megalitres per hectare. You can then use up to six megalitres. They’ve restricted people, but they’ve also allowed people to get around it if they do the right thing.

In addition, Mr. McLeod explained that the company has sometimes used a “good cop, bad cop” strategy to deflect onto the Government any farmer resentment of its policies:

I guess we have created this fear of the Environment Protection Authority within our farmers' minds. We've stressed that they ultimately can shut us down. They can also take individual action against a grower rather than just Murray Irrigation. So that has helped us in getting them to focus on the issues.

A further interesting issue concerns the extent to which the status of irrigators as co-owners of the governance regime has made them more likely to help it meet its LWMP implementation obligations by applying to one another graduated sanctions of the kind that they use in other contexts to informally encourage adherence to local customs or norms. According to Mr. Baxter this new-found status has indeed made them:

... more likely to take action against fellow farmers [who abuse their rights to extract water from the irrigation supply channels] than they were before. Previously it was seen as the Government's water, and it was a bit of a sport trying to rip the Government off. But when it's your own system, then they are ripping you off.

However, it seems at this relatively early stage of the LWMP implementation process that any sanctioning by farmers in respect of one another's adoption (or lack thereof) of LWMP measures that does occur is mostly one-to-one through casually-proffered admiration or information. For instance, Berriquin Farmer Two commented that:

I don't encourage other farmers. But if someone says "You've done that. What do you reckon about that?", then I'm very happy to say "We've done these things and this worked and that hasn't worked". No, we don't go around telling people what they should or shouldn't be doing.

He added:

I don't think you are looked upon badly [by other farmers] if you don't do the things in the LWMP, because it's understood that it costs a lot of money to do it and so you might not be able to afford to do it. ... But if you do a good job on your farm I think people will think "He's done a good job on his farm". So perhaps that is a social kind of encouragement to follow the LWMP on your farm.

Similarly, when asked whether he thought there was social pressure on farmers to adopt LWMP measures, Berriquin Farmer Three responded "No, not at this stage. You get some pretty negative press ... But you really don't take an awful lot of notice of that".

Nevertheless, the following anecdote from Mr. Liphuyzen indicates that farmers can be prepared to exert peer pressure on one another in instances where there is an open lack of support for the CMR-LWMP program that they feel is unjustified:

We've had one or two people in the community that weren't overly enthused about the [Denimein] LWMP. ... And I've actually seen a classic case of social pressure down at the pub

here. One of them started going on about how he didn't like this and he didn't like that. Three other people turned around and pounced on him and made him shut up. He's actually in the process of doing a farm plan now, and moving ahead too.

Mr. Liphuyzen suggested as follows that peer pressure among farmers to adopt LWMP measures would strengthen with their increasing awareness of the costs of not doing so for the environment and the reputation of the region's irrigation industry: "As people become more aware, they will say 'Look at that fella there. He's ripping all his trees out. He shouldn't be doing that'". Berriquin Farmer One suggested another reason why peer pressure among farmers to adopt LWMP measures may strengthen with time: "As more and more farmers take it up, I think greater pressure will be brought to bear on the ones that aren't doing it". This possibility is consistent with Mr. Hearn's comment that:

The plan is very much alive in people's minds. There is lots of 'looking over the fence' to see what other farmers have done. It's like a 'domino effect'. One farmer's uptake of LWMP practices leads others to follow suit.

To the extent that peer pressure among farmers does strengthen with time, it seems likely that CIG members would find themselves with an important role in mediating this social process. As Mr. Hearn remarked, they naturally are the focus of day-to-day feedback from farmers about the LWMPs, including gossip regarding the activities of particular farmers. From this perspective they are similar to the 'public characters' that Jane Jacobs identified as vital for the exchange of feedback within inner-city neighbourhoods (see section 4.5.5).

As Knox *et al.* (2001) have observed from international experience, it is common for members of local communities to avoid the risk of endangering relationships with neighbours that sanctioning them directly may involve. In farming communities each relationship can constitute a vital portion of the social capital available to an individual for meeting needs such as help with emergencies and companionship. As Mr. Stewart observed, "[I]n the country ... if you alienate your neighbour you can't just go a hundred metres and find another one. That's it, you're boxed in".

8.8 *Concluding comments*

The foregoing qualitative analysis of collective action in the CMR-LWMP program indicates that trust indeed has been pivotal in influencing farmers' cooperation within this program. Accordingly, it seems to corroborate the second-generation core theory of collective action in this respect at least.

Moreover, the qualitative analysis has highlighted how the trust of farmers relevant to their cooperation within the program is multi-faceted. Thus the cooperation of individual farmers within the program appears to depend *inter alia* on their trust in (a) other farmers' preparedness to cooperate; (b) the authenticity of the community-participation process; (c) the District's CIG (and formerly CWG); (d) Murray Irrigation as their group-property regime; and possibly also (e) the NSW Government, particularly in respect of the LWMPAT.

The qualitative analysis indicated also a selection of structural variables that appear to substantively influence these facets of farmers' trust. Generally speaking, these variables are consistent with those identified as important in previous case studies of collaborative environmental programs. For instance, it is evident that the structural characteristics of the CMR-LWMP program are for the most part reasonably consistent with Ostrom's (1990) design principles for CPR organisations (see table 5.1).

One apparent exception relates to the sixth of these design principles, which requires that CPR "appropriators and their officials have rapid access to low-cost local arenas to resolve conflicts among appropriators or between appropriators and officials" (ibid. p. 90). Evidence indicating that the CMR-LWMP program is somewhat deficient in respect of this principle is presented at the end of section 8.6. This evidence suggests that a lack of 'hands on' interaction in the working relationship between the Sydney-based LWMPAT and the regional-level governance of the CMR-LWMP program is causing unnecessary decision-making delays within the program's implementation phase, and thus increasing its transaction costs.

The discussion in this chapter, together with the description of the case-study context in chapter six, has also highlighted the relevance for farmers' trust in this context of the classes of structural variables that Born *et al.* (2001) found had been identified repeatedly as affecting the performance of ICM programs (see table 7.1). Indeed, the case-study qualitative analysis has elaborated how these classes of variables link to the diversity of specific structural variables with which those responsible for administering the CMR-LWMP program must actually contend.

For instance, the discussion in section 8.2 identified particular reasons for the program's situational history of mutual antagonism and mistrust between the region's irrigators and the NSW Government. These reasons included: paternalistic attitudes of Government staff; divergent interests of farmers and the Government (e.g., regarding whether employment

generation should be an objective of irrigation-scheme governance); and the confrontational nature of irrigators' leadership in the past.

The pivotal role that a new generation of leadership played in allowing the CMR-LWMP program to circumvent lock-in of Government staff and farmers to the low-trust mental models inherited from this situational history was highlighted in section 8.3. Aspects of governmental leadership that seemed especially important in this case included:

- the senior position held by the person who became primarily responsible for the Government's leadership;
- this leader's willingness and capacity to 'champion' the program across Government; and
- this leader's willingness and capacity to build personal relationships with farmer leaders and to adopt a 'hands on' leadership style.

Moreover, the aspect of farmer leadership that appeared to be particularly critical in this case was the selection by farmers of a younger generation of leaders who were (a) relatively free of the 'baggage' associated with prior Government-irrigator conflicts, and (b) more prepared to adopt the longer-term perspective required to address their Districts' watertable-related problems.

A number of structural variables addressed by the CMR-LWMP program by way of attempting to overcome irrigators' inherited lack of 'epistemological trust' (see sections 5.2.4-5.2.5) in Government-initiated programs were identified in section 8.4. One such variable concerns the authenticity of the Government's commitment to collaborate with farming communities in developing and implementing the LWMPs. The commitment in this case does seem to have been authentic to a degree rarely found in Australian agri-environmental governance.

Another variable of this kind related to the location of responsibility for co-ordinating the collaborative process. The responsibility in this case was located with a specially-recruited Project Co-ordinator who was: independent of both the Government and the District communities; given office accommodation away from the Government offices; committed to the collaborative vision; and who had considerable experience and skills with which to motivate the District communities and Government towards the vision's fruition.

Organising the program's 'grassroots' community-participation strategy on the basis of small-sized discussion groups convened at places convenient for farmers seemed to be a

particularly important factor in gaining their epistemological trust. Attention to fairness in program deliberations was another structural variable that appeared to be important for gaining this kind of trust from farmers.

Section 8.5 of this chapter highlighted the significance for a community's trust in a program of collaborative governance of a decision regarding where organisational control of program resources should be located. Government retained this control during the plan-development phase of the CMR-LWMP program. This reportedly left considerable scope for some government staff to continue treating farmers paternalistically. One consequence of this was apparently an undermining of the contribution that community-Government collaboration elsewhere in the program was making to building trust by farmers in the Government. The program may therefore have been more successful in realising the collaborative vision if control over the resources for plan development had been located independently of the Government and the community (e.g., with the Project Co-ordinator).

The discussion in section 8.6 identified the important contribution that formally institutionalising the commitments by the community and the Government in respect of implementing the LWMPs made to providing mutual trust sufficient for the commitments to be converted into action. The formal institutions in this case were the Heads of Agreement and the associated licenses requiring that Murray Irrigation fulfil the community's commitments to LWMP implementation in order to remain in business. This is an impressive achievement given the comments in section 2.5.4 about how rare it has been for plans or strategies developed in ICM programs to proceed to implementation.

Notwithstanding the significance of formally institutionalising the CMR-LWMP program's implementation commitments, the discussion in section 8.6 indicated that farmers' trust in implementation by other parties continues to depend considerably upon their assessments of these parties' trustworthiness. These assessments seem to be based mainly on their personal interactions with these parties and on word-of-mouth. This indicates *inter alia* that organisations like Murray Irrigation and the LWMPAT would be well-advised to nurture their reputations in farmers' eyes if they are serious about fostering spontaneous cooperation by farmers in fulfilling their implementation commitments.

The significance for farmers' trust in the CMR-LWMP program of responsibilities for governance of on-farm implementation of the program having been devolved largely to Murray Irrigation was considered in section 8.7. The point had previously been made in

section 6.8 that this company effectively constitutes a group-property regime in respect of its role in ensuring on-farm implementation of the LWMPs. The discussion in section 8.7 indicated that farmers are more prepared to trust Murray Irrigation, as their group-property regime, in respect of governance of on-farm implementation than they would the Government. Accordingly, it seems that they are more prepared to cooperate with the former's on-farm implementation policies than the latter's. Indeed, in this case the devolution of authority to a group-property regime appears to have resulted in the introduction of markedly stronger policies in support of on-farm implementation than would otherwise have been possible.

Finally, the possibility that the devolution of authority to a group-property regime would lead farmers—as co-owners of that regime—to take a more active role in sanctioning one another's on-farm LWMP implementation was explored also in section 8.7. It seems that this effect has been weak so far, with the extent of 'first-party' sanctioning of this kind limited mainly to gestures of social approval to farmers who have made progress with on-farm implementation. Nevertheless, there is an expectation among some of the farmers and farmer-leaders interviewed that their peers will become more active in sanctioning one another's on-farm implementation once (a) the deadlines for meeting the collective on-farm targets loom closer, and (b) the momentum of on-farm implementation builds and reluctant implementers become fewer and more noticeable.

9. COOPERATION BY FARMERS IN IMPLEMENTING THE LWMPs ON-FARM

9.1 *Introduction*

This is the first of the two chapters anticipated in section 7.7.1 concerned with quantitative analysis of determinants of cooperation by individual farmers in respect of implementing the on-farm implementation requirements of the CMR-LWMP program. The focus in this chapter falls on analysing cooperation by individual farmers in terms of their own compliance with the on-farm requirements. This collective-action problem constitutes their first-order social dilemma. In chapter ten the focus shifts to analysing cooperation by individual farmers in relation to provision of the selective incentives that typically are required to solve first-order social dilemmas faced by large groups (see sections 3.2.1 and 4.3.2).

The purpose in each of these chapters is to better understand what motivates farmers in the study area to cooperate with attempts at collective action in respect of resolving agri-environmental problems they share in common. Hypotheses were drawn predominantly from the theory discussed in chapters three to five. As discussed in section 7.5, specification of the structural variables used to operationalise the theoretical constructs associated with these hypotheses was guided by the qualitative understanding of the case-study context obtained from the first phase of qualitative interviewing. Relevant excerpts from the qualitative interviews are included in this chapter to illustrate how some of the theoretical constructs of interest might apply to the CMR-LWMP program. In addition, the process of specifying structural variables was informed by the literature-based description of the case-study context presented in chapter six.

The present chapter comprises five main sections. In section 9.2 the structural variables included in the quantitative model are specified and the associated hypotheses are justified. Sample statistics for each of the structural variables are considered in section 9.3. The results from estimating the quantitative model by ordered-probit regression are discussed in section 9.4 prior to closing the chapter in section 9.5 with some concluding comments.

9.2 *Model specification*

In this section the quantitative model is specified and the associated hypotheses are justified.

9.2.1 *Dependent variables*

In analysing the determinants of individual farmers' compliance with the LWMPs, it was recognised that the on-farm compliance targets set in these plans were nearly always specified for farm businesses collectively (e.g., a total number of drainage recirculation systems to be installed across a District) rather than for each individually (see section 6.5). Hence the decision was taken to model compliance on an overall basis (i.e., as compliance generally with the applicable on-farm implementation targets) rather than in respect of each separate on-farm target. Moreover, many of the on-farm targets are long term, whereas implementation of the LWMPs commenced around five years ago. Accordingly, modeling farmers' *intentions* to comply generally was deemed more appropriate than modeling their compliance to date.

The dependent variable for this model, known as Intention to Comply, thus served as a proxy for actual compliance over the long term. This variable was measured by rating scores recorded in response to the following question⁷⁷:

How likely is it that your farm business will carry out all the applicable on-farm aspects of the plan within the next ten years?

The polar scores were 1 for “extremely unlikely” and 9 for “extremely likely”. The question recognised that not all on-farm aspects of a particular LWMP apply to every farm business. The emphasis of the question on the next ten years was intended to provide a time frame sufficiently concrete that respondents would consider not only their desire to comply with the LWMP when answering the question but also their capacity to comply given their foreseeable circumstances.

9.2.2 *Explanatory variables*

Compliance with a LWMP was hypothesised to be greater the more that farmers perceive that its implementation provides a collective good—primarily a reduction of the problems associated with shallow regional watertables (i.e., soil salinity and waterlogging)—is of

⁷⁷ Item L in the interview schedule (appendix B).

private importance to them. This follows from the proposition that individuals with less interest in a collective good tend to free ride more on the provision efforts of others (see section 3.2.1). Farmers in the study area vary in their risk of exposure to problems associated with shallow watertables as a result of differences between their properties in terms of elevation, soil type, enterprise mix, and so on. The hypothesis was tested by including an explanatory variable, known as Private Benefit, in the model. The variable was measured by reverse-scoring responses to the following seven-point rating item⁷⁸:

How do you regard the following as threats to the long-term viability of your farm business? ...
Salinisation and waterlogging if the plan is not successfully carried out⁷⁹.

The possibility that compliance by farmers is also motivated in part by ‘off-farm’ benefits that they expect to result for their wider community was tested by including a variable, known as Community Benefit, that was measured by the rating item following:

The long-term viability of our district’s community would really be improved if everyone successfully carried out their parts of the plan⁸⁰.

This hypothesis need not contravene rational-choice theory’s assumption that all motives derive from pursuit of self interest. Contributing to community viability often confers private benefits as well, although recognition of this is sometimes obscured by individualistic mental models.

For instance, Gerard Lahy recalled in his in-depth qualitative interview how in some cases farmers in the Wakool District were reluctant to agree with aspects of the plan which would involve them cross-subsidising other farmers. In these cases he, as Chairperson of the CWG, would remind them of their wider self-interest by saying things like “When you want to sell your farm, would you want prospective buyers driving through wasteland to get to your place?” or “Do you want to end up drinking in the pub on your own?”. Gerard’s experience accords with the observation of Wondolleck *et al.* (2000) that the mental models of individuals are not necessarily conducive to them recognising when their interests are interconnected.

Moreover, as was noted in section 4.5.2, experimental evidence supports the notion that group identity can emerge from interactions, especially face to face, among a group’s members so that they come to regard one another’s interests more highly when identifying

⁷⁸ That is, raw scores of 1, 2, 3 were rescored as 9, 8, 7 respectively.

⁷⁹ Item *t2* in the interview schedule. This was one of seven threats listed in relation to the same question. The descriptor for the negative pole was “no threat at all” and for the positive pole it was “a very serious threat”.

their own interests. To the extent that group identity exists within a community, therefore, it can be self-interestedly rational for individuals to be motivated by benefits of their actions that spill over to others in their community. This may indeed be the case in the CMR-LWMP program judging from Peter Stewart's observation in his in-depth interview that:

... [T]hey do see themselves as being in a community. You belong to the Berriquin Irrigation District, you know, or the Denimein Irrigation District. And they socialise with each other. Denimein farmers go to the Pretty Pine Hotel, and Berriquin farmers go to the pub at Blighty or whatever. So there is that commonality of values, a sense of belonging, for all those four communities. And they were being beset by similar problems too, of rising watertables and salinity starting to creep in, and waterlogging. So they developed a common sense of purpose in dealing with it. And I think that was fairly strong at the beginning. But once the problem became real clear, once it became "This is what it's like, the way it's going to be", a real sense of shared purpose developed I think.

Aside from differences between farmers in how much they expect to benefit privately from watertable-related problems being reduced, they are heterogeneous too in the extent to which they perceive themselves as facing a social dilemma in addressing those problems. That is, they differ in their perceptions of how much they depend on cooperation from others in addressing their own watertable-related problems. For instance, depending on local transmissivity of shallow groundwater, farm businesses differ in the extent to which LWMP compliance by themselves confers private benefits as against spillover benefits to neighbours⁸¹.

The comparative-static approach to rational-choice analysis of collective action suggests that the greater the social dilemma faced by an individual in providing a good (i.e., the smaller the share of the benefits from providing a good that the provider expects to be able to capture), the less will be the individual's contribution to provision, *ceteris paribus* (Olson 1965). This hypothesis was tested by including two variables in the model accounting for each respondent's perceived exposure to a social dilemma. The first of these variables measured the extent to which respondents perceive that their on-farm benefits of LWMP compliance depend on how others (farmers and non-farmers) comply. This variable, called

⁸⁰ Item p5 in the interview schedule. The poles were "very far from my view" and "very close to my view".

⁸¹ Other farm circumstances can also have a strong influence on the private costs and benefits associated with particular on-farm LWMP measures. For instance, the marginal private value of water savings obtained as a result of installing a drainage recirculation system tends to be greater for farmers with lower irrigation entitlements (Marshall *et al.* 1997).

Dependence, was developed as a summated scale derived as the mean score for the three rating items that follow⁸²:

- The benefits on our farm of following the plan depend at least partly on what other farmers do;
- The benefits on our farm of following the plan depend at least partly on what is done with the plan off-farm; and
- The long-term viability of our farm would really be improved if everyone successfully carried out their parts of the plan.

The composition of this scale was suggested by Principal Components Analysis⁸³. Cronbach's Alpha for the scale is 0.64, indicating that its internal consistency reliability is acceptable⁸⁴. This variable was hypothesised to be related negatively with respondents' LWMP compliance.

The second of the two variables concerned with farmers' perceived exposure to a social dilemma measured the degree to which respondents perceived that their own compliance would be privately worthwhile regardless of how others comply. This variable, called Independence, was based on the rating item following:

- There would be worthwhile benefits to us from following the plan even if no one else followed it⁸⁵.

As this variable measured freedom from a social dilemma, it was hypothesised to have a positive relationship with compliance.

It was highlighted in chapter four how second-generation developments in the rational-choice theory of collective action have identified trust as a pivotal determinant of uptake of reciprocity strategies which, in turn, can allow large-group cooperation to emerge spontaneously within social dilemmas. It is reasoned in this emerging second-generation theory that the more group members trust one another, the more likely they are to be 'brave' enough to expose themselves to the risk of being exploited that is entailed in following a strategy of reciprocity. If this were the only kind of trust-dependent strategy open to the

⁸² Items *p1*, *p2* and *p4* in the interview schedule, respectively.

⁸³ Principal Components Analysis was used to ensure that the items to be combined in a summated scale do actually measure the same underlying concept—so that the summated scale is uni-dimensional (de Vaus 1995).

⁸⁴ Reliability of the items intended for inclusion in a summated scale often cannot be tested directly due to the difficulty of getting interviewees to answer the same questions on two separate occasions. An alternative approach that is commonly used is to measure the overall reliability of the scale by examining the consistency of an interviewee's response on each item compared to each other item intended for the scale (de Vaus 1995). This is referred to as 'internal consistency reliability' and is most commonly measured by Cronbach's Alpha. An Alpha score of zero indicates zero reliability while a score of one indicates perfect reliability. The reliability of a researcher-designed scale is generally considered acceptable if Alpha exceeds 0.6 (Cooksey 1997).

⁸⁵ Item *p3* in the interview schedule. The poles were "very far from my view" and "very close to my view".

farmers, then their LWMP compliance could reasonably be expected to relate positively with their level of trust that others would comply, *ceteris paribus*.

However, ‘free-riding’ is another trust-dependent strategy that is available to these farmers. With this strategy the effect of trust is opposite to that with reciprocity. That is, the more that free riders trust others to comply, and thus the more they expect their problems to be solved regardless of their own actions, the more they can be expected to stint in their own compliance. It follows that the effect of trust on preparedness to cooperate is indeterminate *a priori*. Accordingly, it was hypothesised only that the parameters of the structural variables discussed below—each of which relating to different facets of farmers’ trust pertinent to their LWMP compliance—differ from zero.

For individual farmers, the most significant ‘others’ with which they share social dilemmas in implementing the LWMPs are other farmers, Murray Irrigation, and government (i.e., the NSW and Commonwealth Governments). It was observed earlier in the qualitative analysis reported in chapter eight that farmers’ trust in Murray Irrigation and the NSW Government may indeed be important for their LWMP compliance decisions.

Trust in other farmers complying with the LWMPs was measured by the variable Trust in Other Farmers which was measured by responses to the following rating item⁸⁶:

Most farmers are committed to following the plan.

Trust in Murray Irrigation complying was measured by the variable Trust in Murray Irrigation. This was measured by the rating item following⁸⁷:

Murray Irrigation is committed to following the plan.

Finally, trust in government complying was measured by the variable Trust in Government. This was measured as a summated scale comprising the three rating items that follow⁸⁸:

Local staff of government departments are committed to following the plan.

Head offices of government departments are committed to following the plan.

Government ministers are committed to following the plan.

The composition of this scale was suggested by Principal Components Analysis. The Cronbach’s Alpha statistic of 0.82 indicates that the scale has a good level of internal consistency reliability.

⁸⁶ Item *m2* in the interview schedule. The poles were “very far from my view” and “very close to my view”.

⁸⁷ Item *m5* in the interview schedule. The poles were “very far from my view” and “very close to my view”.

⁸⁸ Items *m6*, *m7* and *m8* in the interview schedule. The poles for each item were “very far from my view” and “very close to my view”.

While these three variables are concerned with the degree to which individual farmers trust that other parties are *committed* to complying, it was expected that compliance by farmers would be influenced also by their degree of trust that their District's LWMP will *actually be implemented*. This more pragmatic facet of their trust was measured by the variable Trust in Implementation that was measured by the rating item following⁸⁹:

The overall plan will be successfully carried out inside the scheduled time.

The possibility that farmers' trust in people generally—that is, extending beyond the cast of actors associated with their watertable-related problems—has an influence on their LWMP compliance that is not captured by the facet of trust associated with the variables discussed above was explored by including in the model a variable called Trust Generally. The possibility that the less-personal sources of trust (e.g., mass media and formal education) with which this variable is concerned are becoming more important as modernisation proceeds was discussed in section 4.5.7. This variable was measured by the following rating item which was based on the item measuring trust in the questionnaire for the *World Values Survey 1995*⁹⁰:

Most people can be trusted.

The influence of social norms of fairness on individuals' willingness to participate in collective action was highlighted in section 5.2.7. The implication is that individuals are more likely to cooperate with rules for collective-good provision the more that they perceive (a) the process of deciding those rules, and (b) the distributive effects of the rules, to be fair. The possibility that these tendencies are at work in relation to farmer compliance with the LWMPs—a possibility reinforced by the qualitative case-study analysis presented in section 8.4—was investigated by including three fairness-related variables in the model. Each of these was hypothesised to relate positively with farmer compliance.

Two of the variables are concerned with perceptions of procedural fairness—that is, of the fairness of the processes of making decisions during the plan-development and plan-implementation phases of the CMR-LWMP program, respectively. These variables are called

⁸⁹ Item *m10* in the interview schedule. The poles were “very far from my view” and “very close to my view”.

⁹⁰ Item *i1* in the interview schedule. The poles were “very far from my view” and “very close to my view”. The wording of the item in the *World Values Survey* is: “Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?”. A derivative question asked by Onyx *et al.* (1997) was: “Do you agree that most people can be trusted?”

Procedural Fairness (Planning) and Procedural Fairness (Implementation). The rating items used to measure them were, respectively⁹¹:

How satisfied were you with chances to influence what went in the plan? and

How satisfied are you with chances to influence how the plan is carried out?

The third variable in the set relates to farmers' perceptions of distributive fairness—specifically in respect of how they judge the fairness of their own share of the total costs of LWMP implementation. This variable, known as Distributive Fairness, was measured by the rating item that follows⁹²:

How fair is your farm's share of the costs of carrying out the plan?

It was observed in section 4.4.2 how laboratory experiments have indicated that substantial proportions of people seem emotionally predisposed to interpret deviations from reciprocity norms as hostile acts that deserve to be punished and to interpret the resulting resentment as constituting a credible threat of punishment. In section 4.4.5 it was noted that peer pressure of this kind is an important source of enforcement of social norms more generally. The case-study qualitative analysis reported in section 8.7 indicated that peer pressure in respect of farmers' LWMP compliance may indeed be operative in the case-study setting. At this stage this peer pressure seems in most cases to be applied fairly mildly—through compliance earning social approval rather than non-compliance provoking social disapproval—although some key informants anticipated that the latter form of peer pressure will become more common as deadlines for meeting targets draw nearer.

Accordingly, a variable was included in the model to test whether peer pressure, either as social approval or disapproval, is currently influencing farmers' intentions to comply with the LWMPs. This variable, called Peer Pressure, was concerned with the extent to which farmers care about how they are regarded by other farmers. The rating item used to measure this variable, after reverse scoring, was⁹³:

I really don't care if other farmers respect me or not.

This variable was hypothesised to be positively related with farmer compliance.

A further variable that has received considerable attention in the literature on the economics of collective action is the net wealth of group members. Olson's (1965) argument referred to earlier in this section—that members of a group with greater interest in the provision of a

⁹¹ Items *B* and *E* in the interview schedule, respectively. The poles were “not satisfied at all” and “completely satisfied”.

⁹² Item *J* in the interview schedule, respectively. The poles were “very unfair” and “very fair”.

collective good are likely to contribute disproportionately more to provision of a collective good than members with a lesser interest—has been interpreted as meaning that wealthier members will tend to contribute disproportionately more than poorer members (e.g., Sandler 1992). This suggests that wealthy members are more likely to cooperate in collective action than poor members.

However, this argument presumes that the interest of a group member in the group obtaining a good through collective action is proportionate to his or her net wealth, and this is not necessarily the case (Cardenas 2000). Indeed, it has been suggested that wealthier individuals are more likely to satisfy their needs through relatively impersonal market exchanges than through collective action which by its nature relies more on developing and maintaining interpersonal connections (Bowles 1998). This indicates too that wealthier members of a group may be less likely to enter a social dilemma following a norm of reciprocity than less-wealthy members, thus making the former less likely to cooperate. As Cardenas (2000 pp. 35-36) has observed:

If wealth increases the fraction of people's transactions that are based on markets, their experience in social exchange is more influenced by competitiveness and self-regarding behavior than the experience of those whose income is more dependent on relating to others through collaboration, sharing and other cooperative traits.

A further consideration in respect of the relationship between the net wealth of individuals and their propensity to cooperate is that cooperation usually entails significant risks. There is the risk that one's cooperation will not be reciprocated, as well as the risk that the problem being addressed collectively will not be solved even if everyone cooperates in implementing the agreed solution (e.g., the risk that watertable-related problems in the study area will persist regardless of whether the LWMPs are successfully implemented). To the extent that individuals are less averse to risk the wealthier they are⁹⁴, it might therefore be expected that the likelihood of individuals cooperating in collective action will increase with their net wealth, *ceteris paribus*. Consistent with this proposition, Gifford *et al.* (1997 p. 171) commented that “very needy harvesters are likely to defect and to defend their lack of cooperativeness in terms of survival”. Nevertheless, they commented that there is little empirical evidence for this proposition in the collective-action literature.

⁹³ Item *i6* in the interview schedule. The poles were “very far from my view” and “very close to my view”.

⁹⁴ Anderson *et al.* (1977) noted that this assumption tends to be intuitively appealing to economists. Moreover, empirical research by Pope *et al.* (1991) suggests that this assumption is valid for farmers, at least those in the USA.

Another pertinent consideration is that the cost of financing the actions entailed by cooperation may be higher for people with lower net wealth—for instance, if providers of relatively low-cost credit regard them as ‘unacceptable risks’ and they would thus be forced to rely on providers of higher-cost credit. This possibility is consistent with Quiggin’s (2001 p. 83) reasoning that: “Farmers in financial difficulty face high effective discount rates, and are therefore more likely to adopt unsustainable farming practices”.

It is evident therefore that there is no consensus in the collective-action literature regarding the effect that an individual’s net wealth is likely to have on his or her preparedness to cooperate in providing a collective good. Hence in this study it was hypothesised only that the parameter of the variable representing net wealth in the model differs from zero. Since the limited time available for each interview precluded obtaining the data required to calculate the net wealth of each farm business, respondents’ perceptions of the long-term viability of their business were used as a proxy measure. The resulting variable, known as Business Security, was measured by the following rating item⁹⁵:

How secure is the long-term viability of your farm business?

The effect that the age of group members has on their preparedness to act cooperatively in social dilemmas appears to have received little attention in the collective-action literature. Nevertheless, it seems that age could be relevant given that the epoch into which people are born typically has considerable consequences for their life experiences and thus their likelihood of acquiring certain values and social norms. Age also influences individuals’ social networks and thus their capacity to obtain the feedback required to establish the trust they need to embark on cooperative ventures. Furthermore, the conventional view in the agricultural extension literature is that older farmers are more risk averse (Abadi Ghadim *et al.* 1999). This would suggest that they might be less likely to take part in cooperative ventures given the risks involved.

However, once the two earlier age-related considerations are taken into account, it would appear that the direction of the effect of the age of farmers on their likelihood of acting cooperatively by complying with their District’s LWMP is ambiguous. Hence the parameter for this variable, called Age, was hypothesised only to differ from zero. Observations were

⁹⁵ Item 5 in the interview schedule. The poles were “very insecure” and “very secure”.

obtained by asking respondents for their year of birth and afterwards calculating their age in years⁹⁶.

Finally, the three dummy variables discussed in section 7.7.5—Interviewer Dum1, Interviewer Dum2 and Interviewer Dum3—were included in the model to control for the possibility of compliance bias associated with different subsets of interviewers.

9.3 *Sample statistics for model variables*

Sample statistics for each of the (non-dummy) variables discussed above, together with their hypothesised coefficient signs, are presented in table 9.1.

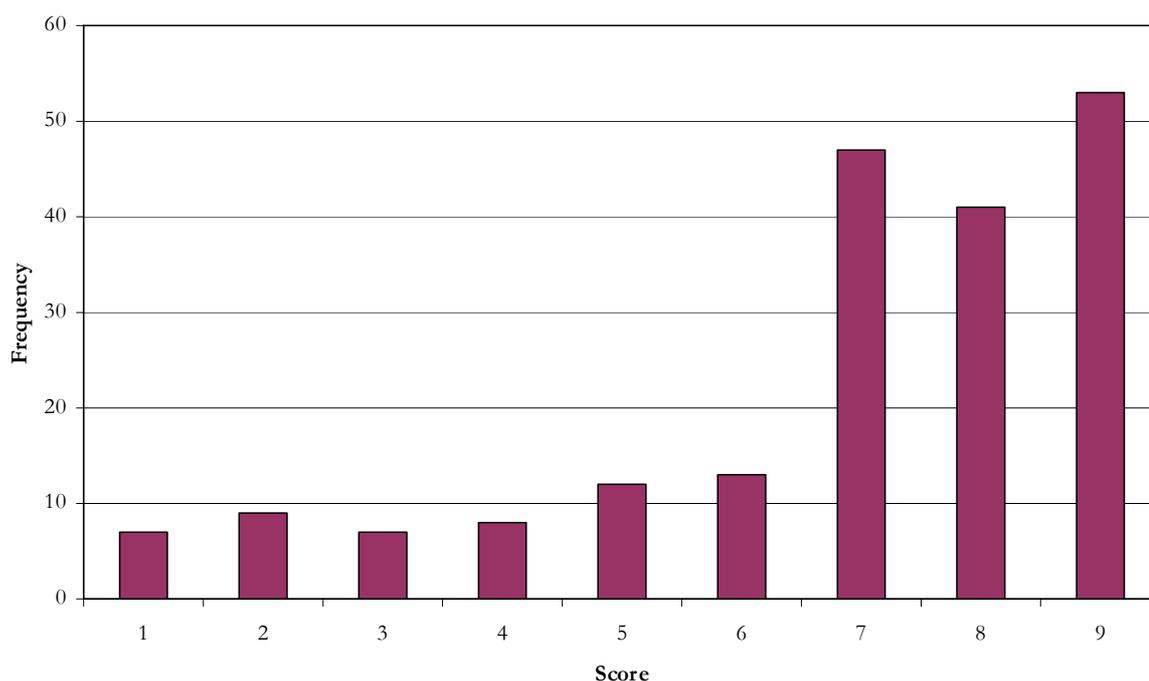
Table 9.1: Sample statistics and hypothesised coefficient signs for the Intention to Comply model

Variable	No. of observations	Mean	Standard deviation	Hypothesised sign
Intention to Comply	197	6.9	2.2	n.a.
Private Benefit	229	6.6	2.6	+
Community Benefit	213	7.7	1.5	+
Dependence	215	6.3	1.8	-
Independence	212	7.0	2.0	+
Trust in Other Farmers	190	6.1	1.6	?
Trust in Murray Irrigation	202	7.9	1.1	?
Trust in Government	190	6.1	2.0	?
Trust in Implementation	197	5.0	2.3	?
Trust Generally	223	6.2	2.0	?
Procedural Fairness (Planning)	163	6.1	2.3	+
Procedural Fairness (Implementation)	167	5.4	2.3	+
Distributive Fairness	200	5.9	2.2	+
Peer Pressure	219	6.1	2.8	+
Business Security	217	5.9	2.0	?
Age	228	48.8	12.0	?

The sample mean of 6.9 for the dependent variable, Intention to Comply, indicates that the average farm business in the study area has a reasonably strong intention to comply fully with the applicable on-farm aspects of its District’s LWMP. Moreover, the frequency distribution of sample scores for this variable, as shown in figure 9.1, exhibits strong negative skewness. Hence of all the observations for this variable, 71.6 per cent lie in the upper third of possible scores (7 to 9 inclusive) and 11.7 per cent lie in the lower third of possible scores (1 to 3 inclusive)(see table 9.2). As encouraging as this might seem, it suggests also that the on-farm compliance targets for the LWMPs will be less than fully

⁹⁶ Item AA in the interview schedule.

Figure 9.1: Frequency distribution of scores for Intention to Comply



achieved unless farmers with weak intentions to comply come to find themselves subject to stronger selective incentives—formal, informal or both—than is currently the case.

Looking at table 9.1, of the explanatory variables measured by rating items the sample means for all but one lie above the midpoint value of five. The exception is Trust in Implementation, for which the sample mean equals the midpoint value. It seems that the average farm business is ambivalent indeed about whether its District’s LWMP will be implemented on time (despite being more positive about the commitment of others to complying with the LWMPs—see below).

It is noteworthy that the sample mean for Community Benefit exceeds that of Private Benefit. This might be taken to suggest that the average farm business views implementation of the LWMPs as more important for the viability of its community than for its own viability. Indeed, the case-study qualitative evidence presented in section 9.2.2 in respect of this variable suggests that many farmers in the LWMP Districts do value highly the community benefits from LWMP implementation.

The sample mean of 6.3 for Dependence indicates that the average farm business perceives that the private benefits to be received from its LWMP compliance depend moderately on the compliance by other parties. Even so, the sample mean of 7.0 for Independence suggests that the average farm business is reasonably confident that the private benefits from complying

will exceed the private costs even if no other parties comply. This result is of course influenced by the grants and rebates provided to farmers under the CMR-LWMP program for various aspects of on-farm compliance.

Wilcoxon signed-rank tests confirm what is indicated by comparing the sample means for Trust in Murray Irrigation, Trust in Other Farmers, and Trust in Government—that the population score for the first of these variables is significantly greater than for the other two variables ($p < 0.001$ for each comparison, two-tailed)⁹⁷. Hence it seems that the average farm business is more confident that Murray Irrigation is committed to complying with the LWMPs than either government or other farmers. Since the sample means for Trust in Other Farmers and Trust in Government are about the same as for Trust Generally, the average farm business does indeed seem to place a relatively high degree of trust in the commitment of Murray Irrigation to LWMP compliance. This accords with the qualitative evidence presented in section 8.7 to the effect that farmers have become considerably more prepared to accept regulation by Murray Irrigation than had been the case when the responsibility for regulating farmers individually resided with Government.

The sample mean of 6.1 for Peer Pressure indicates that the average farm business is only moderately sensitive to whether other farmers approve of it. The sample means of 6.1, 5.4 and 5.9 for Procedural Fairness (Planning), Procedural Fairness (Implementation) and Distributive Fairness respectively suggest that the average farm business is only moderately impressed by the fairness of the decisions made in the CMR-LWMP program and of the decision-making process itself. Nevertheless, the case-study qualitative evidence discussed in chapter eight suggests that this may be a better result than would have been found if the watertable-problems had been dealt with in the top-down manner that had preceded the CMR-LWMP program.

The Wilcoxon signed-rank test indicates that scores for Procedural Fairness (Planning) are significantly higher than for Procedural Fairness (Implementation) ($p < 0.001$, two-tailed). This result might have been expected given that the implementation phase has seen Murray Irrigation showing some courageous leadership by introducing some LWMP-related policies

⁹⁷ An advantage of measuring variables using rating scales is that it allows comparison of the scores of variables measured using the same scale. For instance, many of the variables in this study were measured by nine-point scales with the negative pole denoted by 'very far from my view' and the positive pole denoted by 'very close to my view'. In comparisons of this nature, the scores for the different variables come from the same individuals but under different contexts (in this case different questions). Hence the samples for the different variables are related. When the variables of interest are also measured by an ordinal scale, the test usually recommended is the Wilcoxon signed-ranks test (Cooksey 1997).

that have caused considerable controversy among farmers. This reinforces the conclusion in section 8.8, based on the qualitative analysis, that Murray Irrigation should not take for granted its reputation for trustworthiness among farmers.

The sample mean of 5.9 for Business Security is not far above the midpoint score of five. Hence it seems that the average farm business is not overly confident regarding its long-term financial viability.

The mean age of farmers in the sample is almost 49 years. This compares with the estimate by Garnaut *et al.* (1999) that the average age of owner-managers in Australian broadacre farming in 1997-98 was 52 years⁹⁸. Moreover, it is notable that the distribution of farmer ages in this study's sample exhibits positive skewness. The median age is 47 years and the lower and upper quartiles are 40 years and 57 years, respectively. The range of farmer ages extends from a minimum of 21 years to a maximum of 81 years.

A preliminary indication of whether the hypotheses detailed in section 9.2.2 (and summarised in table 9.1) are supported by the sample data is provided by table 9.2. Preparation of this table involved first allocating each farm business in the sample to one of three subsets depending on whether its score for the Intention to Comply variable fell in the range of 1-3, 4-6, or 7-9. This allowed sample means to be calculated for each of the three resulting subsets of farm businesses in respect of each explanatory variable.

The explanatory variables for which the direction of change in sample means is uniform across the subsets (in fact, positive in each case), as well as consistent with the hypothesised coefficient sign, are Trust In Implementation, Trust Generally, Distributive Fairness, Peer Pressure, Business Security and Age. The hypotheses for Trust in Other Farmers, as well as Trust in Murray Irrigation, are supported less convincingly since in each case the sample means for the first two subsets are the same.

For each of the remaining explanatory variables, except Trust in Government, the sample mean for the second subset is less than the sample means of both the first and third subsets. The non-uniform way in which the sample means change between subsets for these variables might be taken as preliminary evidence that the hypotheses associated with them are not supported by the sample. In the case of the Trust in Government variable the sample means

⁹⁸ This is their preferred estimate, based on estimates using only sample farms new to their survey. Their sample of broadacre farms includes dryland as well as irrigated broadacre farms.

Table 9.2: Preliminary assessment of the model for Intention to Comply

	<i>Score ranges for Intention to Comply:</i>		
	1-3	4-6	7-9
	<i>Percentage of observations in each range:</i>		
	11.7 %	16.8 %	71.6 %
	<i>Explanatory variable mean when score for Intention to Comply lies in each range:</i>		
<i>Explanatory variable:</i>			
Private Benefit	5.9	4.3	5.5
Community Benefit	8.2	7.1	8.1
Dependence	6.9	5.7	6.5
Independence	6.8	5.1	7.2
Trust in Other Farmers	6.1	6.1	6.3
Trust in Murray Irrigation	7.5	7.5	7.9
Trust in Government	6.2	6.2	6.2
Trust in Implementation	3.0	4.2	5.7
Trust Generally	5.6	6.1	6.4
Procedural Fairness (Planning)	6.0	4.9	6.5
Procedural Fairness (Implementation)	5.1	4.9	5.3
Distributive Fairness	4.6	5.4	6.5
Peer Pressure	5.2	6.5	6.6
Business Security	4.6	5.9	6.2
Age	46.7	49.6	49.8

are the same for all three subsets, again providing a preliminary indication that the associated hypothesis lacks support from the sample.

Clearly, this preliminary examination lacks the sophistication of regression analysis in so far as it (i) aggregates data prior to analysis rather than analysing individual observations, and (ii) fails to control (as regression analysis does) for other variables in the data set the effects of which could be disguising the relationships that this examination sought to explore.

9.4 Results

The results of ordered-probit estimation of the model for Intention to Comply are presented in this section. First, the statistical support given by the estimated model for the various hypotheses detailed in section 9.2.2 is considered. Next, the substantive influence of the various explanatory variables on Intention to Comply is discussed. The implications of these results are elaborated in each case.

9.4.1 Coefficients and their statistical significance

The estimated model for Intention to Comply is presented in table 9.3⁹⁹.

Table 9.3: Estimated model for Intention to Comply

Explanatory variables	Estimated Coefficient	p value	Sig.
Private Benefit	-0.02	0.270	
Community Benefit	0.19	0.005	***
Dependence	-0.05	0.217	
Independence	0.02	0.349	
Trust in Other Farmers	-0.18	0.004	***
Trust in Murray Irrigation	0.23	0.005	***
Trust in Government	-0.08	0.114	
Trust in Implementation	0.15	<0.001	***
Trust Generally	0.11	0.012	**
Procedural Fairness (Planning)	-0.01	0.406	
Procedural Fairness (Implementation)	-0.03	0.277	
Distributive Fairness	0.12	0.001	***
Peer Pressure	0.06	0.012	**
Business Security	0.10	0.010	***
Age	0.00	0.996	
Interviewer Dum1	0.09	0.680	
Interviewer Dum2	0.49	0.061	*
Interviewer Dum3	0.17	0.642	
μ_1	2.20		
μ_2	2.74		
μ_3	3.00		
μ_4	3.25		
μ_5	3.55		
μ_6	3.81		
μ_7	4.59		
μ_8	5.28		
Pseudo R ²	0.37		

Note: *, **, and *** indicate that the hypothesis associated with the explanatory variable is supported at the 0.10, 0.05 and 0.01 levels of confidence, respectively.

⁹⁹ A pervasive problem with multiple regression using social-survey data concerns missing observations. With missing data scattered across cases and variables, deletion of cases with data missing for one or more variables would in this study have meant substantial loss of the data obtained for the remaining variables. Furthermore, unless cases with missing data can safely be assumed to be a random subset of the full sample, then deleting these cases biases the sample (Tabachnick *et al.* 1989). Given these problems, a strategy often employed is to regress a variable with missing data against other variables in the data set, using only cases with complete data. The estimated model is used to predict the data missing for the dependent variable. This strategy was followed in estimating this model (as well as the models discussed in chapter ten). The Missing Value Analysis facility provided in SPSS software was utilised for this purpose (SPSS Inc. 1998).

Goodness of fit for the model is reasonable given the use of cross-sectional data (pseudo $R^2 = 0.37$). No suggestion of substantive multicollinearity between explanatory variables was found.

The hypothesised positive influence of Private Benefit on LWMP compliance by farmers is not supported in the estimated model. This is notable given that private gain, or profit, is normally presumed by economists to be a pivotal criterion by which farmers make business decisions. However, the private benefit from mitigating watertable-associated problems—with which the Private Benefit variable is specifically concerned—does not account for all of the private benefits to farmers from LWMP compliance.

Some of the on-farm actions associated with compliance confer sizable private benefits also by augmenting farmers' water availability (e.g., installation of on-farm water storages allowing off-season flows in irrigation channels to be harvested) or by allowing farmers' existing water allocations to be used more efficiently (e.g., installing drainage recirculation systems and converting paddocks to optimal gradients through laser-controlled landforming). It is possible, therefore, that farmers' LWMP compliance is influenced positively by these 'private side-benefits' even if it seems not to be motivated by the watertable-related private benefits more directly relevant to the stated focus of the LWMPs.

The hypothesis that Community Benefit positively affects farmer compliance is supported at the 0.01 level. This suggests scope for increasing this compliance by strengthening farmers' 'sense of community' or 'group identity' (e.g., by providing further opportunities for face-to-face contact) and/or by raising their appreciation of the benefits that flow to their local community and in turn back to themselves (e.g., by awareness-raising activities).

The hypothesised negative effect of Dependence on farmer compliance is not supported by the estimated model—and neither is the hypothesis that Independence positively affects compliance. Therefore, contrary to what the rational-choice theory of collective action predicts, it seems that compliance by farmers in this case is not inversely related with the extent to which they perceive it to involve a social dilemma. Why this is the case is an intriguing question that cannot be answered confidently without further research.

The answer may have something to do with effects of social norms that are not accounted for in the model. For instance, a promise-keeping norm may be at work in so far as farmers in

each District have collectively promised—both at public meetings and through leaders acting on their behalf—to comply with what the District’s LWMP requires of them. Farmers who follow a promise-keeping norm would be expected to take into account strategic considerations, such as perceived degree of exposure to a social dilemma, when deciding whether or not to enter into such promises. If they decide in the affirmative then the strategic considerations would become irrelevant to subsequent compliance choices.

The estimated model indicates that trust by individual farmers in the LWMP compliance of others is influential in respect of their own compliance. The estimated coefficients of three of the five trust-related explanatory variables (i.e., Trust in Other Farmers, Trust in Murray Irrigation, and Trust in Implementation) differ from zero at the 0.01 level of significance. The estimated coefficient of a fourth trust-related explanatory variable (i.e., Trust Generally) differs from zero at the 0.05 level of significance. Only the estimated coefficient for Trust in Government was found not different from zero at the 0.10 level of significance (and then only to miss out narrowly).

The estimated coefficient for the Trust in Other Farmers variable has a negative sign. In respect of on-farm LWMP compliance, therefore, few farmers seem to be mutually interacting according to the reciprocity that second-generation collective-action theory suggests is required if they are to cooperate more spontaneously with one another in ensuring that the on-farm targets are satisfied. Rather, it would appear that they are predominantly following a norm of free riding. This norm and the non-cooperation resulting therefrom are mutually reinforcing in so far as they undermine the trust-building among farmers that needs to occur in this context for sufficient of them to risk the reciprocity needed to begin a virtuous cycle of cooperation.

The estimated coefficients of the remaining trust-related explanatory variables found to be statistically significant at the 0.10 level or better have positive signs as would be expected if the farmers were guided by reciprocity in their compliance choices. Thus farmers seem more likely to comply with the LWMPs the greater their trust (a) in Murray Irrigation fulfilling its commitments to ensuring the implementation of the LWMPs, (b) in overall compliance being sufficient to ensure that LWMP implementation proceeds on schedule, and (c) in people generally.

The hypothesised positive effects of Procedural Fairness (Planning) and Procedural Fairness (Implementation) on farmer compliance are not supported by the estimated model. In

contrast, the hypothesis that Distributive Fairness is positively related with farmer compliance is supported at the 0.01 level of significance. Nevertheless, it seems pertinent here to consider Syme's (1991) remark that perceptions of procedural and distributive fairness easily become intertwined. Thus farmers who assessed the decision-making process of the CMR-LWMP program as fair may have been more likely to assess the distributive outcomes of that process as also fair. Consequently, these results do not rule out the possibility that procedural fairness in the CMR-LWMP program is relevant to farmers' compliance decisions.

The hypothesis that Peer Pressure affects farmer compliance positively is supported at the 0.05 level. Hence it seems that LWMP compliance by farmers increases with their need for social approval from other farmers. This finding recalls the comment included in section 9.7 from Berriquin Farmer Two in respect of farmers being motivated by the prospect of admiration from other farmers.

The hypothesis that Business Security affects farmer compliance is supported at the 0.01 level of significance. The positive coefficient for this variable suggests that in this case the 'upside' for cooperativeness of having greater net wealth outweighs the 'downside'. Recall that in section 9.2.2 the upside was identified as a greater interest in seeing the collective good provided, lower risk aversion, and lower costs of financing the actions entailed by cooperation. The downside was identified as a reduced need generally to depend on cooperation from others and thus a lesser justification for establishing the trust in others required to attempt cooperation by way of reciprocity.

The hypothesised effect of Age on farmer compliance (no direction specified) is not supported by the estimated model. Hence it seems that the possible implications for compliance of the age of farmers identified in section 9.2.2 (i.e., effects on social norms learnt, on social networks and thus trust, and on risk aversion) are either not relevant in this case or they cancel each other out.

The estimated coefficient of one of the three dummy variables included in the model to test for interviewer-induced response bias was found to differ from zero at the 0.10 level of significance. This variable, Interviewer Dum2, was included to test whether farmers' responses to the rating item for Intention to Comply were biased in those cases that they were interviewed by people who have served on a LWMP Working or Implementation Group or who have worked for Murray Irrigation. The positive estimated coefficient for this variable

suggests that farmers interviewed by such people indicated a stronger intention to comply with their District’s LWMP than they would have otherwise.

It is interesting to observe that a few of the foregoing findings from the ordered-probit model differ from what the preliminary analysis of sample data in section 9.3 led us to expect. Perhaps most notably, the preliminary analysis failed to anticipate the ordered-probit model’s support for the hypothesised positive influence of Community Benefit on Intention to Comply. In contrast, the indication from the preliminary analysis that the ordered-probit model would support the hypothesis regarding Age was revealed to be incorrect.

9.4.2 *Substantive significance of coefficients*

The sensitivity factors reported in table 9.4 for the Intention to Comply model were calculated as described in section 7.7.3. To understand how to interpret the table, consider the row for the Private Benefit explanatory variable. It can be seen that a one unit increase in the score for Private Benefit from its sample mean (which table 9.1 shows to be 6.6) is predicted to cause a six per cent increase in the probability of an Intention to Comply score of one, a four per cent increase in the probability of an Intention to Comply score of two, and so on.

Table 9.4: Sensitivity factors for the Intention to Comply model

due to a one unit increase in ... from its mean score:	% change in probability of an Intention to Comply score of:								
	1	2	3	4	5	6	7	8	9
Private Benefit	6	4	3	3	2	1	0	-1	-3
Community Benefit	-38	-30	-25	-21	-17	-13	-3	10	31
Dependence	12	8	6	5	4	3	0	-3	-7
Independence	-5	-3	-3	-2	-2	-1	0	1	3
Trust in Other Farmers	55	36	28	22	16	10	0	-12	-25
Trust in Murray Irrigation	-45	-36	-30	-26	-21	-16	-5	12	39
Trust in Government	22	16	12	10	7	5	0	-5	-12
Trust in Implementation	-31	-24	-20	-17	-13	-10	-2	8	24
Trust Generally	-25	-19	-15	-13	-10	-7	-2	6	18
Procedural Fairness (Planning)	3	2	2	1	1	1	0	-1	-2
Procedural Fairness (Implementation)	6	5	4	3	2	2	0	-2	-4
Distributive Fairness	-27	-21	-17	-14	-11	-8	-2	7	20
Peer Threat	-15	-11	-9	-7	-6	-4	-1	4	10
Business Security	-23	-17	-14	-12	-9	-7	-2	6	16
Age	0	0	0	0	0	0	0	0	0

If the effect on the probability of an Intention to Comply score of five (the scale midpoint) is taken as the yardstick for comparing the sensitivity of this variable to each of the different

explanatory variables found to be statistically significant, it appears that the sensitivity is greatest in respect of Trust in Murray Irrigation, followed by Community Benefit, Trust in Other Farmers, Trust in Implementation, Distributive Fairness, Trust Generally, Business Security and, finally, Peer Pressure. Perusal of table 9.3 shows that this is the same order in which the estimated model coefficients of these variables would be arranged if their absolute values were sorted in descending order.

It is interesting that Intention to Comply appears to be less sensitive to Distributive Fairness and Business Security than it is to variables like Community Benefit, Trust in Murray Irrigation, Trust in Other Farmers and Trust in Implementation. It is evident from section 2.5.6 that the emphasis of Australian governments in respect of resolving agri-environmental conflicts remains heavily on providing government funding to overcome farmers' concerns regarding the distributive fairness of expecting them to undertake conservation activities and the implications for their business security of the costs of these activities. Likewise in the Berriquin LWMP it is stated that “[f]armers in a strong financial position are ... better placed to undertake capital investments and changes to management that will lead to greater environmental sustainability” (Berriquin CWG 1995 p. 128).

These are valid considerations, of course, and their importance is substantiated by the estimated model. However, it appears from the comparison of sensitivity factors that farmers' decisions in respect of LWMP compliance may be even more responsive to a number of other considerations, including trust and recognition of community benefits, falling under the rubric of 'soft culture'. Hence there may be a case for Australian governments taking such 'soft-culture' considerations more seriously in policy deliberations than the discussion in sections 2.5.5, 2.5.6 and 2.6 indicates is presently the case.

Finally, the comparison of sensitivity factors suggests that peer pressure among farmers might be a less influential aspect of their 'soft culture' for LWMP compliance than other aspects like their recognition of community benefits and their trust in others. This is noteworthy given the tendency of policy makers to assume that peer pressure is the primary mechanism by which the 'soft culture' of farmers influences their decisions to undertake conservation activities (see section 2.5.2).

9.5 *Concluding comments*

The results presented in this chapter from modeling LWMP compliance by farmers provide some interesting insights from the field regarding a number of aspects of the emerging second-generation theory of collective action that were considered in chapters four and five. Firstly, the estimated model suggests that the trust farmers have in one another and in others responsible for implementing the LWMPs is indeed influential in affecting their own decisions whether to comply.

In general terms, therefore, this quantitative analysis corroborates the qualitative findings presented in chapter eight in respect of farmers' collaboration in the CMR-LWMP program having helped them to gain trust in the program and, seemingly as a consequence, increased their willingness to cooperate spontaneously in some key aspects of the program. This was perhaps most noticeable in terms of their preparedness to accept Murray Irrigation introducing and enforcing a number of regulatory policies which impinge significantly on their private rights to farm as they see fit.

Secondly, the quantitative findings reported in this chapter added importantly to our understanding of the role of trust in this setting by reminding us that the relationship between trust and cooperation can be expected to be positive only to the extent that members of a group are prepared to follow heuristics or norms of reciprocity. Indeed, the negative relationship found in the quantitative analysis between farmers' intentions regarding on-farm LWMP compliance and their trust one another's compliance indicates that they are predominantly predisposed to free ride upon, rather than reciprocate, others' on-farm compliance.

This could be the result of earlier paternalistic governance of the irrigation schemes having left farmers until recently with little reason to learn strategies—including reciprocity—that would enable them collectively to assume greater responsibility for improving the performance of the schemes. This interpretation is consistent with the view that institutions that do not “support, enhance, help people trust one another so they can really protect their resources for the future” can instead convey the sense that “nobody trusts you, so you might as well cheat any time you think you can” (E. Ostrom as quoted in Katon *et al.* 2001 p. 643).

Thirdly, the finding that compliance by farmers increases with their belief that implementation of the LWMPs would enhance the viability of their communities indicates

that the positive relationship between group identity and cooperativeness that has been identified in laboratory experiments (see section 4.5.2) may be at work in this field setting. However, it might be the case too that expectations of enhanced community viability from LWMP implementation encourage farmers to comply for the more narrowly self-interested reason of wanting to ensure that their own needs (e.g., social interaction, commercial services, cultural activities) from their community continue to be satisfied. Further research would be required to determine the relative strengths of these two contending effects. In this respect it is noteworthy that qualitative evidence from the case-study setting of the kind considered in section 9.2.2 when discussing the Community Benefit variable corroborates the quantitative finding in respect of this variable and suggests too that both of these contending effects are operative in this setting.

Fourthly, variation between farmers in their intentions to comply with the LWMPs seems to be related partly to the influence of social norms. The estimated positive effect of perceptions of distributive fairness on compliance indicates the relevance of farmers' social norms of fairness. As discussed in section 2.3.1, these norms likely are still influenced strongly by the absolutist doctrine whereby farmers presume themselves to have a right to use their land as they please—and thus a right to be compensated fully for any costs imposed on them as a result of any encroachment on this presumed right (e.g., a requirement that they farm in accordance with their District's LWMP).

Without further research it is not possible to conclude confidently whether the positive effect of perceived distributive fairness is due to differences between farmers in the particular fairness norm they are following, differences between them in terms of the actual distributive consequences of their compliance (i.e., relating to their respective shares of the costs and benefits of implementing the LWMPs), or both. Nevertheless, the qualitative evidence from the case-study setting discussed in section 8.4 indicates that local norms of fairness had considerable influence in this setting at least in respect of decision making within the CWGs leading to development of the LWMPs.

Furthermore, the quantitative finding that peer pressure is positively influencing on-farm compliance implies the existence of one or more social norms motivating this peer pressure. However, it is not possible to confidently identify this norm (or norms) without further research. It could be that the peer pressure is motivated predominantly by a social norm of promise-keeping, such that farmers expect one another to comply because they have

collectively committed themselves to do so.

Alternatively, the peer pressure might be motivated more by a social norm that provides status to good producers, where in this case some of the on-farm measures associated with LWMP compliance are regarded as hallmarks of good production practice. As Rogers (1983 pp. 215-216) has observed:

Undoubtedly one of the important motivations for almost any individual to adopt an innovation is the desire to gain social status. ... [Nevertheless] certain individuals (who adopt an innovation at a certain time) are more highly motivated by status seeking than are others.

The qualitative evidence from Berriquin Farmer Two quoted in section 8.7—to the effect that farmers are more likely to offer “a social kind of encouragement” to farmers who comply with their District’s LWMP than they are to “go around telling people what they should or shouldn’t be doing”—indicates that this second source of peer pressure may at this stage be the more important one in the case-study setting.

A further notable implication of the results is that the current strategy—in the case-study setting as well as in Australian agri-environmental conservation programs more generally—of governments motivating compliance by farmers with conservation objectives primarily through offering them funding on the basis of ‘cost sharing’ may be too narrowly conceived. The results indicate that compliance by farmers with the LWMPs is at least as sensitive to their expectations of benefits for community viability and their trust in compliance by others as it is to the variables—like farmers’ perceptions of their business security and the distributive fairness of their compliance—that governments are presumably targeting when they offer them ‘cost-sharing’ financial contributions.

It seems therefore that there is a need for governments to pay greater attention to soft-culture considerations like these when devising their strategies of intervening to achieve conservation objectives. Indeed, as the discussion in section 5.2.6 highlighted, interventions that sideline rather than capitalise upon the contribution that existing soft culture can make to realising an objective tend to erode that potential contribution. Thus they can lead to increased dependency on interventions and consequently to an unnecessary escalation in the transaction costs of achieving the objective. In contrast, interventions designed in accordance with the principle of subsidiarity (see section 5.5) would seek to capitalise on the potential contribution of soft culture to the fullest extent possible.

10. COOPERATION BY FARMERS IN THE PROVISION OF SELECTIVE INCENTIVES FOR ON-FARM LWMP IMPLEMENTATION

10.1 *Introduction*

This is the second of the two chapters anticipated in section 7.7.1 concerned with quantitative analysis of cooperation by farmers in ensuring that the on-farm implementation targets set for the CMR-LWMP program are satisfied. The focus in chapter nine was on the first-order social dilemma faced by farmers in satisfying these targets which in general apply to them collectively rather than individually. As discussed in section 5.2.1, providing the selective incentives required to solve a first-order social dilemma generally involves a second-order social dilemma. This second-order provision entails monitoring whether individual group members are cooperating or not and enforcing selective incentives accordingly.

It was also observed in section 5.2.1 that spontaneous provision of selective incentives in respect of a large-group social dilemma—such as is presented by LWMP implementation—by group members themselves (i.e., first-party provision) is normally inadequate and needs to be complemented by hierarchical, or third-party, provision. Nevertheless, the need to keep the transaction costs of third-party provision of selective incentives manageable by ensuring that it builds on and strengthens first-party provision, rather than marginalises and thus weakens it, was emphasised too.

A third party attempting to intervene so as to complement first-party provision of selective incentives will be advantaged to the extent that it is aware of the first-party provision that exists and understands its determinants. Moreover, it will be assisted in this attempt by knowledge regarding the preparedness of group members to cooperate with its efforts, and about the determinants of that preparedness. The purpose in this chapter is accordingly to enhance such knowledge in respect of the CMR-LWMP program.

Towards this end, ordered-probit models are estimated in relation to three aspects of selective-incentives provision that are applicable in this context. As was the case in chapter nine: (a) the hypotheses underlying specification of these models were drawn mainly from the theory considered in chapters three to five; (b) qualitative evidence from the first phase of

in-depth interviewing, together with the literature-based understanding of the case-study context presented in chapter six, guided specification of the structural variables used to operationalise the theoretical constructs associated with the hypotheses; and (c) the qualitative analysis is referred to where relevant to illustrate how some of the theoretical constructs of interest apply to the CMR-LWMP program.

As with chapter nine, this chapter contains five main sections. In section 10.2 the structural variables included in the three quantitative models are specified and the associated hypotheses are justified. Sample statistics for each of these structural variables are discussed in section 10.3. The results from estimating the models are considered in section 10.4. Finally, concluding comments are presented in section 10.5.

10.2 Model specification

Two of the three aspects of selective-incentives provision that were modeled are concerned with first-party provision—that is, provision by farmers themselves. The third aspect is concerned with the willingness of farmers to cooperate with Murray Irrigation, as a third party, introducing selective incentives in the form of penalties imposed on individual farmers not meeting an acceptable standard of compliance with the LWMPs (hereafter referred to as ‘under-complying farmers’). In this section the three quantitative models are specified and the associated hypotheses are discussed.

10.2.1 Dependent variables

The objective of the first of these quantitative models was to explain variation between farmers with regard to their likelihood of expressing disappointment to under-complying farmers. Expressing disappointment to a farmer signals that continued under-compliance may result in the more severe sanction of disapproval and some consequent degree of ostracism (perhaps in other settings and possibly also of their family members and associates). Hence it can be regarded as a preliminary level in a graduated scale of sanctions of the type discussed in section 5.2.7. The dependent variable for this model is known as Express Disappointment. The rating item on which it was based was¹⁰⁰:

How likely are you to express your disappointment to farmers not making reasonable attempts to follow the plan’s recommendations?

¹⁰⁰ Item *o* in the interview schedule. The poles were “extremely unlikely” and “extremely likely”.

The case-study qualitative analysis discussed in section 8.7 indicated that farmers at this relatively early stage of the LWMP implementation process seem reluctant to exert ‘judgmental’ peer pressure of this kind. Nevertheless, there was a sense too from this analysis that overcoming this reluctance will eventually become necessary as the deadlines for satisfying the on-farm implementation targets draw closer.

The second quantitative model focussed on explaining why farmers vary in the extent to which they disapprove of under-complying farmers. Variation of this kind is suggested, for instance, by Berriquin Farmer Two’s remark in section 8.7 that: “I don’t think you are looked upon badly [by other farmers for lack of on-farm compliance] because it’s understood that ... you might not be able to afford to do it”. Farmers’ propensities to disapprove of other farmers’ under-compliance might accordingly be expected *inter alia* to relate positively with their perceptions of the fairness of the costs of compliance. The dependent variable of the model developed to test such hypotheses was measured by the following rating item¹⁰¹:

I will have less respect for farmers who do not make reasonable progress in following the plan.

This variable is referred to herein as Disapprove.

The third model was concerned with explaining differences between farmers in terms of their preparedness to cooperate with Murray Irrigation, as the relevant third party, imposing penalties on under-complying farmers. This can be regarded as a higher level in a graduated scale of sanctions than farmers themselves expressing their disappointment to, and disapproving of, other farmers perceived to be falling unreasonably behind in their LWMP compliance. The dependent variable for this model, known as Support Penalties, was based on the following rating item¹⁰²:

Farmers who do not make reasonable progress in following the plan should be penalised.

Recollect from the discussion of the qualitative analysis in section 8.7 that farmers subject to the CMR-LWMP program seem more prepared to cooperate with third-party regulation, including by accepting punishment of farmers who unreasonably transgress the regulations, now that the third party is Murray Irrigation rather than the NSW Government. Nevertheless, it is evident that farmers are far from uniform in their acceptance of Murray Irrigation exercising its regulatory function as proactively as it has. For instance, consider Jamie Hearn’s remark included in section 8.7 to the effect that 15-20 per cent of farmers were

¹⁰¹ Item *n2* in the interview schedule. The poles were “very far from my view” and “very close to my view”.

¹⁰² Item *r8* in the interview schedule. The poles were “very far from my view” and “very close to my view”.

upset by Murray Irrigation introducing policies limiting water application and requiring testing of rice-growing soils, and also Gerard Lahy's related comment that "It was a very difficult policy for Murray Irrigation to sell...".

10.2.2 Explanatory variables

Except where indicated below, the three models comprise a common set of explanatory variables. Two explanatory variables (Private Benefit and Community Benefit as defined in section 9.2.2) were included in each model to explore how farmers' perceptions of benefits from LWMP implementation both to themselves privately (i.e., accruing to their farm business) and to their community affect their preparedness to sanction, or have Murray Irrigation sanction, under-complying farmers. Both variables were hypothesised to relate positively with each of the three dependent variables.

Farmers' preparedness to sanction under-complying farmers, or support a third party sanctioning them, was hypothesised to relate positively with their perceptions of compliance involving a social dilemma shared with other farmers—that is, to be greater the more that they believe that their own benefits from complying depend on other farmers complying. This proposition was investigated by including a variable known as Dependence on Other Farmers as an explanatory variable. This was measured by the following rating item¹⁰³:

The benefits on our farm of following the plan depend at least partly on what other farmers do. It was reasoned that the deeper a farmer's dependence on other farmers complying, the greater the loss if they do not comply, and thus the stronger his or her resentment. As discussed in section 4.4.2, resentment has been found in laboratory experiments to provide an emotional impulse sufficient to motivate people to punish others who fail to reciprocate their cooperation.

The more someone practising reciprocity trusts others caught in the same social dilemma to cooperate with her, the more likely is she to act cooperatively towards them (see section 4.3.2). Therefore, the greater the loss is likely to be, and the stronger the resentment, if the others do not in fact reciprocate her cooperation. In this case, therefore, we would expect increased trust in others to be related positively with a desire to see them punished if they act uncooperatively.

¹⁰³ Item *pl* in the interview schedule. The poles were "very far from my view" and "very close to my view".

However, the relationship may well be different if reciprocity is not the strategy being followed. For instance, the more a free rider trusts others to cooperate in providing a collective good, the less likely is she to cooperate (see section 9.2.2) and thus incur new costs. The less is her loss, therefore, if others do not cooperate. It follows that in this case we would expect increased trust in others to be negatively related with a desire to see them punished if they act uncooperatively.

Thus it seems that the relationship between a person's trust in the cooperativeness of others caught in the same social dilemma and her desire to punish them if they do not cooperate can be either positive or negative. For the three models of concern in this chapter, the explanatory variable included to explore this relationship was Trust in Other Farmers, as defined in section 9.2.2. Given the foregoing reasoning, the coefficient of this variable was hypothesised in each case only to differ from zero.

In section 5.2.7 it was observed that considerations of fairness can sometimes moderate the impulse to punish non-cooperators, particularly in so far as it is believed that the lack of cooperation could be due to an excusable error (e.g., arising from an accident or misunderstanding) or temporarily difficult (e.g., financial) circumstances. This possibility was also raised in section 10.2.1 in relation to the model for Disapprove. It seems reasonable to suppose that individuals with greater trust in people generally are more likely to exercise moderation of this kind than individuals with less trust in people generally. The explanatory variable included in the models to test whether this is the case in the context of this study was Trust Generally, as defined in section 9.2.2. Consistent with the preceding reasoning, it was hypothesised to be positively related with each of the three dependent variables.

For the Support Penalties model an additional explanatory variable called Trust in Local Autonomy was included. It was measured by the rating item following¹⁰⁴:

Murray Irrigation has more say over how our plan is carried out than the government does.

Inclusion of this variable follows from Murray Irrigation having been devolved the right to formally regulate compliance by individual farmers with the LWMPs, as well as the responsibility for penalising farmers who transgress these regulations (see section 6.5). Considering how the qualitative analysis highlighted the lack of trust by farmers in this region in the NSW Government (see section 8.2), it was expected that the farmers would be more likely to support imposition of penalties on under-complying farmers the greater their

¹⁰⁴ Item *r3* in the interview schedule. The poles were “very far from my view” and “very close to my view”.

trust that Murray Irrigation truly has been devolved authority to decide independently on such matters. It was reasoned that the more they trust in the autonomy of Murray Irrigation, the more confident would they be that any decision to impose penalties on under-complying farmers is based on a realistic assessment of what is in their best interests collectively. Trust in Local Autonomy was thus hypothesised to be related positively with Support Penalties.

Farmers who believe that farmers generally have been treated fairly in the CMR-LWMP program might reasonably be expected to have a greater desire to see under-complying farmers sanctioned. Conversely, the more that they believe farmers have been treated unfairly, the weaker the emotional impulse to want them punished. Evidence from the case-study qualitative analysis suggestive of this effect was alluded to in section 10.2.1 when discussing the Disapprove model. The variable included in the three models to account for this effect was called Fairness for Farmers. It was measured by reverse-scoring responses to the following rating item¹⁰⁵:

The plan imposes too much of a cost burden on farmers compared with the wider public.

Fairness for Farmers was hypothesised to relate positively with the dependent variables of each of the three models.

It was expected that farmers placing greater importance on civic duty, perhaps as a result of internalising a norm to this effect, would be more likely to want to see others punished who put their own interests ahead of their responsibility to their community—which in this case is compliance with their District’s LWMP. This effect was accounted for in the three models by including an explanatory variable called Civic Duty which was measured by reverse-scoring the rating item following¹⁰⁶:

The rights of individuals should come before the interests of their local community.

This variable was hypothesised to be positively related with each of the three dependent variables.

When asked whether farmers tend to compare notes about how they are going with on-farm LWMP compliance, Berriquin Farmer Two responded: “Yes, I think that is going on. If you see someone digging a drain, you go over and have a look”. It is possible that farmers’ accumulation of knowledge of this nature is relevant to their preparedness to see under-complying farmers punished. The more that farmers possess this kind of knowledge, the

¹⁰⁵ Item *kI* in the interview schedule. The poles were “very far from my view” and “very close to my view”.

¹⁰⁶ Item *i5* in the interview schedule. The poles were “very far from my view” and “very close to my view”.

more confidently might they be expected to hold a view regarding what constitutes a fair standard of compliance by individual farmers at any given stage (remembering that the LWMPs do not stipulate annual compliance targets for individual farms). The more confident farmers are of what constitutes a fair standard of compliance, the more confident might their assessment be of whether other farmers are under-complying. The greater this confidence, the more strongly might they be expected to desire punishment for under-complying farmers.

Accordingly, a positive relationship was hypothesised between farmers' degree of access to this kind of knowledge and each of the three dependent variables. These hypotheses were tested by including the explanatory variable Knowledge of Other Farmers' Compliance in each of the models, measured by the following rating item¹⁰⁷:

We have a good idea of how much progress each farm in our locality has made in following the plan.

Finally, the dummy variables Interviewer Dum1, Interviewer Dum2 and Interviewer Dum3 (defined as in section 7.7.5) were included in these three models to control for the possibility of compliance bias associated with different subsets of interviewers.

10.3 Sample statistics for model variables

Sample statistics for each of the (non-dummy) variables discussed above, together with their hypothesised coefficient signs, are presented in table 10.1.

The sample means for Express Disappointment and Support Penalties (3.5 and 4.0, respectively) are less than the scale midpoint of five. Moreover, the frequency distributions of the sample scores for these dependent variables, as shown in figures 10.1 and 10.3 respectively, exhibit strong positive skewness. Of all the observations for Express Disappointment, 59.1 per cent lie in the lower third of possible scores (1 to 3 inclusive), whereas only 16.3 per cent lie in the upper third of possible scores (7 to 9 inclusive)(see table 10.2). In the case of Support Penalties, 49.1 per cent of observations lie in the lower score range and 25.0 per cent in the upper score range (see table 10.2).

These statistics indicate that farmers overall remain strongly averse to expressing disappointment to other farmers they feel are unreasonably lax in complying with their

¹⁰⁷ Item *n3* in the interview schedule. The poles were "very far from my view" and "very close to my view".

Table 10.1: Sample statistics and hypothesised coefficient signs for the Express Disappointment, Disapprove and Support Penalties models

Variable	No. of observations.	Mean	Standard deviation	Hypothesised sign
<i>Dependent:</i>				
Express Disappointment	215	3.5	2.4	n.a.
Disapprove	204	5.3	2.6	n.a.
Support Penalties	212	4.0	2.7	n.a.
<i>Explanatory:</i>				
Private Benefit	229	5.2	2.0	+
Community Benefit	213	7.7	1.5	+
Dependence on Other Farmers	213	5.1	2.7	+
Trust in Other Farmers	190	6.1	1.6	?
Trust Generally	223	6.2	2.0	+
Trust in Local Autonomy	185	5.1	2.3	+ ^a
Fairness for Farmers	203	4.6	2.5	+
Civic Duty	218	6.2	2.3	+
Knowledge of Other Farmers' Compliance	194	4.8	2.5	+

^a This variable was included only in the model for Support Penalties.

Figure 10.1: Frequency distribution of scores for Express Disappointment

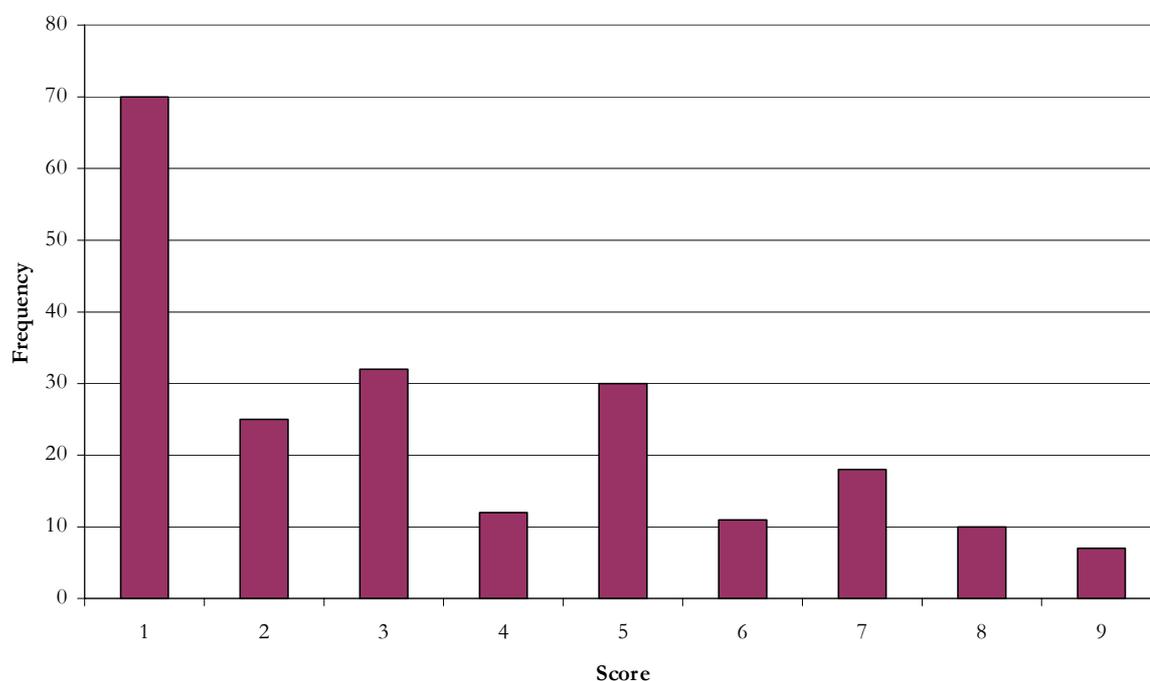


Figure 10.2: Frequency distribution of scores for Disapprove

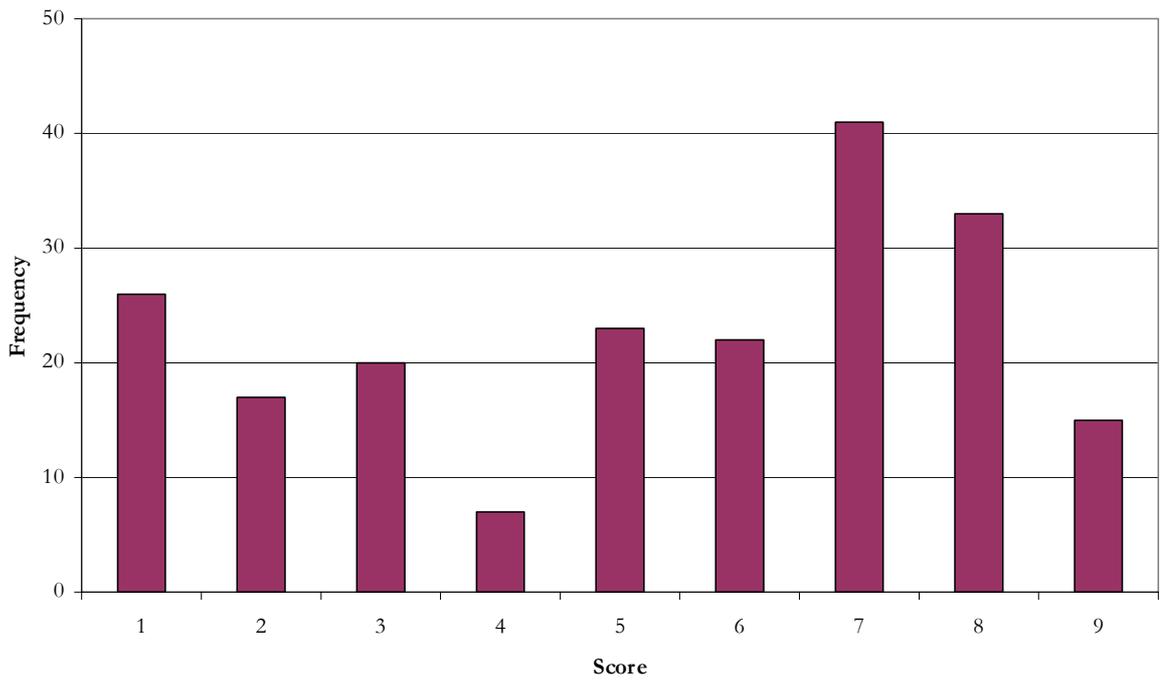
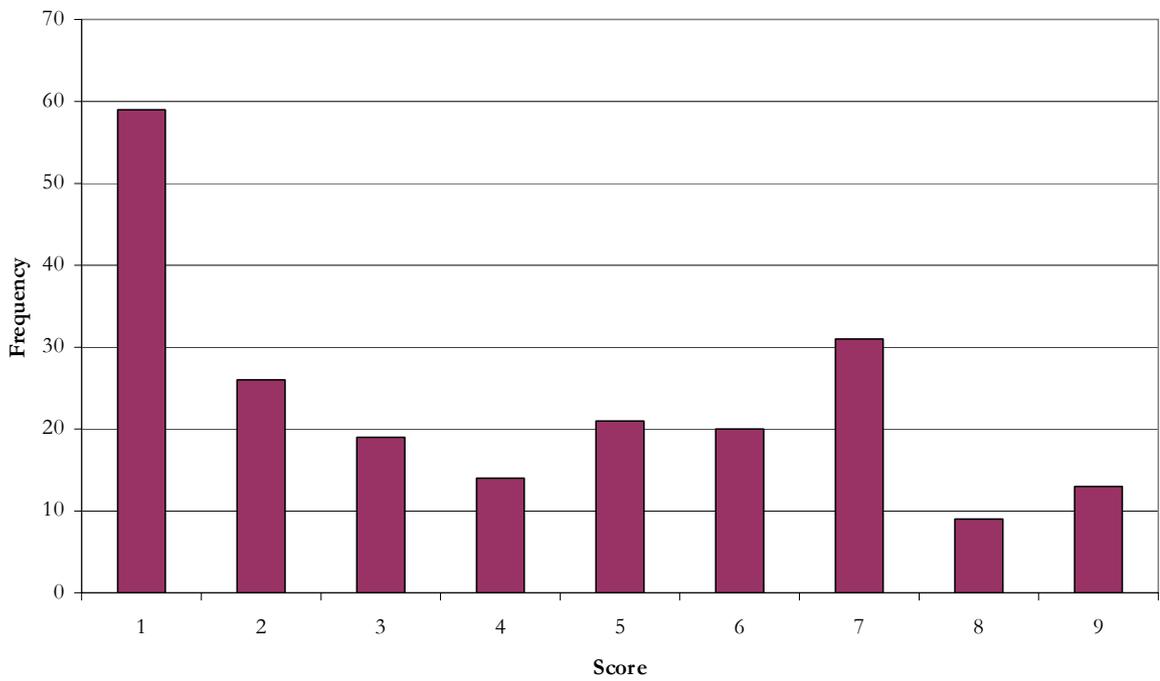


Figure 10.3: Frequency distribution of scores for Support Penalties



District's LWMP. It seems too that overall they remain strongly averse to penalisation of farmers whose LWMP compliance is unreasonably poor, albeit less averse than with expressing disappointment. Despite the qualitative evidence discussed in section 8.7 that suggests devolution of governance of the CMR-LWMP program to Murray Irrigation has potential to gradually erode such aversions, therefore, realisation of this potential cannot be taken for granted.

The sample mean of 5.3 for Disapprove exceeds the scale midpoint only marginally, indicating that the average farm business is ambivalent about whether it would lose respect for farmers who are unreasonably lax in their LWMP compliance. In contrast to the frequency distributions for Express Disappointment and Support Penalties, distribution for Disapprove shown in figure 10.2 is skewed negatively and it comparatively uniform. Of all the observations for Disapprove, 30.9 per cent lie in the lower third of the score range, whereas 43.6 per cent lie in the upper third of this range (see table 10.2).

Comparison of these statistics with those for Express Disappointment and Support Penalties indicates that there is a sizeable proportion of farmers disposed to disapprove of under-complying farmers who nevertheless cannot bring themselves to accept that under-compliance is serious enough a matter to warrant punishments that are more tangible and thus perhaps more effective in motivating behavioural change—like first-party expression of disappointment and third-party imposition of penalties.

Consistent with these comments, the Wilcoxon signed-rank test indicates that scores for Disapprove are significantly greater ($p < 0.001$, two-tailed) than those for Express Disappointment and Support Penalties. By the same criterion, scores for Support Penalties ($p = 0.004$, two-tailed) are significantly greater than those for Express Disappointment. Hence it seems that the average farm business is more comfortable with supporting third-party punishment of under-complying farmers, at least when the third party is Murray Irrigation, than with expressing its disappointment directly to these farmers.

These observations suggest that, on average, farmers subjects to the CMR-LWMP program remain considerably influenced by the absolutist doctrine which insists that ownership of agricultural land confers rights to use it without interference from others (see section 2.3.1). Perhaps it is the persistence of this doctrine that explains why the average farm business is more willing to disapprove of, or support imposition of third-party penalties on, under-

complying farmers than it is to express disappointment to them. The first two options do not require farmers to identify themselves as infringing the doctrine. Disapproval, as well as support for imposing third-party penalties, can be conveyed anonymously or confidentially. It may even remain unexpressed to anyone else. However, expressing disappointment does involve farmers identifying themselves, and thus risks the resentment and possible ostracism by peers that goes with breaking tradition.

Looking again at table 10.1, it is notable that the average farm business seems ambivalent about whether its on-farm benefits from complying with its District's LWMP depend on compliance by other farmers (the sample mean for Dependence on Other Farmers is 5.1). This indicates that farmers still have some way to go in recognising the interdependence of their on-farm efforts to mitigate the watertable-related problems they face. The average farm business seems ambivalent also about whether (a) to trust that Murray Irrigation is truly autonomous from government in respect of how it implements the LWMPs (sample mean for Trust in Local Autonomy is 5.1); (b) the LWMPs are fair to farmers in comparison with other groups (sample mean for Fairness for Farmers is 4.6); and (c) they have a good idea of progress by other local farmers in complying with their District's LWMP (sample mean is 4.8 for Knowledge of Other Farmers' Compliance). However, the average farm business does appear to lean towards the view that the interests of a community should come before the rights of its members (sample mean for Civic Duty is 6.2).

A preliminary indication of whether the sample data supports the hypotheses detailed in section 10.2.2 (and summarised in table 10.1) can be gleaned from table 10.2. Construction of this table followed the procedure outlined in section 9.3 for deriving table 9.2.

This table indicates preliminary support for a hypothesis associated with a particular explanatory variable in so far as the direction of change in sample means is uniform across the score subsets as well as consistent with the coefficient sign hypothesised in table 10.1. According to this criterion, only in respect of Knowledge of Other Farmers' Compliance can preliminary support be adduced for the hypotheses associated with all three models. In the cases of Dependence on Other Farmers and Civic Duty, this criterion is satisfied in respect of two of the models (the Disapprove and Support Penalties models in the former case, and the Express Disappointment and Support Penalties models in the latter) and 'almost satisfied'—in the sense that it would be satisfied except the sample means for two adjoining score subsets are equal—in respect of the remaining model.

Table 10.2: Preliminary assessment of the models for Express Disappointment, Disapprove and Support Penalties

	<i>Score ranges for Express Disappointment:</i>			<i>Score ranges for Disapprove:</i>			<i>Score ranges for Support Penalties:</i>		
	1-3	4-6	7-9	1-3	4-6	7-9	1-3	4-6	7-9
	<i>Percentage of observations in each range:</i>			<i>Percentage of observations in each range:</i>			<i>Percentage of observations in each range:</i>		
	59.1 %	24.7 %	16.3%	30.9 %	25.5 %	43.6 %	49.1 %	25.9 %	25.0 %
	<i>Explanatory variable mean when Express Disappointment score lies in each range:</i>			<i>Explanatory variable mean when Disapprove score lies in each range:</i>			<i>Explanatory variable mean when Support Penalties score lies in each range:</i>		
<i>Explanatory variable:</i>									
Private Benefit	4.8	5.2	6.2	4.9	4.4	5.7	4.9	5.1	5.8
Community Benefit	7.5	7.8	8.3	7.5	7.2	8.2	7.6	7.7	8.3
Dependence on Other Farmers	4.6	5.8	5.8	4.3	5.0	5.9	4.3	5.6	6.5
Trust in Other Farmers	6.1	6.1	6.2	5.8	5.6	6.5	6.1	6.1	6.3
Trust Generally	6.2	6.0	6.3	5.8	6.0	6.5	5.9	6.4	6.1
Trust in Local Autonomy	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	4.9	4.7	5.7
Fairness for Farmers	5.0	4.2	4.6	4.8	4.6	4.7	4.6	4.7	4.9
Civic Duty	5.8	6.3	6.7	5.8	5.8	6.5	5.5	6.6	6.7
Knowledge of Other Farmers' Compliance	4.7	5.3	6.3	3.8	4.6	6.3	4.6	5.3	5.9

For Private Benefit, the criterion is not satisfied (in the sense that the direction of change in means reverses across the score subsets) in respect of the Disapprove model, although it is satisfied in respect of the other two models. An identical pattern is evident for Community Benefit. For Trust in Other Farmers, the criterion is almost satisfied in respect of the models for Express Disappointment and Support Penalties, but is not satisfied for the third model. It is satisfied for Trust Generally in relation to the Disapprove model, but not in relation to the other two models. For Trust in Local Autonomy, the criterion is not satisfied in respect of the Support Penalties model (i.e., the only model including this variable). Finally, the criterion is satisfied for Fairness for Farmers in the case of the Support Penalties model, but not in respect of the other two models.

10.4 Results

The results of ordered-probit estimation of the models for Express Disappointment, Disapprove and Support Penalties are presented in this section. First, the support given by the estimated models to the hypotheses specified in section 10.2.2 is considered. Next, the substantive influence of each of the explanatory variables on each of the three dependent variables is discussed. The implications of these results are elaborated in each case.

10.4.1 Coefficients and their statistical significance

The models estimated for Express Disappointment, Disapprove and Support Penalties are presented in table 10.3.

Goodness of fit for each of the three models is reasonable, although it is greatest for the Disapprove model (pseudo $R^2 = 0.35$) and least for the Support Penalties model (pseudo $R^2 = 0.26$). No suggestion of substantive multicollinearity between explanatory variables was found in any of the models.

The hypothesised positive effect of Private Benefit on the three dependent variables was supported by the models estimated for Express Disappointment and Disapprove (at the 0.01 and 0.05 levels of significance, respectively), but not by the model estimated for Support

Table 10.3: Estimated models for Express Disappointment, Disapprove, and Support Penalties

Explanatory variables	Dependent variable								
	Express Disappointment			Disapprove			Support Penalties		
	Coef.	p value	Sig.	Coef.	p value	Sig.	Coef.	p value	Sig.
Private Benefit	0.08	0.006	***	0.06	0.048	**	0.03	0.218	
Community Benefit	0.09	0.095	*	0.09	0.078	*	0.09	0.087	*
Dependence on Other Farmers	0.03	0.187		0.06	0.027	**	0.07	0.011	**
Trust in Other Farmers	-0.06	0.272		0.06	0.330		-0.05	0.389	
Trust Generally	-0.12	0.002	***	0.02	0.307		0.00	0.457	
Trust in Local Autonomy	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.08	0.013	**
Fairness for Farmers	-0.01	0.392		-0.02	0.306		0.08	0.006	***
Civic Duty	0.08	0.008	***	0.02	0.230		0.14	0.000	***
Knowledge of Other Farmers' Compliance	0.16	0.000	***	0.21	0.000	***	0.06	0.025	**
Int_Dum1	0.33	0.086	*	0.25	0.219		0.12	0.504	
Int_Dum2	-0.37	0.117		0.08	0.747		-0.06	0.801	
Int_Dum3	0.30	0.359		0.26	0.450		0.19	0.580	
μ_1	1.01			1.68			2.23		
μ_2	1.39			2.10			2.63		
μ_3	1.83			2.45			2.89		
μ_4	1.99			2.57			3.07		
μ_5	2.47			2.93			3.38		
μ_6	2.70			3.28			3.69		
μ_7	3.21			3.97			4.34		
μ_8	3.73			4.86			4.65		
Pseudo R ²	0.30			0.35			0.26		

Note: *, **, and *** indicate that the hypothesis associated with the explanatory variable is supported at the 0.10, 0.05 and 0.01 levels of confidence, respectively.

Penalties¹⁰⁸. The positive relationship hypothesised between Community Benefit and the dependent variables was supported at the 0.01 level in each case¹⁰⁹. Hence the preparedness of farmers to first-party sanction other farmers informally (i.e., represented by the variables Express Disappointment and Disapprove) seems to strengthen the more that they expect benefits from implementing the LWMPs to flow to themselves and to their community.

In contrast, their preparedness to support Murray Irrigation issuing third-party penalties to under-complying farmers seems to strengthen with their expectation of community benefits from implementation but not with their expectation of benefits to their own farm business. Thus it appears that the farmers typically feel that third-party penalisation of under-complying farmers, even by Murray Irrigation which they co-own, should be justified only by the implications of lack of compliance for their District communities and not by the implications for themselves privately.

The hypothesised positive influence of Dependence on Other Farmers was supported (at the 0.05 level) by the estimated models for Disapprove and Support Penalties, but not by the model for Express Disappointment¹¹⁰. Accordingly, it seems that increasing the farmers' awareness of their interdependence would make them more likely to disapprove of under-complying farmers and accept Murray Irrigation penalising them. However, it seems that their reluctance to express disappointment other farmers is sufficiently entrenched that it would be unaffected an awareness program of this kind. In addition, the hypothesised influence of Trust in Other Farmers is not supported by any of the three estimated models¹¹¹. Hence it seems that the trust farmers have in one another's LWMP compliance is irrelevant to their decisions in respect of the three sanctioning options considered here.

The hypothesised negative influence of Trust Generally was supported only by the estimated model for Express Disappointment¹¹². Hence it seems that it is only in the case of expressing disappointment that farmers' impulses to sanction under-complying farmers are moderated by trust that there are valid reasons for the lack of compliance. Perhaps this is because expressing disappointment is likely to be the least anonymous of the three sanctioning

¹⁰⁸ In contrast, the preliminary analysis presented in section 10.3 indicated support for this effect in respect of the models for Express Disappointment and Support Penalties, but not for the Disapprove model.

¹⁰⁹ The preliminary analysis presented in section 10.3 indicated support for this effect in respect of only two of the models, namely the Express Disappointment and Support Penalties models.

¹¹⁰ This is consistent with the preliminary analysis in section 10.3 in respect of this variable.

¹¹¹ This is consistent with the preliminary analysis in section 10.3 in respect of this variable.

options considered and therefore to be the one involving the greatest risk of souring one's relations with other farmers. Given this greater risk it makes sense that farmers' impulses to see other farmers punished would be moderated more carefully by their beliefs more generally regarding the common decency of people. To the extent that farmers' assessments of common decency are over-generous when extrapolated to judging the reasonableness of lack of compliance by other farmers, this finding suggests that their reticence in respect of expressing disappointment to under-complying farmers might be weakened if some way were found to rectify this over-generosity.

The explanatory variable called Trust in Local Autonomy was included only in the Support Penalties model, as explained in section 10.2.2. The hypothesised positive effect of this variable was supported by this model¹¹³. Hence it appears that farmers in the CMR-LWMP program are more prepared to accept third-party (in this case, Murray-Irrigation-administered) penalisation of under-complying farmers the more they trust that this third party is truly independent of government which—as indicated by the case-study qualitative analysis presented in section 8.2—they have historically mistrusted. This finding is consistent with the case-study qualitative analysis presented in section 8.7 in so far as it accords with the key-informant observations there to the effect that that Murray Irrigation has been more successful than the NSW Government in regulating farmers as a result of the farmers trusting it more to accommodate their culture, including knowledge and interests.

The hypothesised positive influence of Fairness for Farmers is supported only by the estimated model for Support Penalties¹¹⁴. This might be explained by imposition of penalties on under-complying farmers being a harsher form of punishment than expressing disappointment to them or losing respect for them. It could be that farmers tend to view the two softer punishment options as not severe enough to warrant bringing into play considerations of how fairly the LWMPs affected farmers compared with other groups.

Civic Duty's hypothesised positive effect was supported by the estimated models for Express Disappointment and Support Penalties, but not by the model for Disapprove¹¹⁵. Hence it seems that farmers are more likely to express disappointment to, and accept third-party

¹¹² In contrast, the preliminary analysis in section 10.3 indicated support for this effect only in respect of the Disapprove model.

¹¹³ The preliminary analysis in section 10.3 did not indicate support for this effect.

¹¹⁴ This is consistent with the preliminary analysis in section 10.3.

¹¹⁵ This is consistent with the preliminary analysis in section 10.3.

penalisation of, under-complying farmers the greater their conviction that civic responsibility should take precedence over private interest. Further research is required to explain why the model for Disapprove seems an exception in this respect.

The hypothesised positive influence of Knowledge of Other Farmers' Compliance is supported by all three of the estimated models¹¹⁶. Hence it would seem, following reasoning presented in section 10.2.2, that greater knowledge by farmers of compliance by other farmers tends to increase the confidence with which they assess under-compliance and thus the likelihood of them wanting it punished in some way.

Finally, the estimated coefficient of one of the three dummy variables included in the model to test for interviewer-induced response bias was found in the estimated model for Express Disappointment to differ from zero (at the 0.10 level of significance). This variable, Interviewer Dum1, was included to test whether farmers' responses to the rating item for the Express Disappointment variable were biased in those cases that they were interviewed by farmers from inside the LWMP Districts with no further role in the CMR-LWMP program as a member of a CWG/CIG or Murray Irrigation. The positive estimated coefficient for this variable suggests that farmers interviewed by people of this type indicated a stronger disposition to express disappointment to under-complying farmers than they would have otherwise.

10.4.2 *Substantive significance of variables*

Sensitivity factors for the three models are shown in tables 10.4, 10.5 and 10.6.

As in the case of the Intention to Comply model (see section 9.4.2), the effect on the probability of the dependent variables taking the midpoint score of five was used as the yardstick for comparing their sensitivities to each of the explanatory variables found to be statistically significant. Express Disappointment is thus seen to be most sensitive to Knowledge of Other Farmers' Compliance, followed by Trust Generally. It is almost equally sensitive to the remaining three statistically-significant explanatory variables—Private Benefit, Community Benefit and Civic Duty. Disapprove is also most sensitive to Knowledge of Other Farmers' Compliance.

However, in this case it is next most sensitive to Community Benefit. It is about equally sensitive to the two remaining statistically-significant explanatory variables for this

¹¹⁶ This is consistent with the preliminary analysis in section 10.3.

Table 10.4: Sensitivity factors for the Express Disappointment model

due to a one unit increase in ... from its mean score:	% change in probability of an Express Disappointment score of:								
	1	2	3	4	5	6	7	8	9
Private Benefit	-8	-1	2	5	7	11	14	19	25
Community Benefit	-8	-1	2	5	8	11	14	19	26
Dependence on Other Farmers	-3	0	1	2	2	3	4	6	8
Trust in Other Farmers	7	1	-2	-4	-6	-8	-10	-13	-16
Trust Generally	12	1	-4	-7	-11	-14	-18	-23	-28
Trust in Local Autonomy	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Fairness for Farmers	1	0	0	0	-1	-1	-1	-2	-2
Civic Duty	-8	-1	2	4	7	10	13	18	24
Knowledge of Other Farmers' Compliance	-16	-3	3	8	14	21	28	38	53

Table 10.5: Sensitivity factors for the Disapprove model

due to a one unit increase in ... from its mean score:	% change in probability of a Disapprove score of:								
	1	2	3	4	5	6	7	8	9
Private Benefit	-9	-5	-3	-2	-1	1	4	8	14
Community Benefit	-14	-8	-5	-3	-1	2	7	14	23
Dependence on Other Farmers	-9	-5	-3	-2	-1	1	4	9	15
Trust in Other Farmers	-9	-5	-3	-2	-1	1	4	8	14
Trust Generally	-3	-2	-1	-1	0	1	2	3	5
Trust in Local Autonomy	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Fairness for Farmers	3	1	1	1	0	0	-1	-2	-4
Civic Duty	-4	-2	-1	-1	0	1	2	4	6
Knowledge of Other Farmers' Compliance	-31	-20	-13	-9	-4	3	15	34	63

Table 10.6: Sensitivity factors for the Support Penalties model

due to a one unit increase in ... from its mean score:	% change in probability of a Support Penalties score of:								
	1	2	3	4	5	6	7	8	9
Private Benefit	-3	-1	0	0	1	2	3	4	6
Community Benefit	-10	-3	-1	1	3	6	10	15	21
Dependence on Other Farmers	-8	-3	-1	1	3	5	8	12	17
Trust in Other Farmers	6	2	0	-1	-2	-4	-6	-8	-10
Trust Generally	1	0	0	0	0	0	-1	-1	-1
Trust in Local Autonomy	-9	-3	-1	1	3	6	9	14	19
Fairness for Farmers	-9	-3	-1	1	3	6	9	14	19
Civic Duty	-16	-6	-2	2	5	10	17	26	37
Knowledge of Other Farmers' Compliance	-7	-2	0	1	3	5	8	11	15

model—Private Benefit and Dependence on Other Farmers. By contrast, Support Penalties is (marginally) least sensitive to Knowledge of Other Farmers’ Compliance. It is most sensitive to Civic Duty. It is about equally sensitive to the remaining four statistically-significant explanatory variables—Community Benefit, Dependence on Other Farmers, Trust in Local Autonomy, and Fairness for Farmers.

The finding that Express Disappointment and Disapprove are most sensitive to Knowledge of Other Farmers’ Compliance, but Support Penalties is least sensitive to it, makes sense when it is considered that the sanctioning options associated with the first two dependent variables, unlike for the third, require farmers to determine their own standards of what constitutes reasonable compliance by other farmers—and that, as discussed previously, knowledge of what other farmers are doing helps farmers to determine their own standards more confidently. It is not necessary for individual farmers to do this in the case of the third-party imposition of penalties to which the Support Penalties variable refers. Farmers can leave the responsibility to the third party (i.e., Murray Irrigation) in this case, although there are avenues for them to participate in deciding what standards the third party should apply.

Finally, the finding that Support Penalties is most sensitive to the Civic Duty variable appears to illustrate again the key influence of soft culture on the transaction costs of third-party enforcement. The less that farmers within the CMR-LWMP program feel that the good of their community should take precedence over their individual rights, the lower it seems their support for third-party penalisation of under-complying farmers will be. The lower this support, in turn, the greater the political costs (a type of transaction costs—see section 5.3.6) for Murray Irrigation of imposing penalties.

10.5 Concluding comments

Informal provision by farmers of selective incentives to one another in respect of expressing disappointment to under-complying farmers and disapproving of them appears to remain fairly weak in the CMR-LWMP program—notwithstanding the finding that farmers are significantly more likely to disapprove of under-complying farmers than they are to express disappointment to them.

Nevertheless, this continuing reticence of farmers to first-party sanction one another does not necessarily mean that the attempts to gain farmers’ ownership of the program have failed to make them more amenable to sanctioning one another’s under-compliance than would have

been the case otherwise. Moreover, the qualitative evidence discussed in section 8.7 indicates that informal social sanctioning, or peer pressure, may well strengthen with time as the urgency of meeting on-farm implementation targets increases, farmers become more aware of the need for implementation, and there are more farmers that have fulfilled their implementation responsibilities sufficiently to feel justified in expecting a greater effort from others who have made less progress.

The quantitative finding in section 9.3 that the average farm business is unlikely at this stage to comply fully with the on-farm targets set for its District highlights the importance of continuing to seek changes in the soft culture of farmers in the study area in favour of them becoming more willing to take responsibility for first-party sanctioning of one another's under-compliance, or at least more prepared to cooperate with Murray Irrigation's efforts to provide third-party sanctioning.

The results from the three models considered in this chapter are useful as a guide to the opportunities and constraints likely to arise in attempting to address this challenge within the CMR-LWMP program. On the one hand, farmers' dispositions to trust people generally (found to have a significant influence on Express Disappointment) are likely to be formed through experiences much broader than those associated with the program itself, and thus effectively to lie outside the sphere of what any reformulation of the program could realistically hope to influence. On the other hand, farmers' perceptions of the relevance of the other explanatory variables found to have statistically-significant effects would seem to lie within the realm of what adjustments to program policy and practice might reasonably hope to influence over the medium to long term.

In some cases, this might be possible through education or awareness-raising activities (e.g., in relation to the Private Benefit, Community Benefit, Dependence on Other Farmers, and Civic Duty variables). Indeed, the discussion in section 8.7 indicates that Murray Irrigation already is placing strong emphasis on increasing the awareness of farmers that their interests are interconnected not only with each other but also with other stakeholder groups. In other cases, a focus more on promoting feedback flows between farmers might be appropriate (e.g., in relation to the Trust in Other Farmers and the Knowledge of Other Farmers' Compliance variables). With respect to the Trust in Local Autonomy variable, the focus would appropriately be on promoting feedback flows between farmers and Murray Irrigation. This would involve the company demonstrating, by its ongoing decisions and deeds, that it is

indeed more responsive to the culture, including knowledge and interests, of local farmers than they would expect government to be.

A final comment is warranted regarding the finding that knowledge by farmers of one another's compliance seems to be an important determinant of their willingness to see under-complying farmers sanctioned, particularly by way of expressing disappointment to them or disapproving of them. This is noteworthy in so far as it seems that the primary focus of Murray Irrigation monitoring compliance by farmers until now has been to demonstrate successful implementation of the LWMPs to the NSW Government. As such, this monitoring has not necessarily been organised and reported in such a way that best meets the needs of farmers to gauge what a fair standard of compliance is at any stage and to help provide them with the knowledge of farmers' compliance that they require to judge when that standard is not being met.

The results presented in this chapter suggest that the preparedness of farmers to see under-complying farmers sanctioned, whether by themselves or by Murray Irrigation, might be increased if they were able to obtain greater information about how other farmers are complying individually. It could be that locality-based groups of farmers have an important role to play in finding a way of achieving this that is compatible with local cultural considerations.

PART V:

**POLICY IMPLICATIONS
AND CONCLUSIONS**

11. POLICY IMPLICATIONS

11.1 *Introduction*

The policy problem addressed in this thesis has been the disappointing record to date of attempts to convert the collaborative vision for agri-environmental governance into durable on-ground change. This problem has been exemplified by the poor record here and internationally in implementing the plans emanating from ICM programs. As argued in chapter two, this lack of success does not mean necessarily that the collaborative vision is unrealistic. It may have more to do with under-estimating the difficulty of putting it into practice.

According to the collaborative vision, collaboration by different interests in developing a plan can be expected to strengthen their capacity to cooperate with one another spontaneously when the time comes for its implementation. From an economist's perspective, therefore, realising the vision would provide social benefits since greater spontaneous cooperation lessens the need to motivate cooperation by providing additional selective incentives by means of formal hierarchical organisation—and thereby reduces the overall transaction costs of governance.

However, the understanding of how this might follow remains intuitive. Governments and other stakeholders have been slow to recognise the need to fill this gap in knowledge in order to become better equipped to design, and engage themselves in, collaborative programs such that there can be at least a reasonable expectation of realising the vision.

The urgency of gaining knowledge of how to pursue the collaborative vision has come to be recognised increasingly in recent years. Adaptive management—in which collaborative efforts are regarded as policy experiments to be learned from in designing subsequent efforts—is regarded widely as the appropriate strategy for obtaining this knowledge given the complexity and diversity of the social and natural systems that are involved. Nevertheless, there is clearly a need for theory to guide the choice of experiments and to structure the learning that occurs once the choices are made.

The particular knowledge gap that was identified and addressed in this thesis was the lack of coherent theory explaining how collaboration in developing solutions to collective-action problems associated with agri-environmental governance might make the collaborating

interests more prepared to cooperate spontaneously in implementing the solutions than they would otherwise. The aim was to contribute towards such a theory by (a) synthesising insights arising from developments in the rational-choice tradition of collective-action research (see chapters three to five) and (b) validating and elaborating the resulting theoretical framework by undertaking a case study of one particular program of collaborative agri-environmental governance, namely the CMR-LWMP program (the findings of which were discussed in chapters eight to ten).

The primary purpose of this chapter is to provide an overview of what was found in pursuing the second part of this agenda, and to draw policy implications—including in respect of a future research agenda—from the case-study findings. Section 11.2 sets the scene for the subsequent discussion by providing a brief review of the theoretical basis of the case study (distilled from chapters three to five). An overview of the findings of the case study is then presented in section 11.3. Implications of these findings for future policy development in respect of collaborative agri-environmental governance are explored in section 11.4. Related to these implications, a future research agenda in respect of this domain of governance in Australia is sketched in section 11.5. Finally, some closing comments are provided in section 11.6.

11.2 *Theoretical basis of the case study*

It follows from the comparative-static, or first-generation, approach to studying collective action pioneered by Mancur Olson (1965) that the phrase ‘spontaneous cooperation’ constitutes an oxymoron, at least when applied to large-group social dilemmas. Since the kinds of agri-environmental problems addressed in programs of collaborative governance typically involve a large number of parties, the prediction from the comparative-static theory is that they will not cooperate spontaneously at all when it comes to implementation—even if they collaborate beforehand so successfully that they all agree to cooperate and on how to cooperate. The implication is that cooperation during implementation will occur only to the extent that an external third party, such as government, augments the selective incentives to do so.

Nevertheless, this first-generation approach seems deficient for analysing collective action in so far as it assumes away the possibility of positive feedbacks, or increasing returns, arising from decisions about whether to cooperate. Indeed, the emerging second-generation approach—grounded empirically on the research of Axelrod (1984) and others based

on computerised simulations with artificial agents, and of Ostrom *et al.* (1994d) and others involving people in laboratory experiments—indicates persuasively that increasing returns of this kind are vital to explaining the emergence of spontaneous cooperation within large-group social dilemmas faced in the real world.

The relevance of increasing returns in this context arises from mutually-reinforcing relationships (i.e., virtuous and vicious cycles) involving trust, reciprocity and cooperation. That is, cooperation depends on reciprocity (a strategy that risks cooperating initially) which in turn depends on trust that an initial act of cooperation will be reciprocated, rather than exploited, by others. Moreover, trust is positively influenced *inter alia* by individuals' perceptions of the prevailing level of cooperation. It follows that (a) large-group spontaneous cooperation is possible to the extent that group members trust one another to follow reciprocity, and (b) it is possible for a small amount of this trust once established (e.g., through leadership) to accumulate through successive rounds of a virtuous cycle into an amount capable of supporting significant spontaneous cooperation.

Even so, the capacity for spontaneous cooperation within large groups will not normally be so strong that formal organisation, or hierarchy, is left without an important role as a third party providing additional selective incentives that enable a still-greater level of cooperation to occur. Involving hierarchy nevertheless introduces a further social dilemma. It follows from the second-generation theory summarised above that cooperation between the group and the hierarchy will be spontaneous only to the extent that the two sides trust one another to follow reciprocity.

This trust cannot be taken for granted, and indeed the so-called progressive approach to governance that we have inherited has its origins in scientific elites lacking trust in the ability of citizens to participate rationally in their own governance. Moreover, it seems that the trust of citizens in governments—which are the mainstay of hierarchical governance in the progressive worldview—has declined in most democratic nations over recent decades. One important reason for this seems to be that citizens have become less accepting of being governed according to an externally-arbitrated notion of what a rational response to their shared problems entails—a notion that has implicitly regarded as irrational the way that their cultures (e.g., beliefs and social norms) shape their perceptions of problems and solutions.

Hence it seems that regaining the trust of citizens in hierarchical solutions to collective-action problems depends in large measure on governments learning to trust the rationality of

their citizens. One of the most potent methods of building trust seems to be face-to-face communication. This assists trust formation by facilitating, *inter alia*, a broader vision of shared interests, reassessment of others' reputations for trustworthiness, and group identity. Moreover, opportunities for face-to-face communication can allow a democratic process of deliberation in which mental models inhibiting adaptation to new problems of collective action—for instance, by reinventing a group's shared vision, revising others' reputations for trustworthiness, or recognising new ways to forge group identity—are challenged and possibly modified.

Indeed, this deliberative function of communication is often crucial given the tendency of adaptively-inefficient mental models to become locked-in as a result of the path dependency that typically arises as a result of increasing-return dynamics. Deliberative discourse may thus play a key role in shifting government staff from paternalistic mental models that are inhibiting them, and the agencies to which they belong, from gaining the trust of the citizens whose cooperation they require. Likewise, it may help citizens to recognise when governments have become less paternalistic and thus deserving of greater trust than recommended by their existing mental models. Of course, benefits of these kinds from deliberation are just as applicable to challenges of horizontal cooperation between citizen groups, or between government agencies, as they are to the challenge of vertical cooperation between a citizenry and its system of government.

11.3 *Overview of the case-study findings*

The empirical findings reported in chapters eight to ten indicate that the prediction from the comparative-static theory of collective action—that spontaneous cooperation within large-group social dilemmas will always be zero, and consequently that it will be unaffected by introducing collaborative decision-making—is too pessimistic, at least in the case of the CMR-LWMP program. Rather, the second-generation developments of this theory appear to provide a more accurate and instructive explanation of the behaviour observed.

Consistent with this second-generation theoretical framework for studying collective action, the case-study qualitative analysis presented in chapter eight illustrated the positive effect of trust-building between collaborators—particularly between farmers and the CWGs/CIGs, and the CIGs and Murray Irrigation—on their preparedness to spontaneously initiate and reciprocate cooperation with one another. It demonstrated not only how path dependency of the mental models that collaborators use to assess each other's trustworthiness arises

from their history of prior interactions, but also how collaboration as a democratic process of deliberation helped collaborators to avoid the associated trap of lock-in to mental models that changes in their circumstances—including the trustworthiness of others—make adaptively inefficient.

Moreover, the case-study qualitative analysis highlighted and elaborated the practical significance of many of the types of structural variables considered theoretically in chapters four and five. For instance, the vital role of leadership was elaborated in so far as the attributes of governmental leadership that seemed particularly important in the case-study setting were the leader's (a) senior position within a key government agency; (b) willingness and capacity to champion the CMR-LWMP program's cause across the relevant agencies; and (c) willingness and capacity to build a reputation for trustworthiness among farming-community leaders and their constituents (partly through adopting a 'hands-on' leadership style).

Similarly, two attributes of farming-community leaders that seemed especially important in the case-study setting were (a) relative freedom from the 'baggage' of low-trust mental models associated with prior Government-irrigator conflicts, and (b) greater disposition towards the long-term view required for addressing the region's watertable-related problems. In the case-study setting these attributes were associated with selection of a younger generation of farming-community leaders.

The reader is referred to section 8.8 for a discussion of the particular attributes of other classes of structural variables that the qualitative analysis found to be particularly important for understanding collective action in the CMR-LWMP program. In brief, these classes of structural variables related to: the program's situational history; the authenticity of the Government's commitment to collaborate with farmers; the strategy chosen for co-ordinating the collaboration process; fairness; the strategy selected for grassroots community participation; location of control of program resourcing; the formal institutional arrangements introduced to strengthen selective incentives in favour of the Government and the community delivering on their LWMP implementation commitments; and the degree to which responsibility for ensuring delivery of the community's commitment was devolved to the community itself.

In general terms, the case-study quantitative analysis corroborated and also elaborated the overall support provided by the qualitative analysis for the proposition that collaboration can

increase spontaneous cooperation. A number of structural variables that collaboration might reasonably be expected to influence constructively were found to affect the preparedness of farmers to cooperate in respect of on-farm implementation of their Districts' LWMPs—both in relation to complying themselves (i.e., their first-order social dilemma) and the provision of sanctioning for under-complying farmers. For instance, in chapter eight the structural variables found to significantly affect farmers own intentions to comply included Trust in Other Farmers, Trust in Murray Irrigation, Trust in Implementation, Community Benefit, Distributive Fairness, and Peer Pressure.

Moreover, the case-study qualitative analysis indicated that these types of variables have been influenced substantively by the communication and deliberation associated with grassroots participation by farmers in the CMR-LWMP program. For instance, the qualitative analysis found that trust by individual farmers in their CWGs and Murray Irrigation is greater as a result of this participation than what it would be otherwise. The qualitative analysis also suggests that farmers' mental models have changed as a result of gaining increased awareness of (i) the community-wide benefits dependent on cooperation, (ii) the mitigating factors to be considered before judging distributive fairness unfavourably, and (iii) the inter-connectedness of their own and other farmers' interests in respect of dealing with their watertable-related problems.

For a further example of how the quantitative analysis corroborated the support by the qualitative analysis for collaboration increasing farmers' cooperativeness within the CMR-LWMP program, recollect from section 10.4.1 that the variables found to significantly affect farmers' support for Murray Irrigation penalising under-complying farmers were: Community Benefit; Dependence on Other Farmers; Trust in Local Autonomy; Fairness for Farmers; Civic Duty; and Knowledge of Other Farmers' Compliance. Farmers' perceptions in respect of each of these variables are influenced by mental models of the kind that the qualitative analysis presented in chapter eight suggests would have been influenced constructively by their grassroots participation in the program—for instance, in deciding the contents of the LWMPs, the terms of the community-government partnership for their implementation, and how the LWMPs should be adapted as new issues arise or new information becomes available.

11.4 *Implications for policy*

The implications of the case-study findings for future policy development in respect of Australian pursuit of the collaborative vision for agri-environmental governance are considered in this section. After a brief review of the main policy implications, the discussion turns to the challenges and opportunities lying ahead in developing capacities within both governments and communities to realise this vision more successfully than typically has been the case to date.

11.4.1 *Main lessons*

The case-study findings as summarised in section 11.3, together with the accumulated empirical evidence in support of the emerging second-generation theory of collective action, suggest three key lessons relevant to bringing the collaborative vision for agri-environmental governance to fruition. The first lesson is that this vision is not a mirage despite the widespread frustration, as discussed in section 2.5.4, that its pursuit since the 1980's has caused. The vision could be dismissed as a mirage if it were not possible to provide a plausible theoretical explanation of how it might be realised in actual agri-environmental contexts. Indeed, this was the situation when the only coherent theory of collective action was the comparative-static, or first-generation, theory. As explained in section 11.2, this theory predicts zero spontaneous cooperation within a large group, even if group members collaborate so successfully that they come to agree unanimously that they should cooperate in a certain way.

For the reasons summarised in section 11.2 and elaborated in chapters four and five, the first-generation theory can no longer be regarded as providing an adequate account of real-world prospects for large-group collective action, nor of the potential for collaboration among group members to enhance these prospects. Advances toward a second-generation theory of collective action—which explain *inter alia* how spontaneous cooperation *might* emerge in large groups and how collaboration, as a type of communication, *might* strengthen this possibility—provide better predictions of the accumulated empirical evidence relevant to this issue. Moreover, as reported in section 11.3, the case-study research undertaken for this thesis has provided empirical support for key aspects of this second-generation framework from an Australian agri-environmental setting.

A second key lesson suggested by the case-study findings is that a true understanding of this collaborative vision by governments and communities is not possible with mental models that are adapted to understanding and pursuing the progressive vision of agri-environmental governance. As discussed in section 2.3.2, the progressive vision remained essentially unquestioned until the 1980's. As exemplified by comparative-static economic models of collective action, these mental models account systematically for the negative-feedback (or diminishing-return) aspects of dynamic processes but not the positive-feedback (or increasing-return) aspects.

Accordingly, inherited mental models can reinforce the progressive vision by yielding predictions that accord with this vision's mechanistic presumption that any change in a system leads to a unique, and consequently predictable, new equilibrium. For people with mental models of this kind, the emergence of large-group spontaneous cooperation—whether as the result of collaboration or any other cause—is simply not tenable. It follows that the collaborative vision will at best be afforded 'lip service' by governmental and civil stakeholders whose mental models remain rooted in the progressive world view.

The third key lesson is that a change in the 'official' vision for agri-environmental governance (e.g., from a progressive to a collaborative vision) is in itself far from sufficient to change the mental models of those expected to share and actively pursue that vision. It is a mistake commonly made by leaders to under-estimate the difficulty of translating their own vision into a vision that is shared by those they seek to lead (Kotter 1995). According to Senge (1990 p. 206), a "shared vision is a vision that many people are truly committed to, because it reflects their own personal vision". As Kotter (1995) has argued, people will not commit to a new vision until they believe that the previous vision has become inadequate and the new one would yield a superior result.

However, leading people to accept the need to commit to a new vision is typically challenging as a result of the beliefs or mental models selected by the existing vision having become locked-in. For instance, people's existing mental models contribute significantly to their self-identity. The more that one's existing human and social capital is adapted to the mental models currently held by others, furthermore, the greater the motivation to discourage others from committing to a new vision and thus changing to a new set of mental models consonant with this vision. In addition, existing institutions are predicated upon—and thus reinforce—existing mental models.

Harrison (1997 p. 261) has remarked accordingly that changing peoples' mental models is difficult "because it requires the capacity for objective introspection and attribution to internal factors that touch on the most sensitive questions of self-image and respect". As a result, "[i]ndividuals will often accept intellectual arguments, understand their need to change, and express commitment to changing, but then resort to what is familiar" (Lindsay 2000 p. 283). Moreover, mental models often exist below the level of awareness where they result in beliefs or assumptions becoming accepted mistakenly as facts. Thus Senge (1990 p. 203) has argued that "[u]ntil prevailing assumptions are brought into the open, there is no reason to expect mental models to change ...".

The relevance of cultural lock-in of this nature to actual contexts of agri-environmental governance was illustrated by the qualitative analysis of the CMR-LWMP program presented in chapter eight. That discussion highlighted how mental models adapted to the progressive vision of agri-environmental governance were still entrenched a decade and more after the NSW Government in 1987 officially committed itself to a collaborative vision for agri-environmental governance by promulgating the Total Catchment Management Policy (see section 2.5.1).

Without the strong civil and governmental leadership in the CMR-LWMP program authentically committed to the collaborative vision, the culture of low-trust mental models associated with the longstanding progressive vision could have seriously derailed attempts to build cooperation within that program. The remark below, based on experiences with collaborative environmental governance in the USA, indicates that the problem of lock-in of low-trust mental models is far from unique to the CMR-LWMP program:

A general sense of wariness and skepticism frequently pervades all sides of the collaboration equation due to past interactions, stereotypes, and a societal context that breeds mistrust (Wondolleck *et al.* 2000 p. 58).

11.4.2 Collaborative capacity within government

One of the major obstacles to gaining the commitment of government officers to the collaborative vision for agri-environmental governance seems to derive from mental models adapted to the progressive vision disregarding the increasing-return dynamics associated with collaboration, and thereby portraying attempts at large-group cooperation as inevitably involving 'win-lose' (or, equivalently, 'zero-sum' or 'fixed-pie') interactions. Such models

of large-group collective action predict that contributions to providing a collective good will simply become free rides for non-contributing parties. That is, those naïve enough to contribute are forecast to lose by the same amount in total that free riders win.

The collaborative vision requires government officers to cooperate in providing a new system of governance by devolving to, or sharing with, communities some of the responsibilities and rights that traditionally have been theirs under the progressive vision. However, the win-lose mental models associated with the progressive vision lead these officers to expect that cooperating in this way will mean a loss for themselves and a corresponding win for the communities involved. They may fear that their cooperation will result in the agencies employing them being restructured and/or down-sized, thereby threatening their job security (Knox *et al.* 2001).

Officers may also resist cooperating within government-community collaboration programs because of an expectation that the outcome for them of successful collaboration would be reduced job status or satisfaction. For instance, Wondolleck *et al.* (2000 p. 61) reported an officer in a natural-resources management agency as saying that collaboration threatens agency staff because it has “disrupted the comfort level that some employees have developed over the years”. Indeed, adapting successfully to the collaborative vision does often require officers to obtain new skills and/or agencies to change their selection criteria for new staff. As observed by Selin *et al.* (1995 p. 189), “[m]anagers need new skills to move from the expert opinion role in traditional environmental management to an empowerment role as a mediator, catalyst, or broker in the new order”.

Following from the discussion in section 4.5.1, officers’ fears that they will lose from supporting collaboration often exaggerate reality. This is the case when the fears are based on mental models that are biased against recognising the interdependencies between government agencies and communities—interdependencies that offer possibilities of discovering win-win solutions that allay at least some of the downside of cooperating. This serves to highlight a general need for leaders championing a new vision to remove obstacles to its successful pursuit (Kotter 1995).

For instance, fears that job status or satisfaction will decline if a collaborative vision is brought to fruition may be headed off by pro-actively training staff in the requisite new skills and changing recruitment and promotion criteria to reward mastery and application of these skills. Where the culture of passive resistance to genuine collaboration is widespread within

an agency, this resistance may be eroded more successfully if whole teams of staff are trained simultaneously. There may be fears too that greater collaboration with communities will increase workloads as well as stress levels. These can be overcome by leaders ensuring that staff are resourced at levels appropriate to their new roles and by reforming institutional arrangements—informal as well as formal—within and across agencies that present obstacles to collaborating with communities (Wondolleck *et al.* 2000).

Nevertheless, narrow self-interest is typically not the only reason for government officers baulking at committing themselves to the collaborative vision. For instance, they may have legitimate concerns that they do not know enough about the communities to which they are supposed to devolve responsibilities to trust that fruitful collaboration is feasible. Knox *et al.* (2001 p. 9) have observed accordingly how:

Without a track record of local people's capacity to manage resources, states are being asked to take a leap of faith in entrusting a fundamental source of wealth to those whose management capacity has not been well-tested or documented.

This problem was alluded to earlier in section 5.5.2 when considering the challenge of applying the subsidiarity principle in practice. Two solutions to this challenge were suggested there, namely: (i) devolve responsibilities gradually in increasing order of difficulty, and (ii) augment the lower level's capacity until it can self-reliantly meet the responsibilities devolved to it. The following solution of Knox *et al.* (*ibid.* p. 19) to the problem is similar to the first of these options:

Governments that are reluctant to let go of a large degree of power or are dubious of local people's capacity to assume control over resource management may find a gradual process of rights transfer more palatable or reassuring (*ibid.* p. 19).

This type of solution provides the opportunity to incrementally build the trust of government officers in the communities with which they are supposed to collaborate (and *vice versa* for that matter) by, in the words of Kotter (1995 p. 65), “systematically planning for and creating short-term wins”. The importance of this strategy was emphasised as follows:

Real transformation takes time, and a renewal effort risks losing momentum if there are no short-term goals to meet and celebrate. ... Without short-term wins, too many people give up or actively join the ranks of those people who have been resisting change (*ibid.* p. 19).

Likewise, Fairbanks (2000 p. 279) observed that:

People are more likely to change their attitudes and behavior when they see demonstrations of success. ... In any change effort, we need to find examples in which good things happened because of the new vision.

The value of such a strategy for realising the collaborative vision for agri-environmental governance was highlighted in the following terms by Kaye Dalton, an officer of the DLWC located at Deniliquin and formerly the Co-ordinator for the Murray CMC, in her in-depth interview for the case study:

People are still wary about the whole partnership-approach thing. Governments are still suspicious of it. So is the community. You need some examples where it has worked to make people more willing to commit. I think the LWMPs are a reasonably successful example of that. ... Goodwill needs to be developed, not just in the community but in the agencies as well.

Nevertheless, people with mechanistic mental models carried over from the progressive vision can fail to recognise the merit of such a strategy since to do so requires a mind-set predisposed to appreciating the significance of increasing-return dynamics. In the broad sweep of efforts to pursue the collaborative vision for environmental governance, both in Australia and internationally, it seems that the CMR-LWMP program can rightly be viewed as a rare win. However, the following comment from Mr. Keyworth's in-depth interview indicates that there has been a failure to recognise the potential of this win to promote wider commitment to the collaborative vision:

There is nobody marketing the achievements of those plans [i.e., the central-Murray region's LWMPs]. All groups should be celebrating the level of thought that has gone into this, that investments have been made, and that there are now some outcomes from the process which enable all parties to feel confident and proud of the investments they have made.

Moreover, if the tangible benefits from celebrating success are not understood then the people in a position to take the lead in this may not pay the attention to successes that is deserved. The following remark from Professor Musgrave's in-depth interview might appropriately be viewed from this perspective:

... [T]here seems to be a poor appreciation of the significance of what actually has been achieved [in the CMR-LWMP program] in terms of creating institutions for managing common property. ... [T]he leadership of the resource management agencies doesn't seem to understand that something significant has happened here.

Mr. Keyworth, in his in-depth interview, commented in a similar vein that:

Overall, my assessment was and still is that the Murray plans are the most comprehensive LWMPs that I've seen developed anywhere within Australia. ... [O]ne of my great frustrations is that the NSW Government, and to a smaller extent the Commonwealth, doesn't really appreciate how good those plans are.

Hence strong leadership that understands and is committed to the collaborative vision for environmental governance seems essential if this vision is to become widely accepted and followed within the relevant government agencies. As Wondolleck *et al.* (2000 p. 213) observed, the size and unfamiliarity of the requisite changes means that “[i]t is not sufficient for agencies to wait and hope that their employees will take the collaborative ball and run with it”. This conclusion is accentuated further by Innes *et al.* (2000 p. 24) concluding that if commitment to the collaborative vision is to spread:

Public agencies and bureaucrats will have to let go of the usually futile hope of controlling outputs and behavior and participate in collaborative processes, letting them go where they will. ... The new institutional forms will require the acceptance of change and evolution as normal. It will reward experimentation, risk taking and new ideas rather than punish mistakes and stifle creativity. It will require assessing performance by exploring emergent, second order and long term results. It will require giving up on the idea that anyone knows the answers.

While a detailed account of the strategies that the leadership of government agencies might follow in gaining greater commitment by their staff to the collaborative vision is beyond the scope of this thesis, those seeking guidance in this area might refer usefully to the chapter entitled “A primer for agencies” in Wondolleck *et al.* (2000 chapter 12). Their advice to agency leadership is arranged under the five basic principles below:

1. Help staff to imagine the possibilities of collaboration in carrying out important work, building necessary relationships, and generating better decisions.
2. Enable staff to develop and use collaborative arrangements, for instance by enhancing staff capabilities and providing resources and flexibility to those who are already motivated to collaborate.
3. Encourage staff to experiment with collaborative approaches by influencing the attitudes of staff and supervisors and providing incentives to people outside the agency to be involved in collaborative initiatives.
4. Evaluate the effectiveness of differing approaches to promoting and undertaking collaborative arrangements in the agency and how they might be modified.
5. Be committed to the collaborative process and follow through with the agency’s agreements and responsibilities.

11.4.3 *Collaborative capacity within communities*

Government agencies indeed have a “unique and central role in guiding collaborative initiatives” since they “are the only parties that have explicit authorities and responsibilities assigned to them under law” (ibid. p. 213). Nevertheless, the qualitative analysis reported in chapter eight demonstrates that successful community-government collaboration also depends heavily on community leadership that understands and is committed to the collaborative vision, and is trusted too by its constituents.

The existence of such leadership ready-made cannot be taken for granted given the paternalism that has long characterised governmental pursuit of the progressive vision. As illustrated in the case study, the community leadership inherited from a history of paternalistic governance—typically arising in response to perceived government failure associated with this paternalism—may possess neither the mental models, reputations nor networks appropriate for pursuing a collaborative vision. Consequently, collaborative rural leadership:

... is hard to find. ... Because a new, more strategic leadership is urgently needed, those people who are presently involved in rural development must work to encourage local citizens to learn more about leadership and to prepare themselves to play leadership roles in the future (Richardson 2000 pp. 87-88).

This need is beginning to be recognised in the context of Australian pursuit of the collaborative vision through ICM programs (e.g., AACM *et al.* 1995b; Hooper 1999).

The key role that ‘on the job training’ within the CMR-LWMP program, as provided informally by the Project Co-ordinator, played in preparing a new generation of community leaders to operate collaboratively—with each other, with their constituents, and with government—was evident also from the case-study qualitative analysis. For instance, Noel Graham explained in his in-depth interview that although the members of the Cadell CWG were not given formal training in collaborative leadership skills, they did eventually acquire such skills by emulating the example set by the Project Co-ordinator in facilitating open, authentic dialogue and deliberation. This experience accords with the observation of Innes *et al.* (2000 p. 4) that although collaboration requires authentic dialogue, “[w]e are so unaccustomed to [it] in public situations that to create and manage such dialogue typically requires the help of a professional facilitator and special training for participants”.

Nevertheless, learning of a more formal kind may also contribute to developing community leaders who are both committed to the collaboration vision and capable of helping to bring it to fruition. According to Richardson (2000 chapter 4), a successful example of this has been the rural leadership training provided under the auspices of the EPIC (Environmental Programs/Partnerships in Communities) model of rural community development that emerged in the early 1990's in the USA. She claimed that these courses have been successful in providing opportunities to individuals to, *inter alia*:

- “try out new methods and leadership skills in an atmosphere that is supportive”;
- “increase their ability to handle conflict and make decisions ...”;
- “learn how to approach an issue by seeking common ground rather than by using confrontation”; and
- “learn to understand the interconnectedness of all factors in a community and linkages between communities and regions” (ibid. pp. 123-124).

Similarly, formal training of community leaders in the context of Australian ICM programs has been called for by Hooper (1999).

Richardson (2000 p. 134) observed as follows that an important way for community leaders to win new recruits to their vision is to arrange for successes in its pursuit to be celebrated: “Communities will be more likely to accept ideas if they have seen them used effectively by neighbors or in neighboring communities”. As she noted below, celebrations are important too for sustaining the emotional resolve of those communities and individuals already on-board: “Celebration is very important in rural community development, especially where people can tell their stories and exhibit evidence of their accomplishments to others” (ibid. p. 227).

Moreover, “participants are more likely to stick with a project if they not only believe in it but also enjoy it” (ibid. p. 223). Hoggett *et al.* (2000 p. 360) elaborated upon the importance of the emotional aspects of gaining commitment to local collective action as follows:

When people engage in social action they need to be able to bring their emotions with them, not forced to leave them behind. Democracy has to be convivial; a sense of duty and responsibility is no longer enough to sustain people's participation, ‘getting involved’ has to be enjoyable or else the majority just won't bother. Moreover, conviviality builds trust that in turn enables the expression of differences, often in playful or ritualized ways which enable aggression to be harnessed constructively.

Aside from ensuring that successes are celebrated, Richardson (2000) observed from her experience with the EPIC model that a successful rural community leader will also:

- have a collaborative style and bring that attitude to the table;
- identify and address cultural differences and power imbalances;
- run efficient meetings;
- trust others in the group or around the table;
- be open to new ideas and accessible to group members;
- show that she or he is not afraid to make mistakes;
- share his or her vision with others, developing and strengthening it with participant input; and
- know when to step aside and let someone else lead and, moreover, how to do so gracefully.

While capable leadership can undoubtedly help move citizens towards understanding and committing to the collaborative vision, the strength of history's grip on their mental models should not be under-estimated. Some idea of how reluctantly history loosens its grip is given by Putnam's (1993) observation that contemporary differences in the self-governing capabilities of regions of Italy can be traced to a cultural split between the South and North of the country around the year 1100 (associated with the founding of the Norman Kingdom in the South and the communal republics in the North). Although he observed that nationwide decentralisation of governance to the regions in the 1970's has already favourably affected the behaviour of politicians in the South—where regions inherited a markedly lower self-governing capacity as a result of the Normans coming to govern much more hierarchically and paternalistically than did the republics—he concluded that the spread among citizens of the reciprocity they need to govern themselves more self-reliantly will take appreciably longer to become apparent.

Similarly, despite the significant devolution of agri-environmental governance responsibilities to the community in the CMR-LWMP program, the mental models of the farmers there are likely to take considerable time to adapt from having been governed paternalistically. As a result of this history, they previously had little reason to learn how to cooperate spontaneously with one another in meeting their collective needs for agri-environmental governance. Indeed, the negative relationship found in chapter eight between farmers' own intentions to comply with the LWMPs and their trust that other farmers will

comply indicates that the dominant norm by which they are currently interacting in this particular context is one of opportunistic free riding. Thus they still have far to go culturally before reciprocity among them in this context becomes common enough that they are able cooperate more spontaneously in satisfying the on-farm implementation targets set in their Districts' LWMPs.

How realistic is it to hope for a change in Australian farming culture of this kind? Might not the existing lack of reciprocity among farmers within the CMR-LWMP program in fact be symptomatic of an immutable aspect of Australian farming culture? The passage following could be interpreted as providing some support for such a proposition:

Being one's own boss, free to decide how and when to carry out farming operations, is valued highly by many farmers. Some consider this to be the single most important aspect of being a farmer. ... The converse of independence is dependence on others. Some farmers find it hard to adapt to being a member of a team with a different set of responsibilities. Others are not willing to enter into closer working relationships with neighbours for fear of having to reveal details of their business and private lives (Powell *et al.* 1982 p. 153).

Leith Bouilly, the Chairperson of the Community Advisory Council for the MDB Ministerial Council, made a similar point recently when discussing the prospects of establishing collaborative, community-based environmental governance in the MDB through ICM programs. She observed that the vision of farmers solving their environmental problems cooperatively rather than individually:

... challenges the very notion of democracy in this country where rugged individualism is important and valued, becoming wealthy is important and valued, and working together is sometimes seen as a bit soft and perhaps un-Australian. ... Despite this notion of mateship and the myth of communities pulling together, it's very difficult for communities to do that¹¹⁷.

Nevertheless, as the passage following indicates, Australian farmers have been far from universally averse to working together cooperatively. Instead, it seems from the following examples that their willingness to work with one another cooperatively depends importantly on the context:

Traditionally, farm people have needed to work together in busy periods. They have worked together for community improvements; community halls, sports fields, schools and clubs around rural Australia bear witness to the past practice of rural people working together for the common good (ibid. p. 24).

¹¹⁷ Quoted from the television documentary "Water Pressure" broadcast in Australia by ABC TV on 12th March 2001 as an episode of the *4 Corners* series.

As further evidence for the importance of context, the following excerpt indicates that many Australian farmers cooperate by sharing their labour and machinery according to a norm of reciprocity: “Rarely is there any written agreement on the arrangement; it is merely an understanding between the two parties, that is, ‘I’ll help you, you’ll help me’” (ibid. p. 121). It seems therefore that many Australian farmers *have* learned norms of reciprocity and are ready to interact according to such norms when they trust each other, perceive that working cooperatively would bring them greater benefits than working separately, and, importantly, the type of work involved is not one which their values and social norms dictate should be tackled alone.

From this perspective, an important impediment to getting farmers to interact in this way in the specific context of the CMR-LWMP program would seem to arise from their mental models remaining locked-in to the earlier context wherein, firstly, the watertable-related problems addressed by the LWMPs were not yet a threat to their well-being, and, secondly, they assumed governments would monopolise any collective action related to natural-resource-related problems of this kind. The solution to this impediment clearly lies in convincing farmers not only that the watertable-related problems do pose a significant threat to their welfare, but also that the government is genuine in its commitment to devolve collective-action responsibilities and rights to them as a group-property regime—that is, as co-owners of Murray Irrigation.

It is possible too that some farmers may not have learned norms of reciprocity or have some moral objection to following them. Might obstacles of this kind be overcome through civic education? Axelrod (1984) observed that doubts about the morality of reciprocity partly explain the reluctance of citizens to use it as a norm in their interactions with one another. He noted that the Golden Rule—Do unto others as you would have them do unto you—remains a dominant ethic in Western societies like Australia. This implies a norm of unconditional cooperation, since cooperation is what is wanted from others. Hence ‘turning the other cheek’ is considered virtuous, whereas reciprocating non-cooperation is not.

However, turning one’s cheek burdens the rest of the community in two ways (ibid.). Firstly, by leaving non-cooperative or exploitative behaviour unpunished, the likelihood of others in the community encountering such behaviour is increased. Secondly, it transfers the task of reforming non-cooperative behaviour to the rest of the community. Hence he reasoned that reciprocity is superior to unconditional cooperation as a foundation for morality, provided

that the punishment side of reciprocity is exercised in accordance with each community's moral code. As discussed in section 5.2.7, communities following norms of reciprocity typically achieve this accommodation through systems of graduated sanctions based on local standards of fairness.

Axelrod (ibid.) argued accordingly for civic education regarding the advantages of reciprocity as a moral basis for individual behaviour within social dilemmas. In the context of individual cases of agri-environmental governance, such as the CMR-LWMP program, this might appropriately be through group-based exercises which demonstrate to individuals how reciprocity can help to build spontaneous cooperation, and which also provide opportunities for them to discuss how graduated sanctions could be applied within the confines of local notions of morality and fairness. Skills in applying such sanctions without needlessly endangering valued personal relationships might also be developed experientially through a process of this kind. However, in the longer term it would seem more efficient to embed education of this kind within the mainstream educational system. Indeed, Ostrom (1998a p. 18) has argued in this spirit that:

... we need to translate our research findings on collective action into materials written for high school and undergraduate students. ... It is ordinary persons and citizens who craft and sustain the workability of the institutions of everyday life. We owe an obligation to the next generation to carry forward the best of our knowledge about how individuals solve the multiplicity of social dilemmas—large and small—that they face.

In any case, it seems from the foregoing discussion that recent policy proposals in respect of building the capacities of local communities to collaborate effectively in Australian environmental governance have been conceived too narrowly. For instance, the recent National Action Plan for Salinity and Water Quality (CoA 2000b p. 4) states that:

Capacity building in communities requires:

- reorienting the facilitator and coordinator support network ...
- develop management and technical skills of land managers and other stakeholders to ensure wider adoption of sustainable land and water use and to enhance the capacity of communities to prepare, evaluate and monitor the progress on integrated catchment/regional management plans ...
- extending information to communities ... so that they can effectively develop and implement their plans; and
- developing (where they do not exist) appropriate catchment/regional delivery bodies/arrangements to implement the plans.

Such initiatives undoubtedly have significant roles to play, but they do not adequately address the underlying cultural reasons offered in this thesis for the continuing difficulties being experienced in attempting to win the commitment of civil stakeholders, including farmers, to the collaborative agri-environmental vision. Perhaps most notably, this proposed list of initiatives fails to acknowledge that building the capacity of civilians to contribute spontaneously to their own governance depends vitally on building their trust in others—other civilians, as well as government agencies—that they require if they are to practise the reciprocity upon which their capacity to cooperate spontaneously with each other seems ultimately to depend.

From this perspective, it is clear that the capacity of civil stakeholders to pursue the collaborative vision is linked inextricably with the capacity of governments to do the same. It is therefore unrealistic for government agencies lacking the mental models, cultural sensitivity and interpersonal skills required to collaborate authentically with civil stakeholders to expect their collaboration efforts to win greater trust from those stakeholders.

It follows that it is necessary to begin thinking in terms of building the *whole-of-society* capacity to pursue the collaborative vision for agri-environmental governance. This undoubtedly is an ambitious agenda, not least because it entails governments eradicating the lingering paternalism that has led them to presume complacently that only they are fully equipped already to play their part in effecting a successful transition to the collaborative vision.

11.5 Implications for research

The key lessons drawn in section 11.4.1 from the case-study findings, together with their policy implications as explored in sections 11.4.2 and 11.4.3, offer a further reminder of the complexity that lies ahead for governments and communities intent on pursuing the collaborative vision for agri-environmental governance. As observed in section 11.1, adaptive management is widely acknowledged to be the appropriate strategy for acquiring the knowledge needed to cope with complexity of this kind. Nevertheless, the scope until now to scientifically apply adaptive management in pursuit of the collaborative vision has been limited by the lack of a coherent theoretical framework upon which this endeavour, and particularly the hypothetico-deductive method it would involve, might plausibly be founded.

As discussed in section 11.3, the case-study research undertaken for this thesis has provided qualitative and quantitative support for the argument that the emerging second-generation theoretical framework for rational-choice analysis of collective action is well-qualified to serve as such a foundation in Australian agri-environmental contexts.

It seems therefore that we now have somewhere plausible from which to begin scientific application of adaptive management to the immense complexity inherent in bringing the collaborative vision for agri-environmental governance to fruition across a wide diversity of settings. Nevertheless, how should we proceed from here? If adaptive management involves treating institutional initiatives as experiments to be learned from, what is the best way for us to learn from institutional experiments in respect of collaborative agri-environmental governance?

Clearly, research has a vital role to play in facilitating the exchange of feedback upon which depends the ability of communities and governments to learn from particular institutional experiments in this domain. Seeking out, recording and organising this feedback so that it can be drawn upon selectively to help design new generations of experiments would seem to be too demanding a project to thrust solely upon the people caught up in the hurly-burly of designing and implementing particular policies.

This point is illustrated by the following response from Professor Musgrave when he was asked, in his in-depth interview for the case study, how effectively the NSW Government had learned from its experiences with collaborative environmental governance:

I get the impression that the capacity of government to articulate lessons learnt and to make generalisations about its experience is very limited. That's because of the demands on it, its lack of resources. Universities have an important role in this respect, in making generalisations and being reflective about experience. Also independent reviews have an important job in this respect. They do serve to record, to analyse and generalise, to an extent that communities and governments are unable to. Agencies don't have the time. They're too busy putting out bushfires.

What approach should researchers follow in pursuing this role? Treating Australian institutional experiments in collaborative agri-environmental governance as subjects for case-study analysis would appear to offer a sound basis for such an approach. There is a diversity of qualitative and quantitative methods available for such analysis, including those used in this thesis. Indeed, at this early stage it seems advisable to experiment with which of these methods are most productive in yielding the types of knowledge sought.

In any event, some system of systematically bringing together and organising the knowledge gained from particular case studies, so that it can later be analysed as required by the unique contexts of prospective new institutional experiments, is clearly needed too. One reason is simply the need to keep the transaction costs of locating relevant knowledge affordable. Another is the need for researchers to share a common language. As Ostrom (1986 p. 4) has warned, “[n]o scientific field can advance far if the participants do not share a common understanding of key terms in their field”. Institutional analysis has been, and will continue to be, a multi-disciplinary research endeavour, so co-ordinating a common language is more challenging than is the case in other fields of research where inter-disciplinary cooperation is less essential. A third reason is that, given the limited resources available for research, such a knowledge system would be valuable for identifying where knowledge gaps are currently most critical, and thus which types of institutional experiments would yield the most useful knowledge.

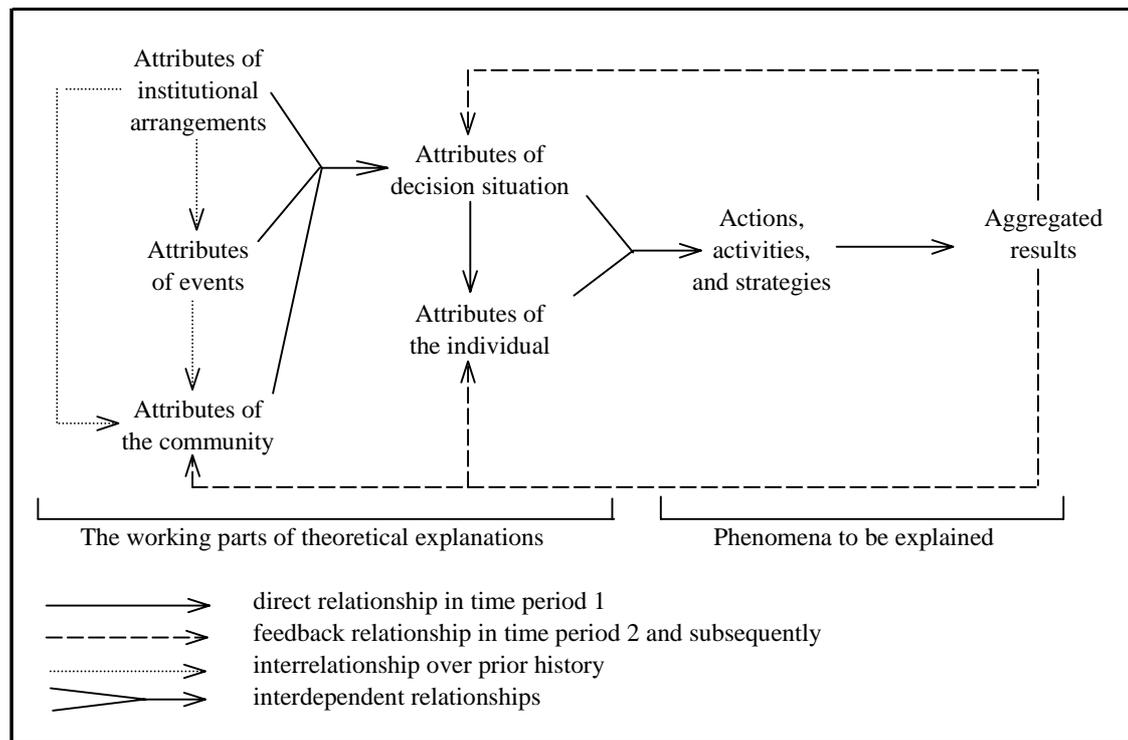
The Institutional Analysis and Development (IAD) approach appears to be an appropriate framework within which to organise the knowledge acquired through case studies of Australian experiences with collaborative agri-environmental governance. The IAD approach was first developed in the early 1970’s in the USA to help understand how different paradigms of political science influenced conceptions of public administration and metropolitan organisation (Ostrom 1972; Ostrom *et al.* 1971). Since the late 1980’s it has been used as a meta-theoretical framework for linking formal models of appropriation of CPRs with multi-disciplinary empirical research conducted in both field and laboratory settings (McGinnis 1999; Ostrom *et al.* 1994d). For instance, in Ostrom’s (1990) *Governing the Commons* it was used influentially to elucidate the design principles shown in table 5.1 characterising self-reliant organisations that are long-enduring and have fostered sustainable use of CPRs.

Kiser *et al.* (1982 p. 180, original emphasis) have explained that the IAD framework “is *metatheoretical*, because it describes the array of elements that are used in specific theories about institutions rather than presenting a particular theory”. The framework is congruent with second-generation developments in the rational-choice theory of collective action in so far as “it starts from the individual as a basic unit of analysis to explain and predict individual behavior and resulting aggregated outcomes”, is primarily concerned with “patterns of human action and the results that occur in interdependent choice-making situations ...” and accounts explicitly for formal and informal institutional arrangements

(ibid. p. 181). Thereby it offers a framework for institutional design, “enabling us to analyze how rules interact with the physical and biological world, and culture, to condition the behavior of individuals, and produce social and environmental outcomes” (Ostrom 1998b p. 84).

The IAD framework has five “working parts”, including (i) the decision maker, (ii) the community affected by interdependent decision making, (iii) events (or goods and services) that interacting individuals seek to provide and appropriate, (iv) institutional arrangements guiding individual decisions, and (v) the decision situation in which individuals make choices (Kiser *et al.* 1982 p. 182). Analysts are free to select appropriate assumptions about the attributes of each working part. The relationship within this framework among the five working parts, actions, and outcomes is shown in figure 11.1.

Figure 11.1: The Institutional Analysis and Development framework



Source: Kiser *et al.* (1982 p. 187, figure 7.1).

Considerable progress has been made in developing taxonomies for each of the working parts (Kiser *et al.* 1982; Ostrom 1986; 1998b). Aspects of the taxonomy developed for institutional arrangements have been discussed previously in sections 3.5.3 and 5.3.5. This taxonomy has been distilled from hundreds of case studies describing the governance of local CPRs around the world. Based on this taxonomy, structured coding forms have been developed to classify particular institutions as they are found in the field (Ostrom 1999).

Ostrom (1998b) has provided a succinct overview of the variables upon which the taxonomies for the other working parts are based. For instance, the decision maker (or actor) is specified by four clusters of variables: the resources that the actor brings to the situation; the actor's valuations of states of the world and of actions; the actor's knowledge and information, and capabilities for acquiring, processing, retaining, and using knowledge and information; and the actor's method of action selection. Variables by which community attributes are classified include: social norms; the level and nature of common understanding shared by potential participants; the extent to which people living in the community have homogeneous preferences; and the distribution of resources. As a final example, the attributes by which events (or goods) are distinguished include their rivalry, excludability, and measurability.

In the research agenda envisaged here, taxonomies of these kinds would be elaborated in accordance with Australian contexts. They would then be applied to organise the data obtained in existing case studies of collaborative agri-environmental governance, such as the one undertaken for this thesis. Data from new case studies would be recorded similarly so that incrementally an accessible database of Australian experience with experiments in this domain would be compiled. In this way, three major international databases (not including Australia) for the study of CPRs and their governance systems have been developed from the IAD approach (Ostrom 1998b).

Hence the research agenda proposed here involves extending this major international research effort into Australian contexts. While the lessons emerging from the international effort are clearly instructive, they also demonstrate the critical importance of matching institutions to local context. Thus in the context of efforts to pursue the collaborative vision for environmental governance through ICM programs, Hooper (1999 pp. 2-3) has observed that:

Australians are slowly moving towards an indigenous form of catchment management ... There is a limit to how much we can depend on international approaches and techniques, since it has been amply demonstrated that Australian hydrology is different from that of other countries; our political and administrative structures and the very scale of our catchments introduce other difficulties.

Furthermore, the research agenda outlined here is consistent with a number of the key research themes identified in a recent review for the Land and Water Resources Research and Development Corporation (now Land and Water Australia) in respect of the present and future challenges for environmental governance in Australian rural areas (Mobbs *et al.*

1999). For instance, one key theme involves:

Comparative analyses of alternative policy instruments under varying conditions. ... We have ... too much advocacy for specific instruments as being appropriate across the board. Clearly, different mixes of instruments will be more effective at different times and for different purposes. The aim would be to isolate key attributes of instruments and problem settings that make effectiveness either more or less likely (ibid. p. 130).

Another theme that would clearly be furthered by putting the proposed agenda into effect is concerned with “[r]esearching and proposing possible ‘meta-arrangements’ to ... enhance policy and management learning across sectors, problems and jurisdictions” (ibid. p. 130).

Application of the IAD approach as proposed here would facilitate the data triangulation required if information about past experiments in collaborative agri-environmental governance is to slowly yield the theoretical knowledge needed for adaptive management to proceed with greater intelligence and less blind optimism. It would do so by providing a common language that would enable different experiences in this domain to be compared and contrasted at a fine scale of resolution. Of course, it cannot be denied that theorising of this kind takes place in “a complex, difficult, and changeable academic terrain” (Kiser *et al.* 1982 p. 181). In the context of ICM-type (‘watershed’) programs in the USA, Born *et al.* (2001) have observed accordingly that:

An enormous array of factors can influence the success of watershed partnerships. [Numerous investigators] have conducted research on partnerships in attempts to discern and clarify the relationships between characteristics, actions, and outcomes. ... Researchers and practitioners have applied numerous analytical approaches to this problem ... and have lumped, split, and re-divided their lists of critical factors myriad ways. The reality remains that the watershed community does not fully understand which factors are critical in various circumstances or how factors interact to influence accomplishments.

The questions motivating the research agenda being suggested here relate specifically to the effects of structural variables, including institutional arrangements, on the level of cooperation and resulting net benefits likely to occur in providing the kinds of CPRs with which ICM programs addressing agri-environmental issues is concerned. Some idea of the multitude of structural variables influencing the performance of ICM programs, and of the complexity of their interaction, was provided in section 7.2. For reasons given in section 4.6, it is simply not feasible to relate all structural variables of this kind in a single causal theory.

As discussed too in section 7.2, the way forward in modeling such complexity formally would seem to be through developing cumulative theoretical scenarios, starting with the core model that has arisen from second-generation attempts by rational-choice theoreticians to explain large-group collective action. This core model posits mutually-reinforcing relationships between trust, reciprocity and cooperation. Hence structural variables (including specific aspects of the general factors listed in table 7.1, such as group size, homogeneity of preferences, symmetry of resource distribution, potential for face-to-face communication, etc.) relevant to a particular setting would be introduced to the core model sequentially, with the predicted effect on cooperation revised at each step. Field testing of the formal models arising from this process would clearly be facilitated by the availability of an extensive IAD-type database of case studies of relevant real-world experience, such as is envisaged for Australia in the research agenda proposed here.

Nevertheless, the theoretical models emerging from such a process would be nowhere near as tidy as those to which modern scholars have traditionally aspired. Moreover, dividends from surrendering this aspiration in an effort to deal more realistically with the complexity of collective action in Australian agri-environmental contexts are far from certain.

As highlighted by the remark following from Ostrom *et al.* (1999 p. 282), success in this venture will depend on how clever we can become at organising ourselves to learn from complexity as it unfolds around us: “In the end, building from the lessons of past successes will require forms of communication, information, and trust that are broad and deep beyond precedent, but not beyond possibility”.

11.6 *Concluding comments*

Despite the frustrations experienced in Australia and elsewhere in realising the collaborative vision for agri-environmental governance, the results of the case study suggest that blame for lack of progress lies not with the vision but rather with the *ad hoc* approach typically followed in its pursuit. Leading change from one vision to another is invariably difficult, and the difficulties are multiplied in the case of the collaborative vision since the people upon whom the change depends are spread across different levels of government, different government agencies, and different sections of the community.

Consequently, it is not sufficient to persevere with a belief that the knowledge needed to effect this change is either common sense or can be obtained anecdotally. Knox *et al.* (2001

p. 32) remarked accordingly that:

Although devolution of rights to local users of natural resources is gaining greater acceptance and recognition in the international community, implementation has yet to become widespread in most countries that have opted to embark on this path. If substantial progress is to be made in transferring rights, research efforts on devolution will have to be stepped up. Otherwise, the risks of venturing into unknown waters may limit government action, or lack of guidance contributes (sic.) to implementation failures.

Given the inherent complexity of devolving agri-environmental governance so that it becomes more of a collaboration between government and community, the most appropriate strategy for such research is one of adaptive management. In this strategy, each attempt to pursue the collaborative vision is regarded as an experiment yielding lessons to be used in incrementally refining a theory of collaborative agri-environmental governance—a theory that can be applied in turn to guide the planning and implementation of subsequent experiments. The case study undertaken for this thesis supports the findings of previous empirical research undertaken outside Australia that a framework that accounts for the increasing-return dynamics of collective action offers a more plausible foundation for such a theory than the comparative-static framework which remains influential among policy analysts and advisers.

Finally, it is evident that successful pursuit of the collaborative vision for environmental governance requires some systemic cultural shifts within government as well as communities. However, as discussed in section 2.5.6, strategies developed recently by Australian governments for furthering this vision are concerned only with developing community capacity to collaborate—as if the collaborative capacity within government were irrelevant or already adequate.

Given that the need to enhance government capacity of this kind has been raised in studies of Australian ICM programs since at least 1995, the reluctance of governments to acknowledge and address this need appears likely to constrain pursuit of the collaborative vision for some years yet. If the reason for this reluctance is to be found in Woodhill's (1997 p. 4) hypothesis that in this era of "risk society" governments are afraid of the political consequences of giving up "charades of being in control" (see section 2.5.5), then it seems there is a pressing need for leaders within governmental and civil spheres to work together in order to find a way out of this bind.

12. CONCLUSION

Every moral has a story. Every story has an end. (Ben Harper, *Glory & Consequence*, 1997).

12.1 *Summary of the thesis*

Attempts in Australia to shift to a collaborative vision for agri-environmental governance began in the 1980's. According to this vision, collaboration in developing solutions to problems leads collaborators to cooperate more spontaneously in implementing them. Enthusiasm for the vision was prompted by a broad consensus among policy makers and landholders that the existing progressive vision had, since its adoption in the late 1930's, distinctly failed to deliver on the optimism of its advocates. As stated matter-of-factly by Bradsen (2000 p. 274), "in the period up to the 1980s, land management and land degradation programs [in Australia] lost their way".

Nevertheless, after over a decade of attempts to operationalise the collaborative vision through ICM and related programs, there is mounting disquiet that agri-environmental problems still seem to be arising faster than they can be solved. Meanwhile, advocates of the collaborative vision have lacked an empirically-grounded theory with which to convince sceptics that it remains achievable and to structure the learning required to realise its potential.

Adaptive management is gaining acceptance in Australia as the appropriate strategy for this learning. However, its treatment of institutional initiatives as experiments to be learned from does not guarantee that learning will occur. Only to the extent that institutional experiments are used to test hypotheses deduced from theory will they generate knowledge and theoretical development rather than incoherent experience.

Accordingly, the research performed in this thesis focussed on the need to identify a theoretical framework with which to systematically begin scientific pursuit of collaborative agri-environmental governance in Australia. Rather than developing new theory, the theoretical contribution of this thesis involved: (a) screening existing rational-choice theory according to its likely applicability to this particular domain of governance; (b) synthesising the theoretical ideas found to be applicable into a coherent theoretical framework; (c) exploring empirically the applicability of this framework to a particular Australian agri-environmental context; and (d) elaborating how this framework applies to this context.

Pursuit of (d) was concerned particularly with how the abstract constructs (e.g., trust) comprising the theoretical framework connect with the multitude of specific structural variables (e.g., authenticity of opportunities for community members to collaborate in governance, cultural homogeneity of community members, capacity of government to resource a collaborative program, etc.) operative in a specific context.

A start on this agenda was made in chapter three, by examining the contribution that the comparative-static, or ‘first-generation’, approach to rational-choice analysis of collective action might make to such a theoretical framework. It was found that comparative-static analyses predict that spontaneous cooperation among members of large groups is impossible. This remains the case even when group members are assumed to have collaborated so successfully that they all agree to cooperate and on how to cooperate. Accordingly, the unavoidable conclusion from this theory is that the collaborative vision is a pipe dream and its sceptics have been right all along.

Chapter four started by observing that the comparative-static prediction is contradicted by numerous real-world instances of non-zero spontaneous cooperation in the provision of collective goods. The inability of comparative-static analysis to account for such instances was found to follow from its neglect of the positive-feedback, or increasing-return, dynamics of collective action. It was demonstrated that once such dynamics are endogenised and individuals are acknowledged to be boundedly rational, it becomes possible to explain large-group spontaneous cooperation evolving through a virtuous cycle of positive feedbacks between reciprocity, cooperation and trust.

Nevertheless, it was recognised that providing the feedback required by group members to assess one another’s trustworthiness typically entails a further social dilemma. The discussion turned to considering how humans have adapted biologically (e.g., by inheriting epigenetic rules) and culturally (e.g., by learning heuristics and social norms) to the challenges presented by this further dilemma.

The role of hierarchical organisation, including government, in supplementing the feedback (e.g., monitoring and sanctioning) members of large groups are capable of spontaneously providing for themselves was explored in chapter five. It was found that the introduction of hierarchy creates new ‘vertical’ social dilemmas. Moreover, it was argued that these vertical dilemmas become intractable in democratic societies unless most of the citizenry are prepared to cooperate spontaneously with attempts by governments to exercise the coercive

powers delegated to them. That is, the transaction costs of effective hierarchical governance become diminishingly affordable the less that citizens trust the hierarchy sufficiently to cooperate conditionally with it by way of reciprocity.

It follows, it was argued, that there are significant advantages to be gained from fostering the endogenous emergence of hierarchy ‘from the bottom up’ compared with imposing it—as is generally the case under the progressive vision—‘from the top down’. These advantages include the greater likelihood under the bottom-up strategy of: (i) hierarchy remaining sensitive to the soft culture (including preferences, mental models and norms) of citizens and thus gaining, or at least maintaining, their trust; and (ii) augmenting, or at least conserving, the human and social capital upon which citizens depend if they are to cooperate spontaneously with one another.

Empirical evidence from democratic nations including Australia that trust by citizens in their governments is in decline suggests that these advantages are becoming increasingly valuable. Indeed, this evidence offers a plausible explanation for the emergence in Australia of a collaborative vision of agri-environmental governance which especially emphasises including civil or ‘community’ stakeholders actively in the governance process.

A further key conclusion in chapter five was that the appropriate efficiency criterion for choosing between organisational alternatives in the context of agri-environmental governance is adaptive efficiency, especially when sustainable development is an avowed social aspiration. Unlike allocative efficiency, the criterion of adaptive efficiency recognises the implications of bounded rationality in so far as complexity in choosing between organisational structures means that the choice made will rarely turn out to be the one that solves the organisational problem most cost-effectively. It recognises too that increasing-return dynamics resulting from the choice will constrain subsequent choices by way of path dependency. Hence it is probable that any process of organising collective action, including hierarchically, will become locked-in to an inferior path.

The criterion of adaptive efficiency requires that differences between organisational options in terms of susceptibility to lock-in, and thus of their consequences for dynamic transaction costs, be taken into consideration in current decisions about how collective action should be organised hierarchically. It recognises too that particular organisational choices influence the overall supply of organisational experimentation within a society, as well as the extent to which feedback therefrom becomes widely and accurately disseminated. Hence

organisational choices in one period can have important implications for the flexibility with which a society can adapt as new problems arise in subsequent periods. Present efforts to shift to a collaborative vision for agri-environmental governance can accordingly be regarded as motivated by an emerging sense that the progressive vision has led us down an organisational path the adaptive efficiency of which has become unacceptably low.

The insights outlined above from chapters four and five correspond with what has become known as a 'second-generation' theoretical framework for rational-choice analysis of collective action. Examining the applicability of this framework to an innovative Australian case of collaborative agri-environmental governance constituted the empirical research undertaken for the present thesis. This examination involved application of the case-study approach to research. The case examined was the central-Murray region's LWMP program.

Documentation relating to the LWMP program's natural and cultural context, as well as its rationale, design and implementation, was reviewed in chapter six. The particular research strategy followed in the case study was justified and detailed in chapter seven. This strategy comprised an interactive program of qualitative and quantitative research. The qualitative research was based on in-depth interviewing of individuals identified as key informants in respect of the experience of designing, running and/or participating in the program. The quantitative research involved ordered-probit regression analysis of data collected from a sample survey of farmers affected by the program.

Findings from the qualitative analysis were presented in chapter eight, and findings from the quantitative analysis were discussed in chapters nine and ten. The overall findings of the case study were summarised and integrated in chapter eleven. Hence it is necessary at this point only to repeat the main finding, namely that the case study provides persuasive empirical support for the proposition that the emerging second-generation framework of collective-action theory is congruent with the actual experience of collective action within the central-Murray region's LWMP program.

The implications of the case-study findings for policy development in respect of ongoing pursuit of the collaborative vision for agri-environmental governance were also explored in chapter eleven. The most important of these is that this vision is not necessarily a pipe dream as would be deduced from the first-generation approach to analysing collective action.

Nevertheless, considerable frustration has clearly been experienced in attempting to realise the collaborative vision. The main source of frustration seems to be a failure to

appreciate the extent to which the progressive vision has become locked-in as a consequence of Western cultures for centuries having coevolved subject to the selection pressures resulting from pervasive adherence to this vision. This means *inter alia* that predominantly the mental models of individuals, regardless of whether located within the governmental or civil sphere, currently remain biased against recognising the adaptive inefficiencies of the progressive vision.

Mental models inherited from the longstanding dominance of the progressive vision also present a barrier of another kind to realising the collaborative vision. These mental models effectively leave people blind to the benefits available from converting to the latter vision. The reason is that the potential of the collaborative vision cannot be grasped without appreciating the significance of positive-feedback or increasing-return dynamics. The progressive vision effectively disregards such dynamics. Consequently, it is not at all surprising that the *ad hoc* efforts so far to effect conversion to the collaborative vision for agri-environmental governance have yielded so much frustration and so little of the intended upsurge in spontaneous cooperation within this domain.

12.2 *Chasing the collaborative vision: Odyssey or folly?*

To summarise, it seems we are caught in a situation where (a) many people feel that continued pursuit of the progressive vision for agri-environmental governance would not be adaptively efficient; (b) they are hoping, implicitly at least, that an alternative vision will emerge that yields greater adaptive efficiency; yet (c) their mental models remain strongly influenced by the progressive vision and, accordingly, are biased against believing that an alternative vision such as the collaborative vision could yield greater adaptive efficiency.

The way to overcome this lock-in of progressive mental models that is working against gaining people's belief in the collaborative vision would appear to be through leadership. As discussed in section 4.5.4, the function of leaders is to facilitate "the convergence of the hopes of their followers into a 'vision' which they can share in common" (Wallis *et al.* 1995 p. 41). It was observed there too that hope is triggered by beliefs of how life could be. It follows that the role of leaders in gaining the wider population's commitment to the collaborative vision is to (a) gain enough understanding of how this vision might be realised to be able to believe in it themselves; and (b) implement strategies to transfer their own belief to their followers in order to facilitate convergence of their followers' hopes into this

vision.

Leadership strategies for inspiring belief and hope in followers come in many forms. Nevertheless, a few remarks especially relevant to agri-environmental governance may be useful here. Firstly, both governmental and civil leaders need to convince the wider population of why the progressive vision has become adaptively inefficient. It is not sufficient to expect followers to simply accept announcements ‘from high’ that this is the case. To truly convince people will often necessitate engaging them in processes of democratic deliberation which allow the progressive mental models they accept as facts to be identified in order that they may be respectfully challenged. However, experience shows that another powerful strategy for convincing people to commit to a new vision is to expose them to successes it has yielded already.

A further strategy might be provision of education and training. These clearly play a vital role in equipping people with the knowledge and skills they require to contribute to and prosper from—and thus to invest hope in—realisation of the collaborative vision. A vital step in this direction would be to ensure that new generations of both citizens and government staff are educated with the knowledge of ‘civics’ they require if they are to become engaged fruitfully in collaborative agri-environmental governance. Clearly, another important step is to ensure that upcoming generations of social scientists and policy analysts are educated with an understanding of how increasing-return dynamics can, under conducive circumstances, allow some degree of collective action to emerge spontaneously.

A major obstacle typically faced in persuading people to relinquish the progressive vision is that many of the institutions still in place coevolved with that vision. These inherited institutions thus remain supportive of behaviours adapted to the progressive vision. A particular challenge in this respect is evident in the reluctance of many professionals to commit themselves to the collaborative vision’s adaptive-management approach to policy development. This is because such a commitment would necessitate them abandoning the mechanistic, or rational-comprehensive, approach upon which the progressive vision was founded. This approach presumes that any problem can be understood comprehensively and solved with predictable results.

Due to the longstanding emphasis on the rational-comprehensive approach, it is not surprising that our inherited institutional arrangements tend to reward most those professionals who execute this approach most convincingly. Hence, aside from the reason of

many people's mental models remaining locked-in to the progressive vision, reluctance to farewell this vision can also be explained by "the political and professional kudos available from pretences of certainty" (Dovers 2000b p. 7).

This source of reluctance can be expected to persist until the offending institutions, within both the governmental and civil spheres, are superseded. Leadership within both spheres clearly has a vital role to play in effecting the requisite reform of institutions, both formal (e.g., official promotion criteria) and informal (e.g., social norms bestowing professional prestige). An important strategy for leaders attempting to change informal institutions involves 'role-modeling' the desired behaviour. As Kotter (1995 p. 64) has observed, "[c]ommunication comes in both words and deeds, and the latter are often the most powerful form. Nothing undermines change more than behavior by important individuals that is inconsistent with their words".

Nevertheless, such attempts at leadership will only catalyse opposition norms and founder unless they account for the culturally-inherited attachment of much of the populace to the progressive vision's pretence that the knowledge required to solve our environmental problems is settled. Dovers (2000a p. 6) remarked accordingly that "[t]aking an adaptive approach, the hardest challenge is the psychological one of accepting what we do is experimental ...". Put another way, "[b]eing settled was comforting, being unsettled is discomfoting" (Dovers 2000b p. 14).

The heralded transition to a collaborative vision for Australian agri-environmental governance can thus be regarded as a cultural odyssey. The challenge for our leaders is to persuade enough of us, in both the civil and governmental spheres, that the discomfort of departing settled cultural terrain will turn out to be worthwhile. Although the odyssey's destination is unknown, some idea of what we might experience, and how we might change, along the way is hinted below:

We are still settling Australia ... Not as settlement-as-event, especially not as event past as taught in much history, but settlement-as-process. So a continued dreaming and restiveness are not to be unexpected, but nurtured into an exciting, inquisitive exploration of purpose and direction. To accept that Australia was not 'settled', that we can never say 'that's settled, then', changes the nature of the game. The quest needs to be underpinned by the humility of admitted ignorance, not the hubris of knowing, by contingency planning not certainty, and by open, learning approaches rather than done deals and neat fixes ... Settlement ongoing provides space for lots of lives and experiments, all with their use-by date, all with their potential yield of lessons (ibid. pp. 12-13).

APPENDICES A AND B

APPENDIX A: Transcripts of in-depth interviews

This appendix can be found in the file Appendix A.DOC which is included in the compact disk enclosed in the rear-cover pocket.

APPENDIX B: Interview schedule used for the quantitative research

This appendix can be found in the file Appendix B.DOC which is included in the compact disk enclosed in the rear-cover pocket.

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